MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

Please find enclosed Amendment 19, effective 28 November 2019, to the Acceptable Solutions and Verification Methods for Clause B1 Structure of the New Zealand Building Code. The previous amendment to the B1 Acceptable Solutions and Vertification Methods was Amendment 18, in June 2019.

Section	**Previous Amendment**	**November 2019 Amendment 19**
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Document Status

The most recent version of this document (Amendment 19), as detailed in the Document History, is approved by the Chief Executive of the Ministry of Business, Innovation and Employment. It is effective from 28 November 2019 and supersedes all previous versions of this document.

The previous version of this document (Amendment 18) will cease to have effect on 31 March 2020, except for the Definition of Good ground in B1/AS1, which will cease to have effect on 29 November 2021.

People using this document should check for amendments on a regular basis. The Ministry of Business, Innovation and Employment may amend any part of any Verification Method or Acceptable Solution at any time. Up-to-date versions of Verification Methods and Acceptable Solutions are available from www.building.govt.nz

B1: Document History

	Date	Alterations	
First published	July 1992		
Amendment 1	September 1993	p. ix–xii, References p. 1, 1.3, 1.4.1–1.4.3, 2.1, 2.2, 3.1–3.3, 4.1, 5.1 p. 2, 6.1, 6.2, 8.1, 9.1 p. 4, 11.1, 12.1 p. 5, 1.2, 2.1, 2.2, 3.1, 3.2,s 4.1, 4.2, 6.1, 6.2, 7.1	p. 9, 1.0.1, 1.0.5 b) c) p. 10, 2.3.5 p. 13, Figure 4 p. 14, 2.3.6 p. 16, 2.3.8, 2.3.9 p. 34, Table 1 p. 47, 1.0.1 pp. 49-54, Index
Amendment 2	19 August 1994	pp. i and ii, Document History pp. vii and viii, Contents pp. x and xi, References p. xiv, Definitions p. 1, 1.4.2, 5.1 p. 2, 6.1 p. 5, 1.3, 3.1, 4.1 p. 6, 7.1 p. 10, 2.3.5 p. 12, Figure 3 p. 13, Figure 4 p. 14, 2.3.6, 2.3.7	p. 15, Tables 4 and 5 p.16, 2.4.1 p. 21, Figure 2 p. 22, Figure 3 p. 32, 2.2.4 p. 33, 1.0.2 p. 34, 3.2.1, Table 1 p. 35, 4.1, 4.1.2, 4.1.3, 4.2.1, 4.2.2, 4.3, 4.3.1, 5.0.1, Table 2 p. 36, 6.1.2, 7.1, 7.1.1 p. 37, 7.3.4 pp. 49, 50, 51, 54, Index
Reprintedincorporating Amendments 1 and 2	October 1994		
Amendment 3	1 December 1995	p. ii, Document History p. ix, References p. 1, 3.1	p. 5, 6.2 p. 50, Index
Reprinted incorporating Amendments 1, 2 and 3	July 1996		
Amendment 4	1 December 2000	p. ii, Document History pp. vii and viii, Contents pp. ix – xii, Revised References pp. xiii and xiv, Definitions	pp. 1–4A, Revised B1/VM1 pp. 5 and 6, Revised B1/AS1 pp. 33–63, Revised B1/VM4 p. 65, Revised B1/AS4 pp. 67–72, Revised Index
Erratum	9 February 2001	p. 46, 4.3.2 a) i)	
Amendment 5 incorporating Erratum	1 July 2001	p. 2, Document Status p. 3, Document History p. 7, References	p. 41, 1.7.2 Comment p. 49, 2.2.4 p. 48, 1.9.1 b) i)
Amendment 6	1 March 2005	p. 11, References	
Amendment 7	1 April 2007	pp. 11–12, 14, References pp. 15–16, Definitions	p. 18, 6.1

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Amendment 8	1 December 2008	p. 2, Document Status p. 3, Document History p. 9, Contents pp. 11–14, References pp. 15–16, Definitions	pp. 17–22B, B1/VM1 p. 51, B1/VM4 1.0.5, 2.0.1 p. 56, B1/VM4 Figure 2 p. 70, B1/VM4 B1.0.2 pp. 83–84, 86 Index
Amendment 9	30 September 2010	pp. 2–3, Document History, Status, pp. 11–14, References p. 20, B1/VM1 2.2.13 p. 21, B1/VM1 3.0, 5.1 pp. 22–22B, B1/VM1 11.0 pp. 23–24, B1/AS1 6.0, 6.1, 6.2, 6.3, 6.4, 7.1, 7.2, 7.3, 7.4	p. 27, B1/AS2 1.0.5 p. 44, B1/AS3 1.7.9 p. 47, B1/AS3 1.8.5, 1.8.6 p. 49, B1/AS3 2.1.1, 2.2.4 p. 63, B1/VM4 4.3.2 p. 67, B1/VM4 5.3.1
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Amendment 10 (Canterbury)	Effective from 19 May 2011 until 31 January 2012	p. 9, Contents p. 12–14, References p. 15, Definitions p. 17, B1/VM1	p. 20, B1/VM1 2.2.14A to 2.2.14D pp. 23–23C B1/AS1 1.4, 2.0, 3.0, 4.0 p. 48, B1/AS3 1.9.3 p. 84, Index
Amendment 11	Effective from 1 August 2011 until 14 August 2014	p. 9, Contents p. 11–14, References p. 17–22B, B1/VM1 1.0, 2.0, 2.2.9, 2.2.14C, 5.2, 6.1, 7.1, 8.1, 12.1, 13.0	pp. 23–24, B1/AS1 1.2, 2.0, 3.0, 4.0, 7.0, 8.0, 9.0 pp. 27–34, B1/AS2 pp. 83–87, Index
Amendment 12	Effective from 14 February 2014 until 31 May 2016	p. 9, Contents pp. 11–13, References pp. 15, 16, Definitions pp. 17, 18, 20, 22, 22A, 22B, B1/VM1 2.1, 2.2.6, 2.2.11, 5.2, 9.0, 12.1	pp. 23–23C, 24 B1/AS1 1.1, 1.2, 2.1.1–2.1.10, 3.1.9, 4.1.5, 8.0, 9.0 p. 79 , B1/VM4 C11.0
Amendment 13	Effective from 1 June 2016 until 30 May 2017	p. 13, References	p. 24 , B1/AS1 7.3.3, 7.3.4
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Amendment 18	Effective from 27 June 2019 until 31 March 2020 except for Definition of Good ground in B1/AS1 (effective until 29 November 2021)	p. 9 Contents pp. 12, 14A References pp. 21, 22A B1/VM1 3.1.1, 3.1.2, 5.3	pp. 23, 24 B1/AS1 1.1, 9.0 p. 84 Index
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Amend 4 Dec 2000

Amend 11 Aug 2011

References

For the purposes of New Zealand Building Code compliance, the acceptable New Zealand and other Standards, and other documents referred to in these Verification Methods and Acceptable Solutions (primary reference documents) shall be the editions, along with their specific amendments, listed below. Where the primary reference documents refer to other Standards or other documents (secondary reference documents), which in turn may also refer to other Standards or other documents, and so on (lower order reference documents), then the applicable version of these secondary and lower order reference documents shall be the version in effect at the date these Verification Methods and Acceptable Solutions were published.

Amend 12 Feb 2014

Amend 7 Apr 2007

Amend 12 Feb 2014

		Where quoted
Standards New Zealand		
Amend 16 Apr 2018 / Amend 19 Nov 2019 — AS/NZS 1163: 2016	Cold-formed structural steel hollow sections *Amend: 1*	VM1 5.1.1
Amend 11 Aug 2011 — AS/NZS 1170:	Structural design actions –	VM1 1.0, 2.1, 2.2, 5.2, 6.1, 7.1, 8.1 AS1 7.2, 7.3
Part 0: 2002	General principles *Amends: 1, 2, 3, 4, 5*	VM4 2.0, B1.0
Part 1: 2002	Permanent imposed and other actions *Amends: 1, 2*	
Part 2: 2011	Wind actions *Amends: 1, 2, 3, 4, 5*	
Part 3: 2003	Snow and ice actions *Amend: 1*	
NZS 1170: Part 5: 2004	Structural design actions – Earthquake actions – New Zealand	VM1 2.1, 2.2

Amends 12 and 17

Amends 10 and 11

COMMENT

The above suite of Structural Design Action Standards, together with their amendments, are referred to collectively as "AS/NZS 1170".

Amend 11 Aug 2011

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AS/NZS 1554: Part 1: 2014	Structural steel welding Welding of steel structures *Amends: 1, 2*	VM1 5.1.13
Amend 16 Apr 2018 — AS/NZS 1594: 2002	Hot-rolled steel flat products	VM1 5.1.1
AS/NZS 1664: Part 1: 1997	Aluminium structures – Limit state design *Amend: 1*	VM1 7.1

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Amend 7 Apr 2007 — AS/NZS 1748:-	Timber – Stress graded for structural purposes	VM1 6.1
Part 1: 2011	General requirements *Amend: 1*	VM1 6.1
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Amend 12 Feb 2014 — AS/NZS 2032: 2006	Installation of PVC pipe systems *Amend: 1*	AS1 6.3

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Amend 9 Sep 2010	AS/NZS 2033: 2008	Installation of polyethylene pipe systems *Amends 1, 2*	AS1 6.4
Amend 17 Nov 2018	AS/NZS 2327: 2017	Composite structures – Composite steel-concrete construction in buildings	VM1 5.1.4A
Amend 9 Sep 2010	AS/NZS 2566: 2002	Buried Flexible pipelines.	
Amend 19 Nov 2019	Part 1: 1998	Structural Design *Amend: 1*	AS1 6.1
Amend 19 Nov 2019	Part 2: 2002	Installation *Amends: 1, 2, 3*	AS1 6.2
	AS/NZS 2918: 2001	Domestic solid fuel heating appliances installation	AS3 3.2.1, 2.2.4
Amend 16 Apr 2018 Amend 6 Mar 2005 Amend 8 Dec 2008	NZS 3101:- Part 1: 2006	Concrete structures standard The design of concrete structures *Amends: 1, 2, 3*	VM1 3.1, 11.1 (Amend 18 Jun 2019)
Amend 9 Sep 2010	NZS 3106: 2009	Design of concrete structures for the storage of liquids.	VM1 3.2
Amend 7 Apr 2007	NZS 3109: 1997	Concrete construction *Amend: 1, 2*	AS3 1.8.2, 1.8.5 b), 2.2.1 c), 2.2.3
Amend 9 Sep 2010 Amend 9 Sep 2010	NZS 3112:- Part 2: 1986	Methods of test for concrete Tests relating to the determination of strength of concrete *Amend: 1, 2*	AS3 1.8.3 c)
Amend 9 Sep 2010 Amend 17 Nov 2018 Amend 9 Sep 2010 Amend 11 Aug 2011	NZS 3404:- Part 1: 1997	Steel structures standard Steel structures standard *Amend: 1, 2*	VM1 5.1
	SNZ TS 3404: 2018	Durability requirements for steel structures and components	VM1 5.1.9A
Amend 7 Apr 2007	NZS 3603: 1993	Timber structures standard *Amend: 1, 2* (Applies to building work consented prior to 1 April 2007) *Amend: 1, 2, 4* (Applies to building work consented on or after 1 April 2007)	VM1 6.1, VM4 5.3.1
Amend 10 May 2011 Amend 11 Aug 2011	NZS 3604: 2011	Timber framed buildings	AS1 1.4, 3.1, 3.2, 4.1 AS3 1.1.1, 1.9.1 b), 1.9.2, 1.9.5, 2.2.1 b), (Amend 19 Nov 2019)
Amend 9 Sep 2010	NZS 3605: 2001	Timber piles and poles for use in building	VM4 5.3.1

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Amend 7 Apr 2007	NZS 3622: 2004	Verification of timber properties *Amend: 1*	VM1 6.1
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Amends 9 and 12	NZS 3640: 2003	Chemical preservation of round and sawn timber *Amends: 1, 2, 3, 4, 5*	VM4 5.3.1
	AS/NZS 3678: 2016	Structural steel – Hot-rolled plates, floorplates and slabs	VM1 5.1.9
	AS/NZS 3679	Structural steel	
	Part 1: 2016	Hot-rolled bars and sections	VM1 5.1.9
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	AS/NZS 3725: 2007	Design for installation of buried concrete pipes	VM1 11.1
Amend 8 Dec 2008			
	AS/NZS 3869: 1999	Domestic solid fuel burning appliances – Design and construction	AS3 2.1
Amend 9 Sep 2010	AS/NZS 4058: 2007	Pre cast concrete pipes(pressure and non-pressure)	VM1 11.1
Amends 10 and 11	NZS 4210: 2001	Code of practice for masonry construction: materials and workmanship *Amend: 1*	AS3 1.8.1, 1.8.3 (f and g)
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Amend 9 Sep 2010	Part 2: 2016	Insulating glass units	AS1 7.2
Amend 15 Jan 2017			
Amends 13 & 15	Part 3: 2016	Human impact safety requirements *Amend: 1*	AS1 7.3
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Amend 9 Sep 2010	Part 4: 2008	Wind, dead, snow, and live actions *Amend 1*	AS1 7.4
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Amends 10 and 11	NZS 4229: 2013	Concrete masonry buildings not requiring specific engineering design	AS1 1.4, 2.1 AS3 1.1.1, 1.8.4, 1.9.2, 1.9.5, 2.2.1 b)
Amend 12 Feb 2014			
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Amend 11 Aug 2011	Part 1: 2007	Cement plasters for walls, ceilings and soffits	

			Where quoted
	NZS 4297: 1998	Engineering design of earth buildings	VM1 8.1
Amends 10 and 11	NZS 4299: 1998	Earth buildings not requiring specific design *Amend: 1*	AS1 1.4, 4.1
	NZS 4402:-	Methods of testing soils for civil engineering purposes.	VM1 11.1
	Test 2.2: 1986	Soil classification tests – Determination of liquid limit	Definitions
	Test 2.4: 1986	Soil classification tests – Determination of plasticity index	VM1 11.1
	Test 2.6: 1986	Soil classification tests – Determination of the linear shrinkage	Definitions
	Test 2.8.1: 1986	Soil classification tests – Standard method by wet sieving	VM1 11.1
	Test 2.8.2: 1986	Soil classification tests – Standard method by dry sieving	VM1 11.1
	Test 2.8.3: 1986	Soil classification tests – Standard method for fine soils (pipette method)	VM1 11.1
	Test 2.8.4: 1986	Soil classification tests – Subsidiary method for fine soils (hydrometer method)	VM1 11.1
	Test 4.1.1: 1986	Soil compaction tests – Determination of the dry density/water content relationship – New Zealand standard compaction test	VM1 11.1
	Test 4.2.1: 1988	Soil compaction tests – Determination of the minimum and maximum dry densities and relative density of a cohesionless soil – Minimum dry density	VM1 11.1
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Amend 16 Apr 2018	Test 5.1.1: 1986	Soil density tests – Determination of the density of soil – Sand replacement test for the determination of in situ density	VM1 11.1
	NZS 4431: 1989	Code of practice for earth fill for residential development *Amend: 1*	VM1 10.1
Amend 19 Nov 2019	AS/NZS 4600: 2005	Cold-formed steel structures *Amend: 1*	VM1 5.2
Amends 10 and 11	AS/NZS 4671: 2001	Steel Reinforcing Materials *Amend: 1*	AS1 2.1.5, 3.1.8 AS3 1.8.5, VM1 14.0 (Amend 14 Nov 2016)
Amend 9 Sep 2010	AS/NZS 4680: 2006	Hot-Dip Galvanised (zinc) Coating	AS3 1.8.6
Amend 16 Apr 2018	AS/NZS 5131: 2016	Structural steelwork – Fabrication and erection	VM1 5.1.3, 5.1.5-5.1.8, 5.1.10-5.1.12

			Where quoted
Amend 8 Dec 2008	SNZ HB 8630: 2004 Tracks and outdoor visitor structures		VM1 2.2.9
	The National Association of Steel Framed Housing Inc (NASH)		
Amend 11 Aug 2011 Amend 18 Jun 2019	NASH Standard Part 2: May 2019 Light Steel Framed Buildings		AS1 9.1
	British Standards Institution		
	BS 8004: 1986	Code of practice for foundations	VM4 4.0.3
	BS EN 14399	High-strength structural bolting assemblies for preloading	
	Part 1: 2015	General requirements	VM1 5.1.4
	Part 2: 2015	Suitability for preloading	VM1 5.1.4
	Part 3: 2015	System HR. Hexagon bolt and nut assemblies	VM1 5.1.2, 5.1.4
Amend 16 Apr 2018	Part 5: 2015	Plain washers	VM1 5.1.2, 5.1.4
	Standards Australia		
Amend 14 Nov 2016	AS 1391: 2007	Metallic materials – Tensile testing at ambient temperature	VM1 14.1.1
Amends 9 and 19	AS 1397: 2011	Steel sheet and strip – Hot-dipped zinc-coated or aluminium/zinc-coated	AS3 1.7.9
Amend 11 Aug 2011	AS 2159: 1995	Rules for the design and installation of piling (known as the SAA Piling Code) *Amend: 1*	VM4 4.0.3
	American Society of Testing and Materials		
	ASTM D1143: 1981	Test method for piles under static axial compressive load	VM4 4.0.3
	New Zealand Geomechanics Society		
	Guidelines for the field descriptions of soils and rocks in engineering use. Nov 1988		VM1 11.1
	New Zealand Legislation		
Amend 8 Dec 2008	Chartered Professional Engineers of New Zealand Act 2002		VM1 1.0
	International Organization for Standardization		
	ISO 15630-2 2010:	Steel for the reinforcement and prestressing of concrete – Test Methods – Part 2 Welded Fabric	VM1 14.1.1
Amend 14 Nov 2016	ISO 17025: 2005	General requirements for the competence of testing and calibration laboratories	VM1 14.1.1

Definitions

This is an abbreviated list of definitions for words or terms particularly relevant to these Acceptable Solutions and Verification Methods. The definitions for any other italicised words may be found in the New Zealand Building Code Handbook.

Amends 7 and 12

Adequate *Adequate* to achieve the objectives of the *Building Code*.

Amend 8 Dec 2008

Alter in relation to a *building*, includes to rebuild, re-erect, repair, enlarge and extend the *building*.

Baluster A post providing the support for the top and bottom rails of a barrier.

Boundary joist A joist running along the outer ends of the floor joists.

Amend 7 Apr 2007

Building has the meaning ascribed to it by sections 8 and 9 of the Building Act 2004.

Building element Any structural and non-structural component or assembly incorporated into or associated with a *building*. Included are *fixtures*, services, *drains*, permanent mechanical installations for access, glazing, partitions, ceilings and temporary supports.

Amend 10 May 2011

Canterbury earthquake region is the area contained within the boundaries of the Christchurch City Council, the Selwyn District Council and the Waimakariri District Council.

Chimney A *non-combustible* structure which encloses one or more *flues, fireplaces* or other heating appliances.

Chimney back The *non-combustible* wall forming the back of a *fireplace*.

Chimney base That part of a *chimney* which houses the *fireplace*.

Chimney jambs The side walls of a *fireplace*.

Combustible See *non-combustible*.

Amend 8 Dec 2008

Construct in relation to a *building*, includes to design, build, erect, prefabricate, and relocate the *building*.

Drain A pipe normally laid below ground level including fittings and equipment and intended to convey *foul water* or *surface water* to an *outfall*.

Factor of safety in relation to any *building* means the ratio of resisting forces to applied forces for a given loading condition. It is generally expressed to two significant figures.

Fireplace A space formed by the *chimney back*, the *chimney jambs*, and the *chimney breast* in which fuel is burned for the purpose of heating the room into which it opens.

Fixture An article intended to remain permanently attached to and form part of a *building*.

Flue The passage through which the products of combustion are conveyed to the outside.

Gather That part of a *chimney* where the transition from *fireplace* to stack occurs.

Good ground means any soil or rock capable of permanently withstanding an ultimate bearing pressure of 300 kPa (i.e. an allowable bearing pressure of 100 kPa using a factor of safety of 3.0), but excludes:

a) Potentially compressible ground such as topsoil, soft soils such as clay which can be moulded easily in the fingers, and uncompacted loose gravel which contains obvious voids,

b) Expansive soils being those that have a liquid limit of more than 50% when tested in accordance with NZS 4402 Test 2.2, and a linear shrinkage of more than 15% when tested, from the liquid limit, in accordance with NZS 4402 Test 2.6, and

Amend 4 Dec 2000

c) Any ground which could forseeably experience movement of 25 mm or greater for any reason including one or a combination of: land instability, ground creep, subsidence, liquefaction, lateral spread, seasonal swelling and shrinking, frost heave, changing ground water level, erosion, dissolution of soil in water, and effects of tree roots.

Amends 10 and 19

COMMENT:

Soils (excepting those described in a), b) and c) above) tested with a dynamic cone penetrometer in accordance with NZS 4402 Test 6.5.2, shall be acceptable as good ground for *building* foundations if penetration resistance is no less than:

a) 5 blows per 100 mm at depths down to twice the footing width.

b) 3 blows per 100 mm at depths greater than twice the footing width.

Amend 12 Feb 2014

Depths shall be measured from the underside of the proposed footing.

Amend 4 Dec 2000

Hearth The insulating floor under the *fire* and in front and at the sides of the *fireplace*.

Intended use, in relation to a *building*:

Amend 7 Apr 2007

a) includes any or all of the following:

i) any reasonably foreseeable occasional use that is not incompatible with the *intended use*;

ii) normal maintenance;

iii) activities undertaken in response to *fire* or any other reasonably foreseeable emergency; but

Amend 7 Apr 2007

b) does not include any other maintenance and repairs or rebuilding.

Nominal pile width The least width of a pile in side view and is equal to the diameter in round piles.

Non-combustible Materials shall be classified as *non-combustible* or *combustible* when tested to: AS 1530 – Part 1.

Other property

a) means any land or *buildings*, or part of any land or *buildings*, that are—

i) not held under the same *allotment*; or

ii) not held under the same ownership; and

Amend 8 Dec 2008

b) includes a road

Sitework means work on a *building* site, including earthworks, preparatory to or associated with the *construction*, *alteration*, demolition or removal of a *building*.

Specified intended life has the meaning given to it by section 113(3) of the Building Act 2004.

Section 113(3) states:

"(3) In subsection (2), **specified intended life**, in relation to a building, means the period of time, as stated in an application for a building consent or in the consent itself, for which the building is proposed to be used for its intended use."

Amend 8 Dec 2008

Strength reduction factor The factor by which the ultimate strength is multiplied to obtain the design strength.

COMMENT:

NZS 4203: 1992 uses the terms ideal strength in place of ultimate strength, and dependable strength in place of design strength.

Amend 2 Aug 1994

Surface water All naturally occurring water, other than sub-surface water, which results from rainfall on the site or water flowing onto the site, including that flowing from a *drain*, stream, river, lake or sea.

Territorial authority (TA) means a city council or district council named in Part 2 of Schedule 2 of the Local Government Act 2002; and—

a) in relation to land within the district of a *territorial authority,* or a *building* on or proposed to be built on any such land, means that *territorial authority*; and

b) in relation to any part of a coastal marine area (within the meaning of the Resource Management Act 1991) that is not within the district of a *territorial authority,* or a *building* on or proposed to be built on any such part, means the *territorial authority* whose district is adjacent to that part.

Verification Method means a method by which compliance with the *Building Code* may be verified.

Amend 8 Dec 2008

2.2.15 NZS 1170 Part 5, Clause 4.2 Seismic weight and seismic mass After: "0.3 is the earthquake imposed action (live load) combination factor for all other applications" add the following:

"except roofs.

ψ_E = 0.0 is the earthquake imposed action (live load) combination factor for roofs."

2.2.16 NZS 1170 Part 5, Sections 5 and 6 Time history analysis Time history analysis is not part of this *Verification Method.*

COMMENT:

Time history analysis is a highly specialised method of assessing structural response to earthquakes. It requires many detailed and interdependent assumptions to be made in relation to the nature of earthquake shaking and its propagation from the source, the properties of the *building* site and the detailed characteristics of the *building* and its structural elements.

AS/NZS 1170 outlines the steps for time history analysis in some detail, but the applicability of each step needs to be evaluated on a *building*-by-*building* basis. More importantly, the output of the analysis needs to be examined carefully in each particular context.

Time history analysis can be an acceptable aid to verifying compliance with structural requirements provided that:

- It is carried out by specialists with in-depth experience in applying the technique.
- The output of the analysis and the viability of the resulting structural design are reviewed by an independent team experienced in both analysis and design.

2.2.17 NZS 1170 Part 5, Clause 5.2.2.3, equation 5.2(4) Delete equation 5.2(4) and replace with:

$$C_d(T) = \frac{C(T)\, S_p}{k_\mu} \qquad \text{... 5.2(4)}$$

2.2.18 NZS 1170 Part 5, Clause 6.1.4.1 Requirement for modelling Delete the last sentence of the first paragraph and replace with:

"The model shall include representation of the diaphragm's flexibility."

Amend 8 Dec 2008

Delete the third (last) paragraph.

Amend 9 Sep 2010

3.0 Concrete

3.1 NZS 3101: Part 1 subject to the following modifications:

Amends 9, 14, 15, 16, Err 1

3.1.1 Clause 18.7.4.4 Detailing requirements for support of hollow core floors

At the end of Clause 18.7.4.4 (b) add an additional sentence:

"The details given by C18.6.7(e) may be applied to hollow-core units where the depth of the precast unit is equal to or less than 400 mm."

Amend 18 Jun 2019

COMMENT:

Welded wire fabric that is used in designs to NZS 3101 is subject to the requirements of Paragraph 14.0 Ductile Steel Mesh of this Verification Method.

Amend 16 Apr 2018

Amend 9 Sep 2010

3.2 NZS 3106

4.0 Concrete Masonry

Amend 8 Dec 2008

4.1 NZS 4230

5.0 Steel

Amends 8 and 9

5.1 NZS 3404: Part 1 subject to the following modifications:

5.1.1 Clause 2.2.1 Specification

In Clause 2.2.1 a) replace:

Amend 19 Nov 2019

"AS 1163 Cold-formed structural steel hollow sections AS 1594 Hot-rolled steel flat products",

with

"AS/NZS 1163 Cold-formed structural steel hollow sections

AS/NZS 1594 Hot-rolled steel flat products"

5.1.2 Clause 2.3.1 Steel bolts, nuts and washers

In Clause 2.3.1 add the following to the end of the Clause:

"BS EN 14399-3 High-strength structural bolting assemblies for preloading, System HR. Hexagon bolt and nut assemblies

Amend 16 Apr 2018

BS EN 14399-5: High-strength structural bolting assemblies for preloading, Plain washers"

5.1.3 new Clause 3.10 Documentation

Insert the following after clause 3.9:

"Clause 3.10 Documentation

The requirements in AS/NZS 5131 Section 4.1.1 General shall be applied."

5.1.4 Clause 9.3.1 Bolts and bolting category

In Clause 9.3.1.2 replace:

"and AS 1559"

with

", AS 1559, BS EN 14399.1, BS EN 14399.2, BS EN 14399.3 and BS EN 14399.5".

Amend 16 Apr 2018

5.1.4A Section 13 Design of composite members and structures

Replace Section 13 Design of composite members and structures with the following:

"13 Design of composite members and structures shall be in accordance with AS/NZS 2327."

Amend 17 Nov 2018

5.1.5 Section 14 Fabrication

Replace Section 14 Fabrication with the following:

"14 Fabrication

The fabrication of steel structures shall be in accordance with AS/NZS 5131.

Construction categories for the purposes of this Standard shall be determined in accordance with Appendix C of AS/NZS 5131."

5.1.6 Section 15 Erection

Replace Section 15 Erection with the following:

"15 Erection

The erection of steel structures shall be in accordance with AS/NZS 5131.

Construction categories for the purposes of this standard shall be determined in accordance with Appendix C of AS/NZS 5131."

5.1.7 Section 16 Modification of Existing Structures

Replace Section 16 Modification of existing structures with the following:

"16 Site modifications during erection and modification and repair of existing structures

Amend 16 Apr 2018

Site modifications during erection and modification and repair of existing structures shall be in accordance with AS/NZS 5131 Section 14 Site modifications during erection and modification and repair of existing structures."

5.1.8 new Section 18 Architecturally Exposed Structural Steelwork

Insert the following after Section 17:

"18 Architecturally exposed structural steelwork

The requirements in AS/NZS 5131 Section 10 Architecturally exposed structural steelwork shall be applied."

5.1.9 Appendix A

Replace references to AS/NZS 3678, AS/NZS 3769.1 and AS/NZS 3679.2 in NZS 3404 with the 2016 versions that are referenced in this Verification Method

Amend 16 Apr 2018

5.1.9A Appendix C

Replace Appendix C Corrosion Protection with the following:

"Appendix C Corrosion Protection

Corrosion protection shall be in accordance with SNZ TS 3404."

Amend 17 Nov 2018

5.1.10 Appendix D

Replace Appendix D Inspection of Welding to AS/NZS 1554.1 with the following:

"Appendix D Inspection of Welding

The recommendations in AS/NZS 5131 Appendix I Inspection of Welding and Bolting. (Informative) should be used."

5.1.11 Appendix K

Replace Appendix K Standard test for evaluation of slip factor (normative) with the following:

"Appendix K Standard test for evaluation of slip factor (normative)

The requirements in AS/NZS 5131 Appendix G Standard test for evaluation of slip factor shall be used."

5.1.12 Appendix L

Replace Appendix L Inspection of bolt tension using a torque wrench (informative) with the following"

Amend 16 Apr 2018

Acceptable Solution B1/AS1 General

1.0 Explanatory Note

Amend 12 Feb 2014

1.1 B1/AS1 contains Acceptable Solutions for Masonry (Paragraph 2.0), Timber (Paragraph 3.0), Earth Buildings (Paragraph 4.0), Stucco (Paragraph 5.0), Drains (Paragraph 6.0), Glazing (Paragraph 7.0) and Steel (Paragraph 9.0).

Amend 18 Jun 2019

Amend 19 Nov 2019
Amend 11 Aug 2011

1.2 B1/AS3 is an Acceptable Solution for small *chimneys* (referred to in Paragraph 8.0).

1.3 Modifications to the Standards, necessary for compliance with the New Zealand Building Code, are given against the relevant clause number of each Standard.

1.4 Consequential changes due to 2010/11 Canterbury earthquakes

Amend 11 Aug 2011

COMMENT:
Raising the seismic hazard factor Z in NZS 1170 Part 5 (Table 3.3) for the *Canterbury earthquake region* through amendments to B1/VM1 requires consequential amendments to NZS 4229, NZS 3604 and NZS 4299 referenced in B1/AS1.

2.0 Masonry

2.1 NZS 4229 subject to the following modifications:

2.1.1 NZS 4229 Clause 7.8.3

Delete clause 7.8.3.

Replace with:

"All slab-on-ground reinforcing shall extend to within 75 mm of the outside edge of the slab (including the foundation wall) and shall consist of a minimum 2.27kg/m^2 welded Grade 500E reinforcing mesh sheets (1.14 kg/m^2 in each direction), which shall be lapped at sheet joints such that the overlap measurement between the outermost cross wires of each fabric sheet is equal to the greater of one of the following:

- the spacing of cross wires plus 50 mm;

- 150 mm; or

- the manufacturer's requirements.

Slabs shall have a maximum dimension of 18 m between free joints."

Amend 12 Feb 2014

2.1.2 NZS 4229

Foundations where *good ground* has not been established.

Amend 19 Nov 2019

COMMENT:

Foundations for houses built on ground that has the potential for liquefaction or lateral spread are outside the scope of B1/AS1.

The MBIE/MfE guidance document "Planning and engineering guidance for potentially liquefaction-prone land"outlines a risk-based process to identify and manage liquefaction-related risk in land use planning and development decision-making.

For houses built in areas that have the potential for liquefaction, the MBIE guidance document "Repairing and rebuilding houses affected by the Canterbury earthquakes" may be appropriate. This guidance provides a range of potential foundation solutions depending on expected ground movement and available bearing capacity. These parameters also determine the required degree of involvement of structural and geotechnical engineers and the extent of specific engineering design.

Amend 19 Nov 2019

Amends 11 and 12

2.1.3 NZS 4229 Grade 500E welded steel mesh

Where Grade 500E welded steel mesh is specified, it shall meet the requirements of Paragraph 14.0 in B1/VM1.

Amend 14 Nov 2016

Amend 12 Feb 2014

3.0 Timber

3.1 NZS 3604 subject to the following modifications:

3.1.1 NZS 3604 Paragraph 1.3 Definitions
Add (in the definition for Good Ground): "liquefaction, lateral spread," after "subsidence" in subparagraph (c).

Amend 19 Nov 2019

Amend 11 Aug 2011

Amend 10 May 2011

3.1.2 NZS 3604 Section 5 Bracing Design

Make the following amendments:

Amend Figure 5.4, Earthquake zones, so that all the area within the Christchurch City Council boundary is within Zone 2.

Amend Figure 5.4 Earthquake zones, so that the lowest zone within the Selwyn or Waimakariri District Council boundaries is within Zone 2. Areas within Selwyn District that are designated as Zone 1 in NZS 3604 shall become Zone 2.

Amend 11 Aug 2011

Amend 15 Jan 2017

3.1.2A NZS 3604 Clause 7.4.1.3

Delete Subclause 7.4.1.3 (c).

3.1.2B NZS 3604 Figure 7.10(b)

On the plan view replace the text "2/M12 x 250 mm coach screws at 140 crs" with "2/M12 x 240 mm coach screws at 140 crs vertically."

On the plan view replace "2/M12 at 400 crs" twice with "2 M12 bolts at 140crs vertically to capture end joist laminations and blocking, and boundary joist laminations and blocking, at post centrelines."

Add to Note 3: "All coach screws to have 50 x 50 washers."

3.1.2C NZS 3604 Figure 7.10(c)

On the plan view insert the text "At each strap location (at joist ends and nogging), 2/M12 x 240 mm long coach screws are required."

On the plan view, replace the text " 2/M12 x 250 mm coach screws at 140 crs vertically" with " 2/M12 x 200mm coach screws at 140 crs vertically."

On the section view, replace the text "M12 x 200 mm coach screws at 400 crs vertically" with M12 x 240 mm coach screws at 140 crs vertically.

Delete "2/M12 bolts at 400crs" which tie laminations together along edge joists and along boundary joists.

Amend 15 Jan 2017

3.1.3 NZS 3604 Clause 7.5.2.3
Delete: Clause 7.5.2.3

Replace with: "Clause 7.5.2.3 The combined foundation and edge details shall be constructed as shown in Figures 7.13(B), 7.14(B) or (C) (and Figures 7.15(B) and 7.16(B) or (C) for foundations supporting a masonry veneer)."

3.1.4 NZS 3604 Figure 7.13
Delete: Figure 7.13(A) – Foundation edge details – In situ concrete – Dimensions & reinforcing for single storey.

Amend 11 Aug 2011

Amend title of Figure 7.13(B) to "Dimensions & reinforcing for 1 or 2 storeys".

Amend 11 Aug 2011

3.1.5 NZS 3604 Figure 7.14
Delete: Figure 7.14(A) – Foundation edge details – Concrete masonry – Single storey

Amend title of Figure 7.14(B) to "1 or 2 storeys", and add a note: "for a single storey foundation, 15 Series masonry may be used and the minimum footing width may be 190 mm".

Amend 11 Aug 2011

COMMENT:
Unreinforced and untied slab to footing single storey option removed.

3.1.6 NZS 3604 Figure 7.15

Delete: Figure 7.15(A) – Masonry veneer foundation edge details – Dimensions and reinforcement for single storeys.

Amend 11 Aug 2011

Amend 10 May 2011

COMMENT:
Unreinforced and untied slab to footing single storey options removed.

Amend 11 Aug 2011

3.1.7 NZS 3604 Figure 7.16

Delete: Figure 7.16 (A) – Masonry veneer foundation edge details – Concrete masonry – Single storey.

COMMENT:
Unreinforced and untied slab to footing single storey option removed.

Amend 11 Aug 2011

3.1.8 NZS 3604 Clause 7.5.8.1

Delete: Clause 7.5.8.1

Replace with: "Clause 7.5.8.1 All slab-on-ground floors shall be reinforced concrete in accordance with Clauses 7.5.8.3, 7.5.8.4 and 7.5.8.6.4. All reinforcing steel, including welded mesh, shall be Ductility Class E in accordance with AS/NZS 4671."

Amend 19 Nov 2019

Where Grade 500E welded steel mesh is specified, it shall meet the requirements of Paragraph 14.0 in B1/VM1.

Amend 14 Nov 2016

Amend 11 Aug 2011

3.1.9 NZS 3604 Clause 7.5.8.3

Delete: Clause 7.5.8.3

Replace with: "Clause 7.5.8.3 All slab-on-ground reinforcing shall extend to within 75 mm of the outside edge of the slab (including the foundation wall) and shall consist of a minimum 2.27 kg/m^2 welded reinforcing mesh sheets (1.14 kg/m^2 in each direction), which shall be lapped at sheet joints such that the overlap measurement between the outmost cross wires of each fabric sheet is equal to the greater of one of the following:

- the spacing of cross wires plus 50 mm,
- 150 mm or
- the manufacturer's requirements.

Slabs shall have a maximum dimension of 24 m between free joints."

Amend 12 Feb 2014

Amend 11 Aug 2011

3.1.10 NZS 3604 Clause 7.5.8.6.2

Delete: Clause 7.5.8.6.2

Amend 11 Aug 2011

3.1.11 NZS 3604 Figure 7.18

Delete title: Figure 7.18 – Irregular slab (plan view) (see 7.5.8.6.2)

Amend 11 Aug 2011

Amend 10 May 2011

Replace with: "Figure 7.18 – Irregular slab (plan view) (see 7.5.8.6.4)".

Amend 11 Aug 2011

3.1.12 NZS 3604 Clause 7.5.8.6.3

Delete: Clause 7.5.8.6.3.

Amend 11 Aug 2011

3.1.13 NZS 3604 New Clause

Add new: "Clause 7.5.8.8 Free Joints.

At free joints, slab reinforcement shall be terminated and there shall be no bonding between vertical concrete faces (prevented by using building paper or a bituminous coating). R12 dowel bars 600 mm long shall be placed at 300 mm centres along the free joint and lapped 300 mm with slab reinforcement on both sides of the joint. All dowel bars on one side of the joint shall have a bond breaker applied, e.g. by wrapping dowel bars for 300 mm with petrolatum tape. Joint dowel bars must be installed in a single plane, in true alignment and parallel."

Amend 19 Nov 2019

3.1.14 NZS 3604 Foundations where good ground has not been established

Amend 11 Aug 2011

COMMENT:
Foundations for houses built on ground that has the potential for liquefaction or lateral spread are outside the scope of B1/AS1.

Amend 12 Feb 2014

The MBIE/MfE guidance document "Planning and engineering guidance for potentially liquefaction-prone land"outlines a risk-based process to identify and manage liquefaction-related risk in land use planning and development decision-making.

For houses built in areas that have the potential for liquefaction, the MBIE guidance document "Repairing and rebuilding houses affected by the Canterbury earthquakes" may be appropriate. This guidance provides a range of potential foundation solutions depending on expected ground movement and available bearing capacity. These parameters also determine the required degree of involvement of structural and geotechnical engineers and the extent of specific engineering design.

Amend 19 Nov 2019

3.2 Slab-on-ground in expansive soils

3.2.1 NZS 3604 Clause 1.1.2 Buildings covered by this Standard

Amend 1.1.2(a) to read:

"Buildings founded on good ground or on expansive soils where the requirements of 1.1.5 are met"

3.2.2 NZS 3604 New Clause

Add new: "**Clause 1.1.5 Buildings on expansive soils**

Buildings on expansive soils shall be supported on slab-on-ground foundations complying with 7.5.13 and in addition to 1.1.2 shall be limited as follows:

(a) single storey, stand-alone household unit, and

(b) maximum length or width of floor of 24.0 m including any attached garage, and

(c) simple plan shapes such as rectangular, L, T or boomerang, and

(d) concrete slab-on-ground with a minimum thickness of 100 mm and a minimum concrete compressive strength of 20 MPa, and

(e) simple roof forms, incorporating hips, valleys, gables or mono pitches, and

(f) maximum overall height of 7.0 m to roof apex from lowest cleared ground level, and

(g) maximum roof height of 3.0 m, and

(h) roof slope between 10° and 35° from the horizontal, and

(i) maximum span of roof truss 12.0 m, and

(j) external walls maximum of 2.4 m height studs, other than gable end walls and walls to mono-pitched roofs, which shall not exceed 4.0 m.

COMMENT:

Floor plans

Where floor plans incorporate re-entrant corners then continuity of the exterior ground beam shall be maintained by continuing it as an internal beam, with the exterior beam details continued for a length of at least 1.0 m into the internal beam. This is only applicable where internal beams are specified in Tables 7.4A and 7.4B. This is aimed to bring the solution in NZS 3604 in line with Clause 5.3.8 of AS 2870:2011.

Amend 19 Nov 2019

Ground movement

Provision for the additional ground movement effects from trees near to foundations in expansive soils should be considered. Trees remove moisture from the soil for a radius equal to the height of the tree. This causes expansive soils to shrink to varying degrees, and when near houses leads to differential settlement occurring under foundations. Movement of the foundations may lead to cracks in the building and door jamming.

Where existing trees (including trees that have been recently removed) are located closer to the foundations than 1.5 times the mature height of a tree, then additional geotechnical advice should be obtained. Planting of new trees should be avoided near foundations of new buildings or neighbouring buildings on sites with expansive soils.

3.2.3 NZS 3604 Clause 7.5.1

Add the following paragraph at the end of Clause 7.5.1:

"Slabs on expansive soils for buildings meeting the requirements of 1.1.5 shall, in addition to meeting the requirements of 7.5.1 to 7.5.12, meet the requirements of 7.5.13. Where there is conflict the requirements of 7.5.13 shall apply."

3.2.4 NZS 3604 New clause, tables and figures

Add new: **Clause 7.5.13 Slab-on-ground in expansive soils**

7.5.13.1 Identification of expansive soils

7.5.13.1.1 Should reasonable enquiry as outlined in 3.1.3 show any signs of expansive soils, the expansive soil class, as defined in AS 2870, shall be established by one or all of:

(a) enquiry to the local territorial authority, and/or

(b) reference to the certificate of suitability issued in terms of NZS 4431, and/or

(c) a soil test undertaken by a suitably qualified soils engineer.

7.5.13.1.2 Expansive soil class shall be defined as:

(a) Slightly 'S', having an I_{SS} range of 0–1.9%, and a 500 year design characteristic surface movement return (y_S) of 22 mm, or

(b) Moderately 'M', having an I_{SS} range of 2.0–3.7% and a 500 year design characteristic surface movement return (y_S) of 44 mm, or

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(c) Highly 'H', having an I_{SS} range of 3.8–6.5%and a 500 year design characteristic surface movement return (y_S) of 78 mm, or

(d) Extremely 'E', having an I_{SS} range of 6.6–7.5% and a 500 year design characteristic surface movement return (y_S) of 90 mm.

7.5.13.2 Maximum aspect ratio of concrete slabs

The aspect ratio of the concrete slabs or bays of concrete slabs, such as in the case of L, T or boomerang concrete slab shapes, shall not exceed 5 to 1 (length to width).

7.5.13.3 Foundation details

7.5.13.3.1 For the identified expansive soil class the foundation details, external and internal thickenings shall be as follows.

(a) For light wall claddings refer to Table 7.4A and Figure 7.22.

(b) For medium wall or heavy wall claddings refer to Table 7.4B and Figure 7.23.

7.5.13.3.2 Situations where no internal thickenings shall be required are limited to a rectangular slab with long side not exceeding 17.0 m. Where this limit is exceeded, add additional internal thickenings across the slab with the same cross section dimensions and reinforcing as the external footing, so that the centre to centre spacing of thickenings is always less than 17.0 m.

COMMENT:

Design constraints:

a) The characteristic surface movements and the corresponding expansivity classifications have been calculated based on design for ultimate limit state (ULS) conditions for a 1 in 1000 year "extreme" drought event, and the serviceability limit state (SLS) conditions for a 1 in 500 year drought event.

b) Maximum soil movements are calculated to be based on a 500 year return period for SLS, and a 1000 year return period for ULS*;

(*NB: *This differed from the recommendations contained within BRANZ Study Report 120A (BSR120A) which used a 300 year return period for the design level drought conditions)*

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Nov 2019

c) Climate parameters adopted from BSR120A of Δu = 1.2 pF, Hs = 1.5 m, and a crack depth of 0.5 Hs

d) The I_{SS} (soil stability index) ranges attributed to the expansivity classifications as defined in 3.2.4 above have been calculated using the parameters presented in BSR120A and Equation 2.3.1 of AS 2870:2011.

e) Sites subject to parameters that differ from those mentioned above, in particular sites where the crack depth is less than 0.75 m, such as cut natural ground or clay backfill, require specific engineering assessment to confirm their appropriate site classification.

f) The effects of nearby trees (whether existing, recently removed, or future planting) are not considered in these solutions. It is recommended that specific geotechnical engineering advice is obtained where a tree is within a lateral distance of 1.5 times its mature height of the foundations.

Maintenance of foundations in expansive soils

Normal maintenance is that work generally recognised as necessary to achieve the expected performance over time of the foundation located on expansive soils. Unless otherwise specified by the designer and noted on the drawings, basic normal maintenance tasks should ensure that:

a) the drainage and wetting of the site is controlled so that extremes of wetting and drying of the soils are prevented, and

b) the position and operation of gardens adjacent to the dwelling are controlled, and the planting of trees near to foundations is suitably restricted, and

c) any leaks which develop in plumbing, storm water or sanitary sewage systems are repaired promptly.

Amend 19
Nov 2019

Table 7.4A **Reinforced concrete foundations in expansive soils for light wall claddings**
Clause 7.5.13 and Figure 7.22

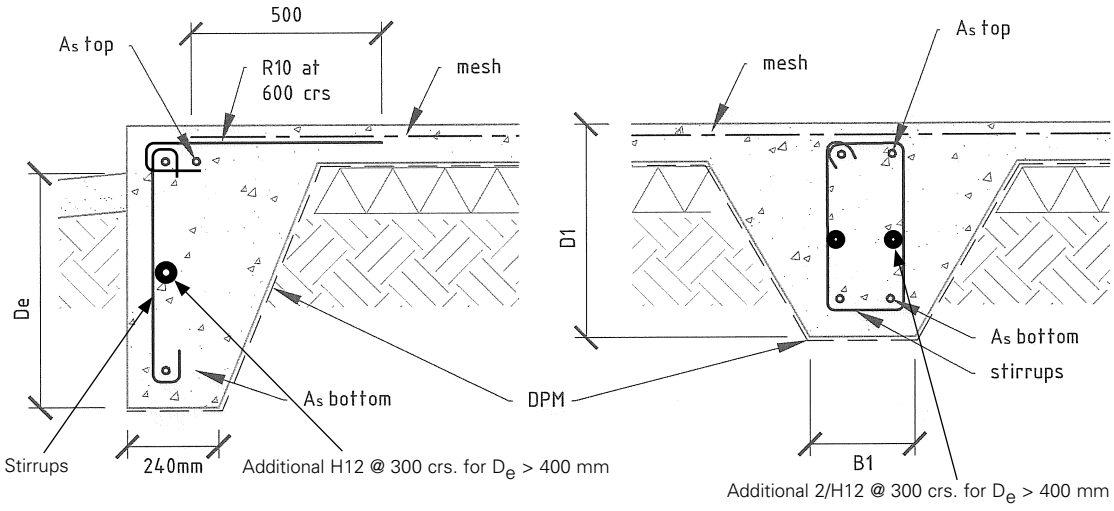
Expansive soil class	Slightly 'S'	Moderately 'M'	Highly 'H'	Extremely 'E'
Soil embedment (De)	375 mm	525 mm	575 mm	625 mm
Top steel (A_S top)	2/D 16	2/ D16	2/ D16	2/ D16
Bottom steel (A_S bottom)	1/ D16	1/ D25	1/ D20	1/ D25
Stirrups	R6/ 125 crs.	R6/ 125 crs.	R6/ 300 crs.	R6/ 300 crs.
Maximum spacing of internal thickenings	no internal thickening	no internal thickening	2.5 m crs.	2.5 m crs.
Depth of thickening (D1)	–	–	400 mm	450 mm
Base width (B1)	–	–	300 mm	350 mm
Top steel (A_S top)	–	–	2/ D20	2/ D20
Bottom steel (A_S bottom)	–	–	2/ D16	2/ D20
Stirrups	–	–	R6/ 150 crs.	R6/ 150 crs.

Table 7.4B **Reinforced concrete foundations in expansive soils for medium wall and heavy wall claddings**
Clause 7.5.13 and Figure 7.23

Expansive soil class	Slightly 'S'	Moderately 'M'	Highly 'H'	Extremely 'E'
Soil embedment (De)	500 mm	550 mm	775 mm	800 mm
Top steel (A_S top)	2/ D16	2/ D20	2/ D20	3/ D20
Bottom steel (A_S bottom)	2/ D16	2/ D16	2/ D20	2/ D20
Stirrups	R6/ 125 crs.	R6/ 250 crs.	R6/ 300 crs.	R6/ 300 crs.
Maximum spacing of internal thickenings	–	2.5 m crs.	2.5 m crs.	2.5 m crs.
Depth of thickening (D1)	–	350 mm	450 mm	500 mm
Base width (B1)	–	300 mm	300 mm	350 mm
Top steel (A_S top)	–	2/ D16	3/ D20	3/ D20
Bottom steel (A_S bottom)	–	2/ D16	2/ D16	2/ D20
Stirrups	–	R6/ 125 crs.	R6/ 150 crs.	R6/ 150 crs.

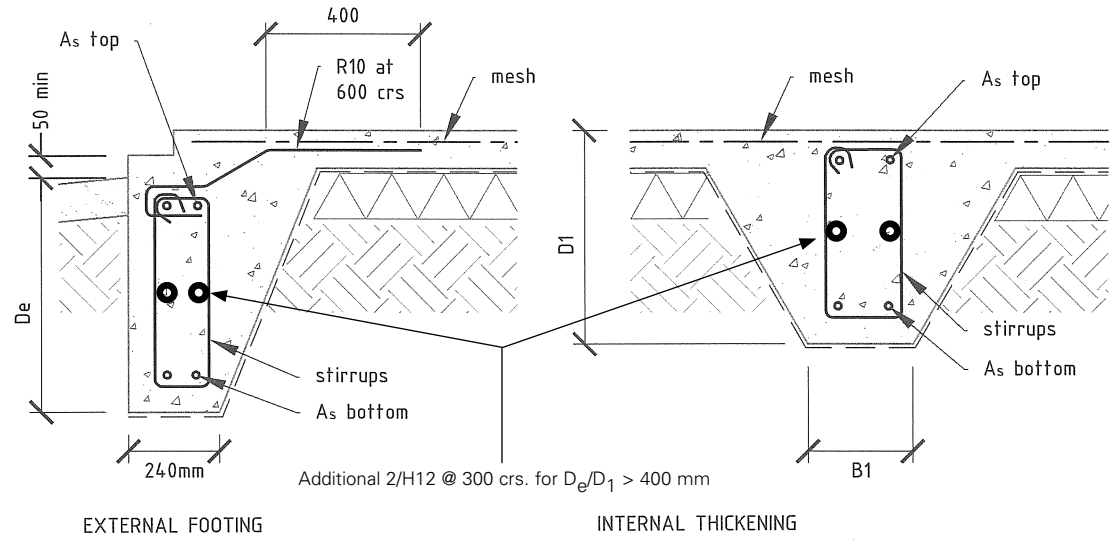
Amend 19
Nov 2019

Figure 7.2.2 **Reinforced concrete foundations in expansive soils for light wall claddings**
Clause 7.5.13 and Table 7.4A



Note: It would be considered good practice to construct corner junctions with the longitudinal reinforcing lapping around the corners and to construct internal beams with longitudinal bars at standard 90° hooked into the perimeter beams to provide adequate anchorage

Figure 7.2.3 **Reinforced concrete foundations in expansive soils for medium wall and heavy wall claddings**
Clause 7.5.13 and Table 7.4B



Note: It would be considered good practice to construct corner junctions with the longitudinal reinforcing lapping around the corners and to construct internal beams with longitudinal bars at standard 90° hooked into the perimeter beams to provide adequate anchorage

Amend 19
Nov 2019

4.0 Earth Buildings

Amend 11 Aug 2011

4.1 NZS 4299 subject to the following modifications:

Amend 11 Aug 2011

4.1.1 NZS 4299, Paragraph 1.3 Definitions
Add (in the definition for Good Ground):

Amend 19 Nov 2019

"liquefaction, lateral spread," after "subsidence" in subparagraph (c).

Amend 11 Aug 2011

4.1.2 NZS 4299, Clause 2.3 Earthquake zones
Add to the end of Clause 2.3:

"The earthquake zone factor > 0.6 shall apply to the *Canterbury earthquake region*."

Amend 11 Aug 2011

4.1.3 NZS 4299, Figure 2.1 Earthquake zones
On the map shown in NZS 4299 Figure 2.1 Earthquake zones, the *Canterbury earthquake region* shall be interpreted as having an earthquake zone factor of > 0.6.

Amend 11 Aug 2011

4.1.4 NZS 4299, Clause 4.8.6.
Delete: Clause 4.8.6

Replace with: "Clause 4.8.6 The thickness and reinforcement and detail of concrete slabs shall comply with the requirements of NZS 3604 as modified in B1/AS1 Paragraph 3.1."

Amend 10 May 2011

Amend 19 Nov 2019

Amend 11 Aug 2011

4.1.5 NZS 4299 Foundations where good ground has not been established

Amend 12 Feb 2014

COMMENT:
Foundations for houses built on ground that has the potential for liquefaction or lateral spread are outside the scope of B1/AS1.

The MBIE/MfE guidance document "Planning and engineering guidance for potentially liquefaction-prone land" outlines a risk-based process to identify and manage liquefaction-related risk in land use planning and development decision-making.

For houses built in areas that have the potential for liquefaction, the MBIE guidance document "Repairing and rebuilding houses affected by the Canterbury earthquakes" may be appropriate. This guidance provides a range of potential foundation solutions depending on expected ground movement and available bearing capacity. These parameters also determine the required degree of involvement of structural and geotechnical engineers and the extent of specific engineering design.

Amend 19 Nov 2019

5.0 Stucco

5.1 NZS 4251

Amend 10 May 2011

6.0 Drains

6.1 AS/NZS 2566.1, including Amendment 1

Amend 19
Nov 2019

6.2 AS/NZS 2566.2, including Amendments 1, 2 and 3

6.3 AS/NZS 2032

6.4 AS/NZS 2033

Amend 9
Sep 2010

Amend 9
Sep 2010

Amends 9, 11, 15

7.0 Glazing

7.1 NZS 4223.1

7.2 NZS 4223.2

7.3 NZS 4223.3

7.3.1 Clause 22.4.3 modified

Delete clause 22.4.3

Replace with:

"22.4.3 Structural glass barriers

Structural glass barriers use glass as a structural element and are normally classified by the following types. Glass design for these types shall comply with the following tables (see note 1):

Table 14 - Structural balustrade – cantilevered glass;

Table 15 - Structural balustrade – two-edge point fixed;

Table 16 - Structural balustrade – two-edge support;

Table 17 - Structural balustrade – three-edge support.

Design types and glass types not shown in Tables 14 to 17 require specific design.

All structural glass barriers safeguarding a fall of 1000 mm or more shall have interlinking rails, which in the event a glass pane breaks, spans the broken pane at the required barrier height and,

i) resists Line and Concentrated design loads (SLS) specified in Tables 14 to 17, and

ii) does not deflect more than 100 mm, in any direction, under the design loads.

Interlinking rails are not required for a heat-strengthened or toughened laminated safety glass barrier that:

(a) has a top capping, corner brackets or a proprietary system and will, when both panes of the laminate are fractured, resist a 0.2 kN concentrated load and not deflect more than 250 mm (see note 2), or

(b) has two or three edges supported by structural sealant joints or continuous clamps, and will, when both panes of the laminate are fractured, resist a 0.2 kN concentrated load and not deflect more than 250 mm (see note 2), or

(c) has a stiff interlayer and will, when both panes of the laminate are fractured, resist a 0.2 kN concentrated load and not deflect more than 250 mm (see note 2). Physical testing must be undertaken to demonstrate compliance with the load and deflection requirements for laminated glass barriers with a stiff interlayer (see note 3).

Physical testing of glass barriers must include all components of the barrier system, including all structural connections. Loads and deflections must be applied and measured horizontally, at midspan, at the required barrier height. The concentrated load shall be applied over an area of 100 mm x 100 mm and for at least one minute.

NOTE –

(1) The design of structural connections, fasteners and mounting hardware, that are part of the glass barrier, is outside the scope of this Standard and must be specifically designed.

(2) Laminated glass is susceptible to minor edge delamination, depending on the interlayer type and laminating process. Normally this will not affect the mechanical properties but can be noticeable on exposed edges.

(3) Test results for dual pane fracture of laminated glass barriers with stiff interlayers are not applicable to barriers that have narrower glass panes than that tested"

Amend 15 Jan 2017

Amend 13 Jun 2016

7.4 NZS 4223.4

Amend 11 Aug 2011

8.0 Small Chimneys

See Acceptable Solution B1/AS3.

Amend 12 Feb 2014

9.0 Steel

9.1 NASH Standard Part 2 Light Steel Framed Buildings

Amend 18 Jun 2019