

Get to know B1/VM2 Second edition

INFORMATION ON THE NEW EDITION OF THE VERIFICATION METHOD

On 28 July 2025, MBIE published Verification Method B1/VM2 Geotechnical design of foundations Second Edition. This document was previously published as B1/VM4 Foundations.

If you have used the verification method in the past, you may see some changes in the new version.



New layout

Since 2021, MBIE has been publishing new editions of the acceptable solutions and verification methods in an updated document format. The new format has a consistent layout and structure and should be easier to use in an electronic format. Consequently, headings and paragraph numbers in B1/VM2 have changed to fit in the new layout.



Building Product Specifications

The verification method now includes references to the Building Product Specifications. Further information on the Building Product Specifications and what purposes it is used for are provided in the verification method.



Minor amendments that do not affect the level of performance

Other minor amendments have been made to the verification method that do not affect the level of performance require but may assist in the interpretation and use of the document. This includes corrections for typos, grammar, formatting, cross-references, and punctuation. The document has also been revised to reflect current practices for drafting the text and equations and written into sentence and paragraph format.

We have provided the table on the follow pages to outline the differences between the First edition and Second edition including:

- A side-by-side index of the headings and paragraph numbers that have changed, and
- Comments on specific headings and paragraphs where the text has changed.

This table has been provided for information only. The wording and numbering in the verification method itself takes precedence.

The previous edition of the verification method can still be used to demonstrate compliance with the Building Code until 31 July 2026.

Information on the second edition

B1/VM4 First edition Reference	B1/VM2 Second edition Reference	Comments on B1/VM2 Second edition
B1/VM4 Foundations	B1/VM2 Geotechnical design of foundations	Title of the document changed to reflect the scope. Verification method number changed as there is no other current B1/VM2 or B1/VM3.
	Part 1. General	New heading to align with drafting of other AS/VMs
	1.1 Introduction	New heading to align with drafting of other AS/VMs
1.0 Scope and limitations	1.1.1 Scope of this document	Heading revised to align with drafting of other AS/VMs
1.0.1	1.1.1.1	Rewritten into a list.
	1.1.2 Items outside the scope of this document	New heading to align with drafting of other AS/VMs
1.0.2	1.1.2.1	
1.0.3	1.1.2.2	Comment box revised
1.0.4	1.1.2.3	
1.0.5	1.1.2.4	
1.0.6	1.1.2.5	
1.0.7	<Paragraph removed>	Relevant text contained within front matter “Features of this document”.
	1.1.3 Compliance pathway	New subsection to align with drafting of other AS/VMs
	1.1.3.1	New paragraph on compliance with the Building Code.
	1.1.3.2	New paragraph to remind users that alternatives may also be used for compliance.
	1.2 Using this verification method	New heading to align with drafting of other AS/VMs
2.0 General	1.2.1 Design loads and geotechnical engineering design methods	New heading to describe the contents of the subsection.
2.0.1	1.2.1.1	
2.0.2	1.2.1.2	
2.0.3	1.2.1.3	
2.0.4	1.2.1.4	
2.0.5	1.2.1.5	
2.0.6	1.2.1.6	
2.0.7	1.2.1.7	

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B1/VM4 First edition Reference	B1/VM2 Second edition Reference	Comments on B1/VM2 Second edition
2.0.8 Supervision and verification of soil parameters	1.2.1.8	Heading removed.
3.0 Shallow foundations	Part 2. Shallow foundations	
3.1 General provisions	2.1 Demonstrating compliance	New heading to describe the contents of the section
3.1.1	2.1.1.5	
3.1.2	2.1.1.6	
3.1.3	2.1.1.7	
3.1.4	2.1.1.8	
3.2 Ultimate and design bearing strength and design bearing pressure	2.2 Overview	Heading revised to align with other AS/VMs and avoid repetition with other headings.
3.2.1	2.1.1.2	
3.2.2	2.1.1.4	
3.2.3	2.1.1.3	
3.2.4	2.1.1.1	Relocated to the start of the subsection as it sets the criteria for demonstrating compliance. Rewritten to align with drafting of other AS/VMs.
3.3 Ultimate limit state bearing strength for shallow foundations	2.2 Ultimate limit state bearing strength for shallow foundations	
	2.2.1 Determining the ultimate bearing strength	New heading
3.3.1	2.2.1.1	First sentence redrafted.
3.3.1 [Notations]	<Removed from document>	Notations added to the appropriate equation as relevant. Text and figures relevant to the effective dimensions of the foundation relocated to the new Subsection 2.2.2.
Figure 1	Figure 2.2.2.1 Bearing strength stress block for a shallow rectangular foundation subject to vertical load and moment	Relocated to Subsection 2.2.2
Figure 2	Figure 2.2.2.2 Effective foundation area for a circular foundation subject to vertical load and moment	Relocated to Subsection 2.2.2
3.3.2 Ultimate bearing strength	<Heading removed from document>	

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B1/VM4 First edition Reference	B1/VM2 Second edition Reference	Comments on B1/VM2 Second edition
3.3.2 [First paragraph]	2.2.1.2 and Equation 2.1	
3.3.2 [Second paragraph]	2.2.1.2 and Equation 2.1	
3.3.2 [Third paragraph]	2.2.1.2 and Equation 2.1	
	2.2.2 Effective dimensions of the foundation	New subsection added to calculate the effective breadth, length, and area of the foundation. Equations and figures previously located within the notations for this part.
	2.2.2.1 Equation 2.2 Equation 2.3 Equation 2.4	New paragraph and equations to calculate the dimensions for a rectangular foundation.
	2.2.2.2 Equation 2.5	New paragraph and equation to calculate the dimensions for a circular foundation. Equation previously found in Figure 2.
	2.2.3 Bearing strength factors	New heading based on the contents of the paragraph and equations.
3.3.2 [Fourth paragraph and equations]	2.2.3.1 Equation 2.6 Equation 2.7 Equation 2.8	Bearing strength factors relocated to a separate subsection.
Figure 3	Figure 2.2.3.1: Bearing strength factors	
	2.2.4 Shape, depth, load inclination, and ground inclination factors	New heading based on the contents of the paragraphs and equations.
3.3.2 [Fifth paragraph a) and equations]	2.2.4.1 Equation 2.9 Equation 2.10 Equation 2.11	Rewritten into paragraph format.
3.3.2 [Fifth paragraph b) and equations]	2.2.4.2 Equation 2.12 Equation 2.13 Equation 2.14	Rewritten into paragraph format.
3.3.2 [Fifth paragraph c) and equations]	2.2.4.3 Equation 2.15 Equation 2.16 Equation 2.17	Rewritten into paragraph format.
3.3.2 [Fifth paragraph d) and equations]	2.2.4.4 Equation 2.18 Equation 2.19 Equation 2.20	Rewritten into paragraph format. Angle 'v' corrected to ω . Degrees symbol added to "150" in Equation 2.18.

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B1/VM4 First edition Reference	B1/VM2 Second edition Reference	Comments on B1/VM2 Second edition
3.3.3 Local shear	<Heading removed>	
3.3.3 [Paragraph text]	2.2.1.3	Relocated to Subsection 2.2.1 as this paragraph relates to the calculation of the bearing strength.
3.4 Ultimate limit state sliding resistance	2.3 Ultimate limit state sliding resistance	
	2.3.1 Determining the sliding resistance	New heading
3.4.1	2.1.1.9	Relocated to Section 2.1 as part of demonstrating compliance.
3.4.2	2.3.1.1	
3.4.3	2.3.1.2	
3.4.4 [First paragraph]	2.3.1.3	Combined with undrained conditions
3.4.4 [Equation]	Equation 2.21	
3.4.4 [Second paragraph]	2.3.1.4	
3.4.5	2.3.1.3	Combined with drained conditions
3.4.6 Design sliding resistance	<Heading removed>	
3.4.6 [Paragraph text]	2.3.1.5 and Equation 2.22	
3.5 Strength reduction factors	2.1.2 Strength reduction factors	Relocated to Section 2.1
3.5.1	2.1.2.1	
Table 1	Table 2.1.2.1	
4.0 Pile foundations	Part 3. Pile foundations	
	3.1 Demonstrating compliance	New heading to align with drafting of other AS/VMs
	3.1.1 Overview	New heading to align with drafting of other AS/VMs
4.0.1	3.1.1.1	
4.0.2	3.1.1.2	
4.0.3 [First paragraph]	3.1.1.3	
4.0.3 [Second paragraph]	3.1.1.4	
4.0.4	3.1.1.5	
4.1 Ultimate vertical strength of single piles	3.2 Ultimate vertical strength of single piles	
4.1.1 Notation	<Removed from document>	Notations added to the relevant equations throughout the document.

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B1/VM4 First edition Reference	B1/VM2 Second edition Reference	Comments on B1/VM2 Second edition
Table 2	Table 3.2.4.2 Values of δ' and K_s for pile shafts	
4.1.2 Vertical strength	3.2.1 Vertical strength	
4.1.2 [Paragraph text]	3.2.1.1 and Equation 3.1	
4.1.3 Base resistance	3.2.2 Base resistance	
4.1.3 [First paragraph]	3.2.2.1 and Equation 3.2	
4.1.3 [Second paragraph]	3.2.2.2 and Equation 3.3	
Figure 4		
4.1.4 Shaft resistance	3.2.3 Shaft resistance	
4.1.4 a)	3.2.4.1 Equation 3.4	
Figure 5	Figure 3.2.4.1 Adhesion factor for piles in cohesive soils	
4.1.4 b) and c)	3.2.4.2 Equation 3.5	
4.2 Column action	3.3 Column action	
	3.3.1 Column behaviour of piles	
4.2.1	3.3.1.1	
4.2.2	3.3.1.2	
4.2.2 a)	3.3.1.3	
4.2.2 b)	3.3.1.4	
4.3 Ultimate lateral strength of single piles	3.4 Ultimate lateral strength of single piles	
	3.4.1 Classification of pile heads	New heading
4.3.1 [First paragraph]	3.4.1.1	
4.3.1 a)	3.4.1.2	
4.3.1 b)	3.4.1.3	
	3.4.1.4	
	Table 3.4.1.4	
4.3.2 Undrained lateral strength of piles in cohesive soil having a constant undrained shear strength with depth	3.4.2 Undrained lateral strength of piles in cohesive soil having a constant undrained shear strength with depth	
4.3.2 a) i)	3.4.2.1 Equation 3.6 Equation 3.7 Equation 3.8	
4.3.2 a) ii) long free head piles	3.4.2.2 Equation 3.9	

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4.3.2 b) i) short restrained head piles	3.4.2.3 Equation 3.10 Equation 3.11	
4.3.2 b) ii) intermediate restrained head piles	3.4.2.4 Equation 3.12 Equation 3.13 Equation 3.14	
4.3.2 b) iii) long restrained head piles	3.4.2.5 Equation 3.15	
4.3.3 Undrained lateral strength of piles in normally consolidated cohesive soil	3.4.3 Undrained lateral strength of piles in normally consolidated cohesive soil	
4.3.3 [First and second paragraph]	3.4.3.1	
4.3.3 a) Long free head pile	3.4.3.2 Equation 3.16 Equation 3.17	
4.3.3 b) i) intermediate restrained head piles	3.4.3.3 Equation 3.18 Equation 3.19	
4.3.3 b) ii) Long restrained head piles	3.4.3.4 Equation 3.20	
4.3.4 Drained lateral strength of piles in cohesionless soil	3.4.4 Drained lateral strength of piles in cohesionless soil	
4.3.4 a) i) Short free head piles	3.4.4.1 Equation 3.21 Equation 3.22 Equation 3.23	
4.3.4 a) ii) Long free head piles	3.4.4.2 Equation 3.24	
4.3.4 b) i) short restrained head piles	3.4.4.3 Equation 3.25 Equation 3.26	
4.3.4 b) ii) Intermediate restrained head piles	3.4.4.4 Equation 3.27 Equation 3.28 Equation 3.29	
4.3.4 b) iii) Long restrained head piles	3.4.4.5 Equation 3.30	
4.4 Pile groups	3.5 Pile groups	
4.4.1 Ultimate vertical strength of pile groups	3.5.1 Ultimate vertical strength of pile groups	

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4.4.1 [First and second paragraph]	3.5.1.1 Equation 3.31 Equation 3.32	
4.4.1 [Third paragraph]	3.5.1.2 Equation 3.33	
4.4.2	3.6.1.3	
4.5 Downdrag	3.1.3 Downdrag	Relocated to Subsection 3.1 as relevant for all piles.
4.5.1	3.1.3.1	
4.6 Ultimate lateral strength of pile groups	3.5.2 Ultimate lateral strength of pile groups	Combined with section on strength reduction factors
4.6.1	3.5.2.1	
Table 3	Table 3.5.2.1 Design lateral resistance for closely spaced piles	
4.7 Strength reduction factors	3.1.2 Strength reduction factors	
4.7.1 [First and second paragraph]	3.1.2.1	
Table 4	Table 3.1.2.1: Strength reduction factors for deep foundation design	
5.0 Pile types	3.1.4 Pile types	Relocated to Part 3 as it relates to pile foundations.
5.1 Concrete piles	<Heading removed>	
5.1.1	3.1.4.1	
5.1.2	3.1.4.2	
5.2 Steel piles	<Heading removed>	
5.2.1	3.1.4.3	
5.2.2	3.1.4.4	
5.3 Timber piles	<Heading removed>	
5.3.1	3.1.4.5	Amended to reference the Building Product Specifications.
5.3.1.1	<Paragraph removed>	Replaced with reference to the Building Product Specification.
References	Appendix A. References	
Definitions	Appendix B. Definitions	
Appendix A (Informative)	Appendix C. Informative Appendices	Informative appendices combined together.
A1.0 Site investigation	C.1 Site investigation	
A1.1 General	C.1.1 Overview	
A1.1.1	C.1.1.1	
A1.1.2	C.1.1.2	

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B1/VM4 First edition Reference	B1/VM2 Second edition Reference	Comments on B1/VM2 Second edition
A.1.1.2 [last sentence]	C.1.1.3	
A1.2 Preliminary investigation	C.1.2 Preliminary investigation	
A1.2.1	C.1.2.1	
A1.3 Detailed investigation	C.1.3 Detailed investigation	
A1.3.1	C.1.3.1	
A1.4 Recording information	C.1.4 Recording information	
A1.4.1	C.1.4.1	
A1.4.2	C.1.4.1	
Appendix B (Informative)	C.2 Foundation settlement	Heading revised based on contents of the appendix.
B1.0 Serviceability limit state deformations (Settlement)	C.2.1 Serviceability limit state deformations	
B1.0.1	C.2.1.1	
B1.0.2	C.2.1.2	
B1.0.3	C.2.1.3	
Appendix C (Informative) Design Example – Retaining Wall Foundation	<Removed from document>	

Information on the second edition

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ISBN (online) 978-1-991409-23-2

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