SRIA

Steel Reinforcement Institute of Australia

Residential Slabs and Footings Construction Requirements

Eric Lume, National Engineer

SRIA Disclaimer

The information presented by the Steel Reinforcement Institute of Australia in this presentation has been prepared for general information only and does not in any way constitute recommendations or professional advice. While every effort has been made and all reasonable care taken to ensure the accuracy of the information contained in this presentation, this information should not be used or relied upon for any specific application without investigation and verification as to its accuracy, suitability and applicability by a competent professional person in this regard. The Steel Reinforcement Institute of Australia, its officers and employees and the authors and reviewers of this presentation do not give any warranties or make any representations in relation to the information provided herein and to the extent permitted by law (a) will not be held liable or responsible in any way: and (b) expressly disclaim any liability or responsibility for any loss or damage costs or expenses incurred in connection with this presentation by any person, whether that person is the reader or downloader of this presentation or not. Without limitation, this includes loss, damage, costs and expenses incurred as a result of the negligence of the authors or reviewers.

The information in this presentation should not be relied upon as a substitute for independent due diligence, professional or legal advice and in this regards the services of a competent professional person or persons should be sought.

SRIA
Steel Reinforcement Institute of Australia

Performance

The most controversial aspect of AS 2870 is almost certainly that some damage may occur even though all parties have fulfilled their obligations competently.

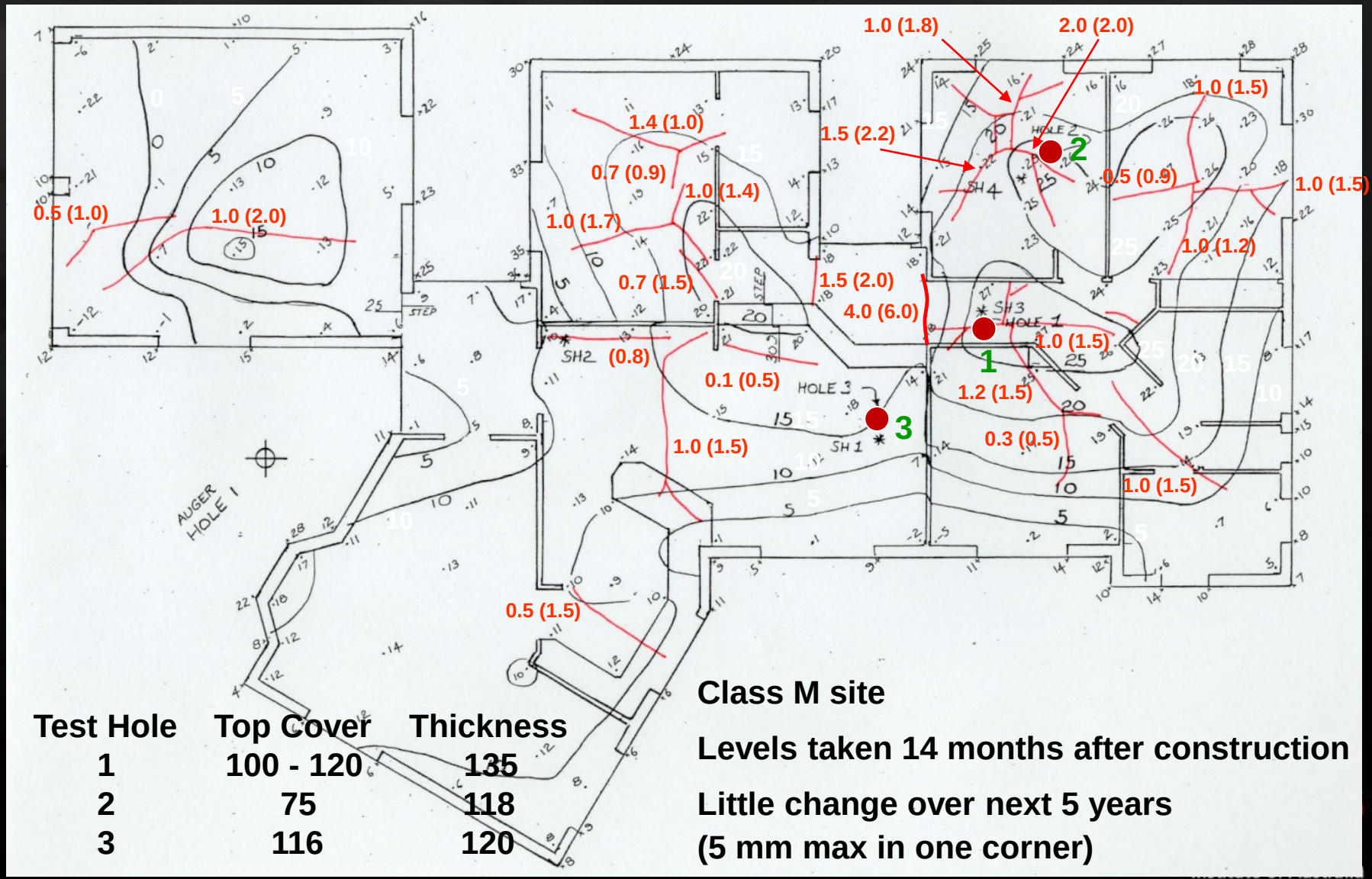
- ➔ Some factors unknown even after detailed investigation
- ➔ Compromise between cost and reasonably foreseeable actions
- ➔ Standard designs not expected to fully resist all actions
- ➔ Homeowners may request more conservative design

Comply with AS 2870 and BCA wherever possible

Simplest and most effective defense

SRIA
Steel Reinforcement Institute of Australia

Performance – Average house slab



Test Hole	Top Cover	Thickness
1	100 - 120	135
2	75	118
3	116	120

Class M site

Levels taken 14 months after construction

Little change over next 5 years (5 mm max in one corner)

Standards are interrelated

AS 3660.1 (2000) Termite management Part 1: New building work

Performance Requirements (Clause 2.3.1)

A concrete slab or footing used as a termite barrier shall….

‘be designed and constructed so that any cracks passing through the slab or footing do not exceed 1 mm in width through the depth of the slab’

Deemed-to-satisfy requirements for concrete slabs (Clause 4.3.1)

‘A slab-on-ground shall be designed and constructed either in accordance with AS 2870 or AS 3600’.

- **Cracking became major issue**
- **Resulted in large number of enquiries**

SRIA
Steel Reinforcement Institute of Australia

Table C2 of AS 2870

Classification of Damage with reference to concrete floors (extract)

Description of typical damage	Approx. crack width limit in floor	Change in offset from a 3 m straightedge centred over defect	Damage category
Hairline cracks, insignificant movement of slab from level	< 0.3 mm	< 8 mm	0 Negligible
Fine but noticeable cracks. Slab reasonably level	< 1.0 mm	< 10 mm	1 Very slight
Cracks noticeable but easily filled. Doors and windows stick slightly	< 2.0 mm	< 15 mm	2 Slight

- **How to ensure limits are achieved?**
- **Construct in accordance with Standard**

SRIA
Steel Reinforcement Institute of Australia

Construction in accordance with AS 2870?

Not just about placing concrete

All factors must be considered as contributing to performance

- Classify site correctly
- Select appropriate standard design
- Modify if necessary for site conditions eg rock outcrops, pipes
- Comply with detailing requirements
- Comply with construction requirements

SRIA
Steel Reinforcement Institute of Australia

Construction in accordance with AS 2870?

Not just about footing/raft design

Walling must also be considered

Articulated Masonry

Section 3 Standard Designs include details for:

- Articulated masonry veneer
- Articulated full masonry

Clause 1.8.1 Articulated full masonry

Full masonry construction incorporating articulation of external and internal walls

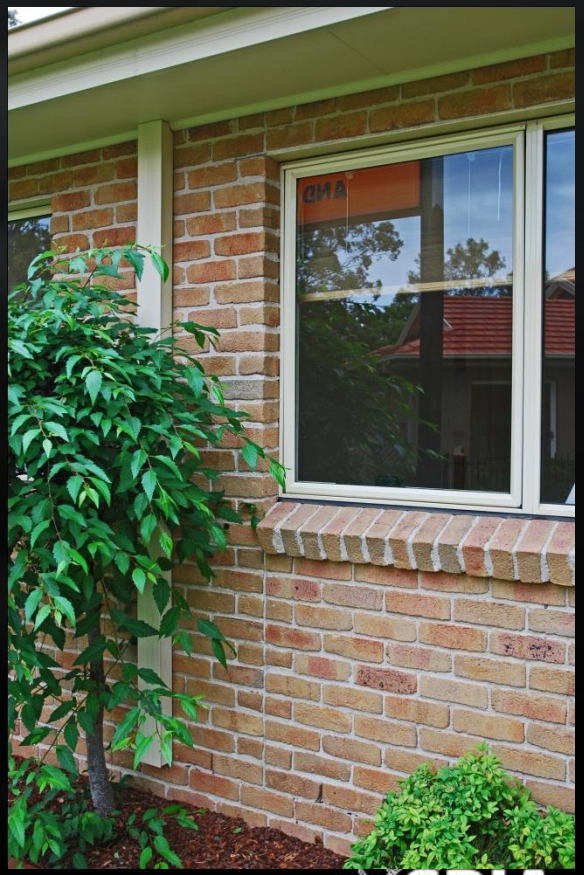
Clause 1.8.2 Articulated masonry veneer

Masonry veneer construction incorporating articulation of the masonry veneer.

SRIA
Steel Reinforcement Institute of Australia

Articulated Masonry

Typical articulation joints



Steel Reinforcement Institute of Australia

Articulated Masonry

AS 4773.1 (2010)

Masonry for small buildings

- contains requirements for articulation joints
- called up in BCA
- contraction joints included
- expansion joints included

Also refer to:

CCAA TN61

Articulated Walling

www.ccaa.com.au

Referenced in AS 2870

TABLE 13.1

SPACING OF ARTICULATION JOINTS FOR UNREINFORCED MASONRY WALLS

Site class (see Note)	Masonry wall construction and surface finish	Joint spacing, m		
		Up to 4 m high for 10 mm joints	4 m to 8.5 m high for 10 mm joints	4 m to 8.5 m high for 15 mm joints
M, M-D	External face finish masonry	6.0	4.2	6.0
	External rendered and/or painted masonry	5.5	3.9	5.5
	Internal face finish or sheeted masonry	6.0	4.2	6.0
	Internal rendered and/or painted masonry	5.5	3.9	5.5
H1, H1-D	External face finished masonry	5.5	3.9	5.5
	External rendered and/or painted masonry	5.0	3.5	5.0
	Internal face finish or sheeted masonry	5.5	3.9	5.5
	Internal rendered and/or painted masonry	5.0	3.5	5.0
H2, H2-D	External face finished masonry	5.0	3.5	5.0
	External rendered and/or painted masonry	4.5	3.2	4.5
	Internal face finish or sheeted masonry	5.0	3.5	5.0
	Internal rendered and/or painted masonry	4.5	3.2	4.5

NOTE: Site class as defined in AS 2870. For further information and guidance on site classification, see AS 2870.

Steel Reinforcement Institute of Australia

Section 5 Detailing Requirements

Drainage

Requirements for rafts and slabs

- Concrete
- Reinforcement
- Vapour barriers and damp-proof membranes
- Edge rebates
- Recesses in slab panels
- Heating cables and pipes
- Shrinkage cracking control
- Beam continuity in rafts
- Beam layout restrictions

SRIA
Steel Reinforcement Institute of Australia

Section 5 Detailing Requirements

Requirements for Pad and Strip Footings

- Concrete
- Reinforcement
- Stepping of strip footings

Requirements in Aggressive Soils

Additional requirements for Classes M, H1, H2 and E Sites

SRIA
Steel Reinforcement Institute of Australia

Drainage

Avoid water ponding against or near the footing

- Slope ground away from building (50 mm over 1 m width)
- Consider effects of a number of variables such as flooding and landscaping

Avoid water entering the building

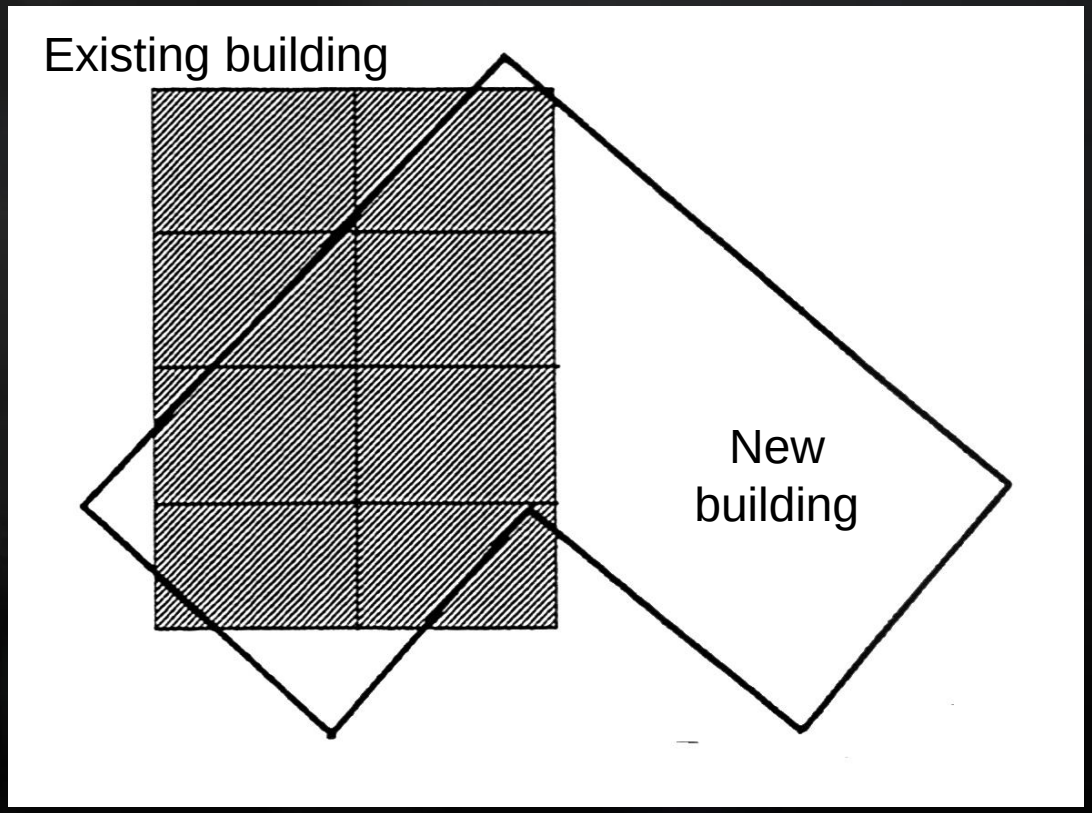
For Class 1 buildings, minimum floor height above finished ground or paving level

- 150 mm typically
- 100 mm for sandy, well-drained areas
- 50 mm where adjacent paving slopes away from building
- May be reduced locally (at doorways) if shielded from weather

SRIA
Steel Reinforcement Institute of Australia

Consider Abnormal Moisture Conditions

- Drains
- Channels
- Ponds
- Dams
- Tanks
- Trees
- Fill
- Urbanisation
- Previous structures

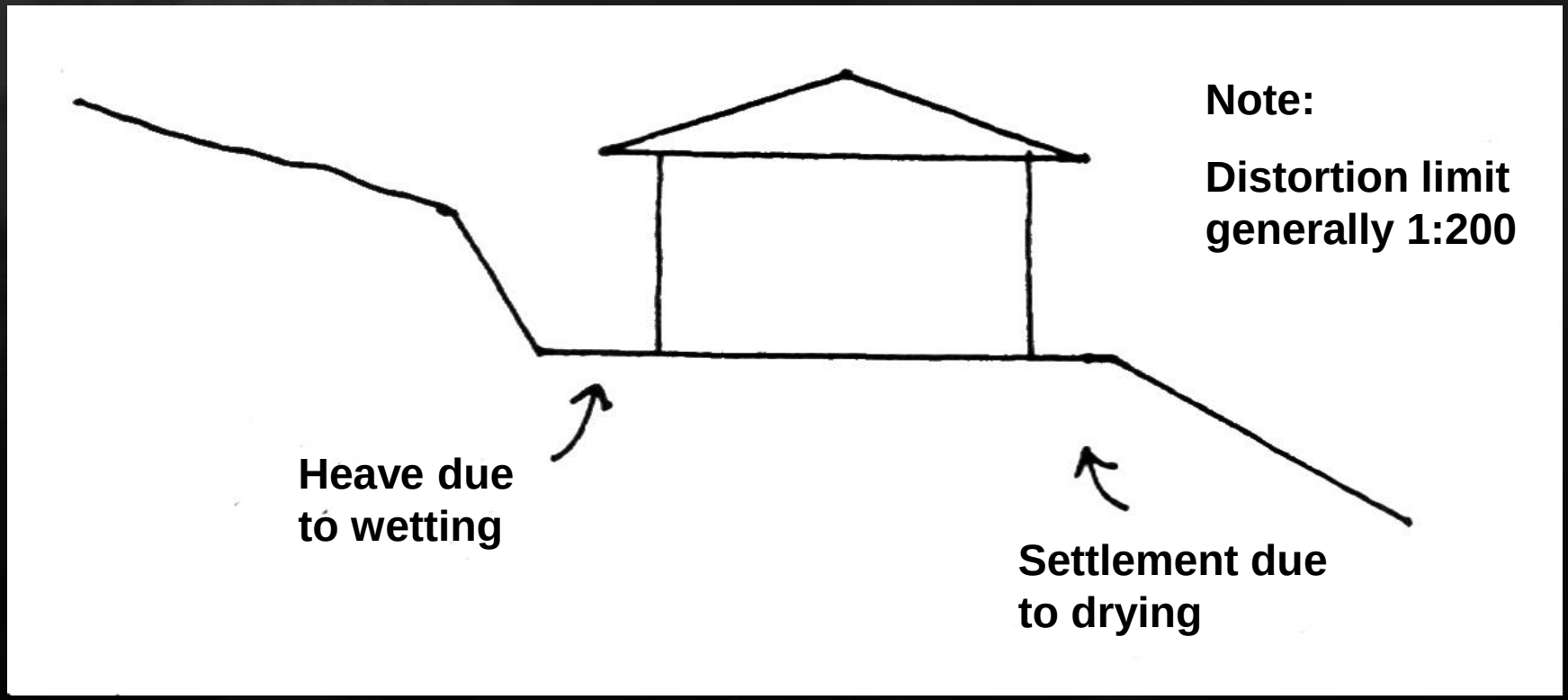


Previous structure has changed moisture conditions

SRIA
Steel Reinforcement Institute of Australia

Abnormal Moisture Conditions

Cut and fill



SRIA
Steel Reinforcement Institute of Australia

Requirements for rafts and slabs

Concrete

- N20, 100 mm slump, 20 mm maximum nominal aggregate size
- In accordance with AS 1379 – ensures quality, not final performance

Reinforcement – previously covered

Vapour barriers and damp-proof membranes

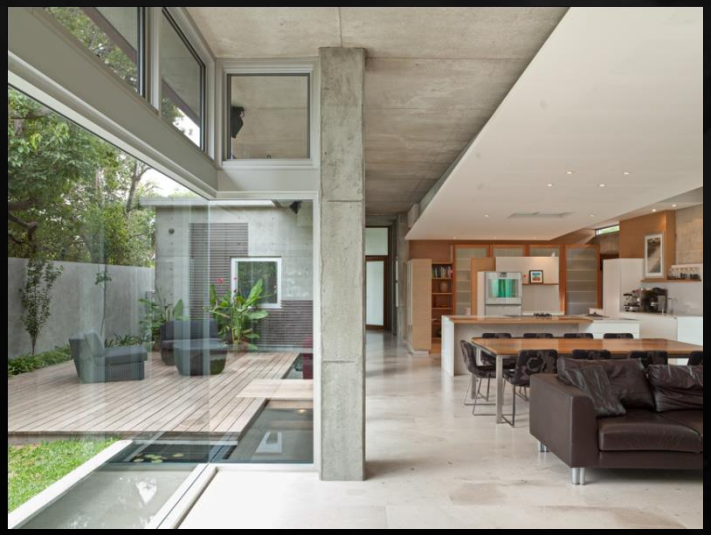
- Materials, properties and installation - only in AS 2870
- NSW and SA required to have damp-proof membrane

SRIA
Steel Reinforcement Institute of Australia

Requirements for rafts and slabs

Shrinkage cracking control

- Re-entrant corners – 2 x 3-L8TM, 1 x 3-L11TM or 3-N12
- Brittle floor coverings
  - Minimum SL92 mesh or extra layer of slab mesh
  - Use appropriate bedding system
  - Delay placement of brittle finishes



Large tiled areas

Polished concrete

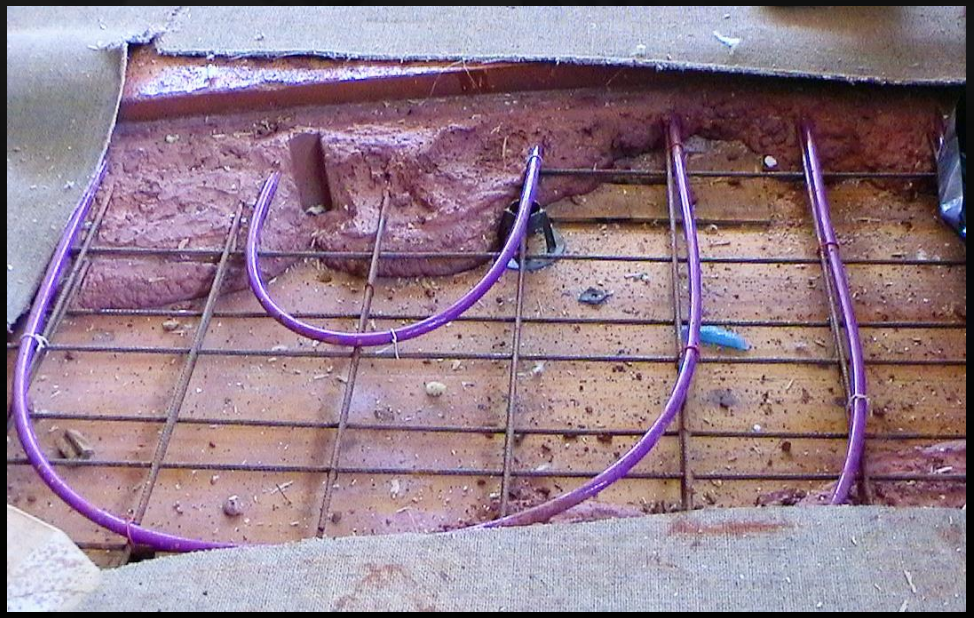
SRIA
Steel Reinforcement Institute of Australia

Requirements for rafts and slabs

Shrinkage cracking control – floor heating

- Electric systems – no increase in slab thickness or mesh size
- Hydronic systems
  - increase slab thickness by 25 mm
  - increase mesh by one size

Hydronic floor heating system



Steel Reinforcement Institute of Australia

Requirements for rafts and slabs

Beam continuity in rafts

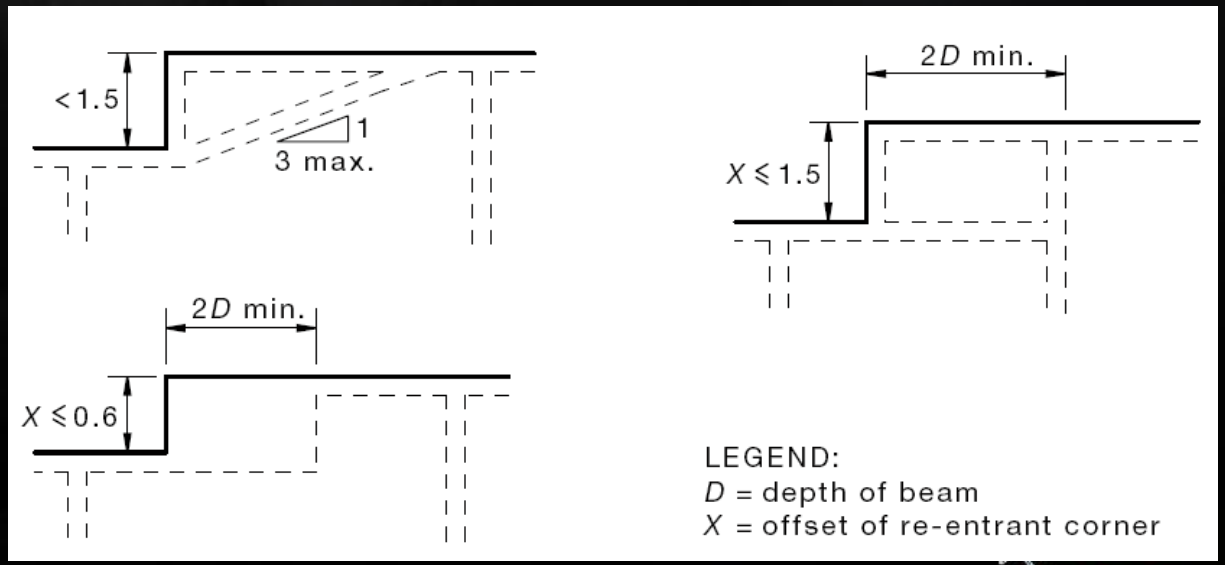
Continuity of internal and external beams must be maintained

- from edge to edge of the slab
- across steps in the slab (Clause 6.4.4 (c) (iii))
- at re-entrant corners
  - provide internal beam
  - if < 1.5 m, refer details in Figure 5.4

Continuity of footing beams

(Figure 5.4 from AS 2870 - 2011)

(dimensions in metres)



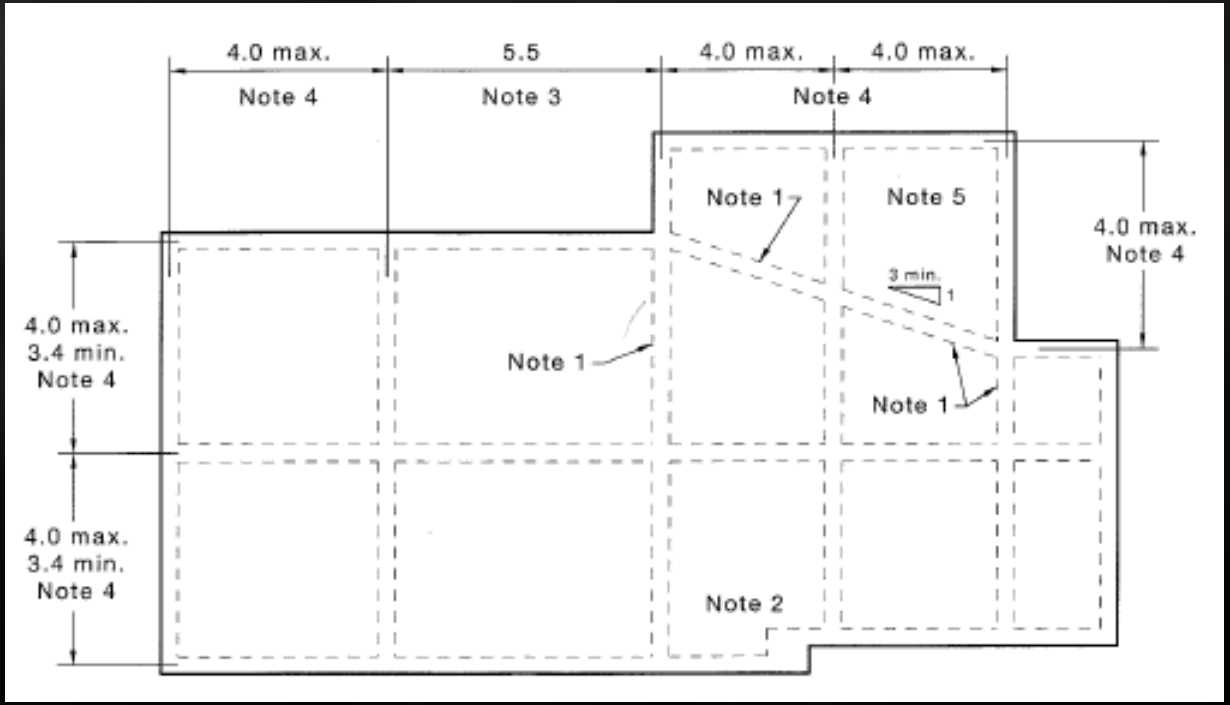
Steel Reinforcement Institute of Australia

Requirements for rafts and slabs

Beam continuity in rafts - Commentary

Arrangement of stiffening beams

(Figure C5.4 from AS 2870 - 2011)

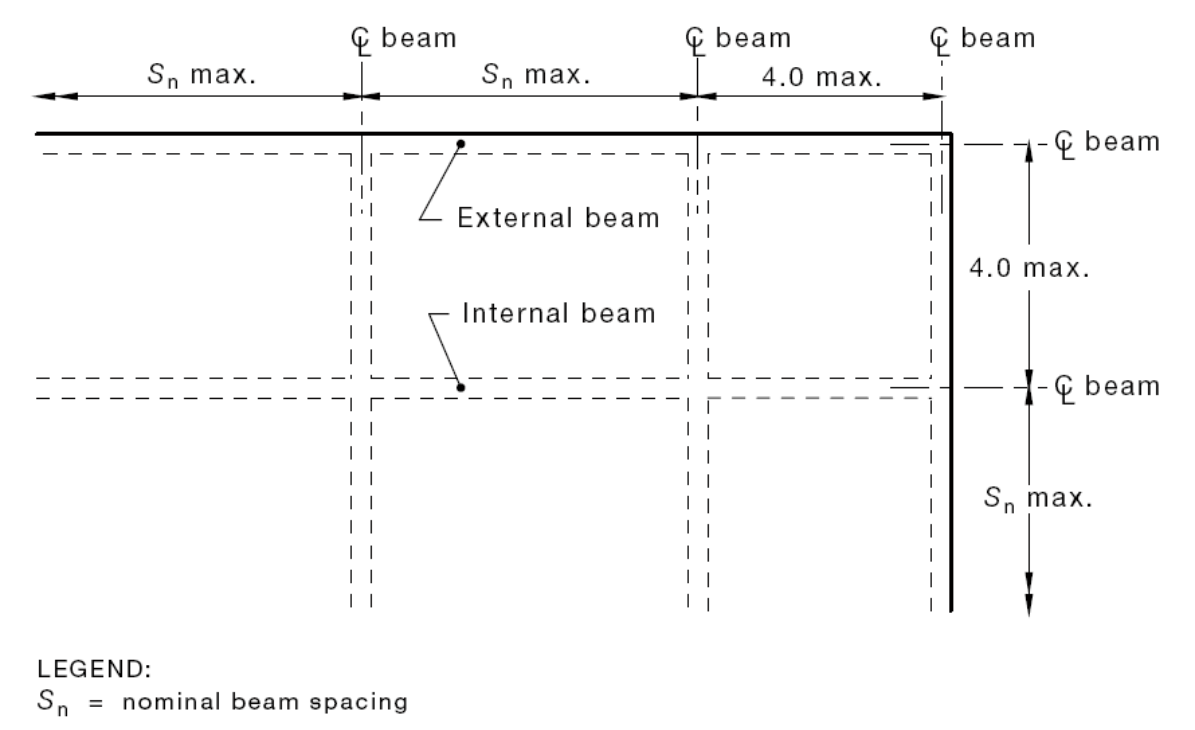


Steel Reinforcement Institute of Australia

Requirements for rafts and slabs

Beam layout restrictions

Limits placed on spacing of internal beams at external corners



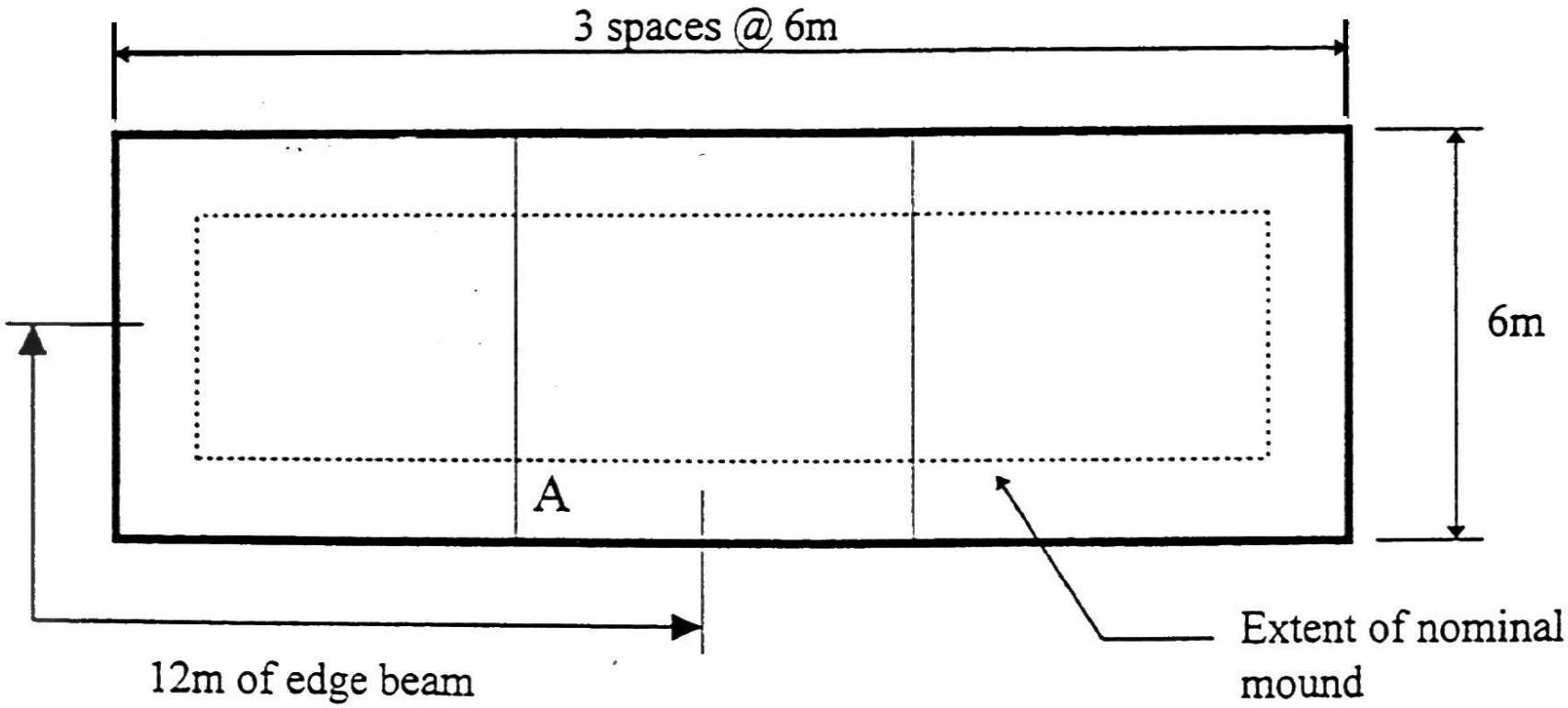
Beam spacing at external corners

(Figure 5.5 from AS 2870 - 2011)

SRIA
Steel Reinforcement Institute of Australia

Requirements for rafts and slabs

Beam spacing at corners

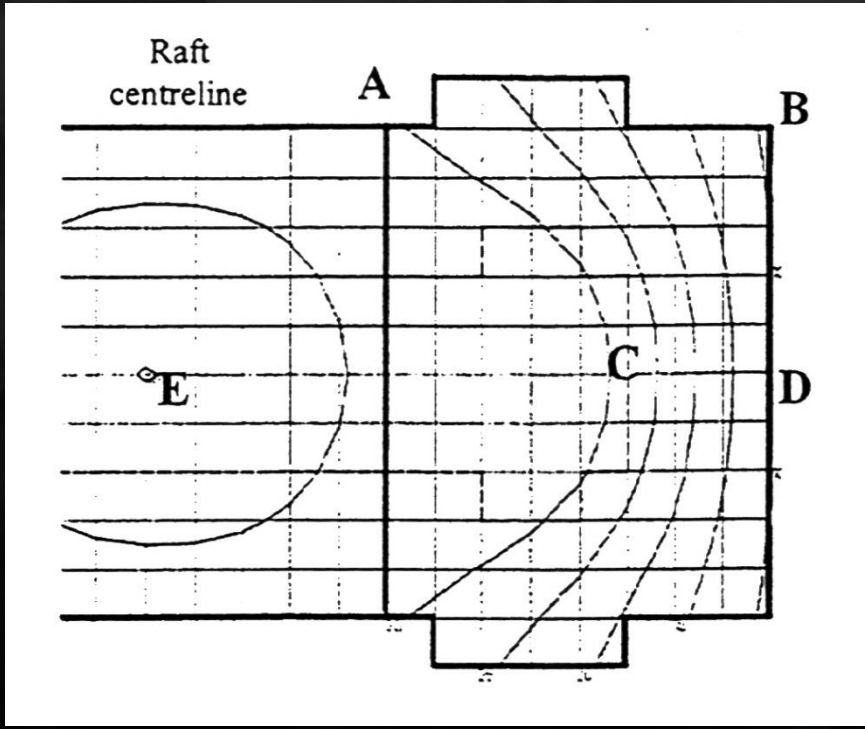


SRIA
Steel Reinforcement Institute of Australia

Requirements for rafts and slabs

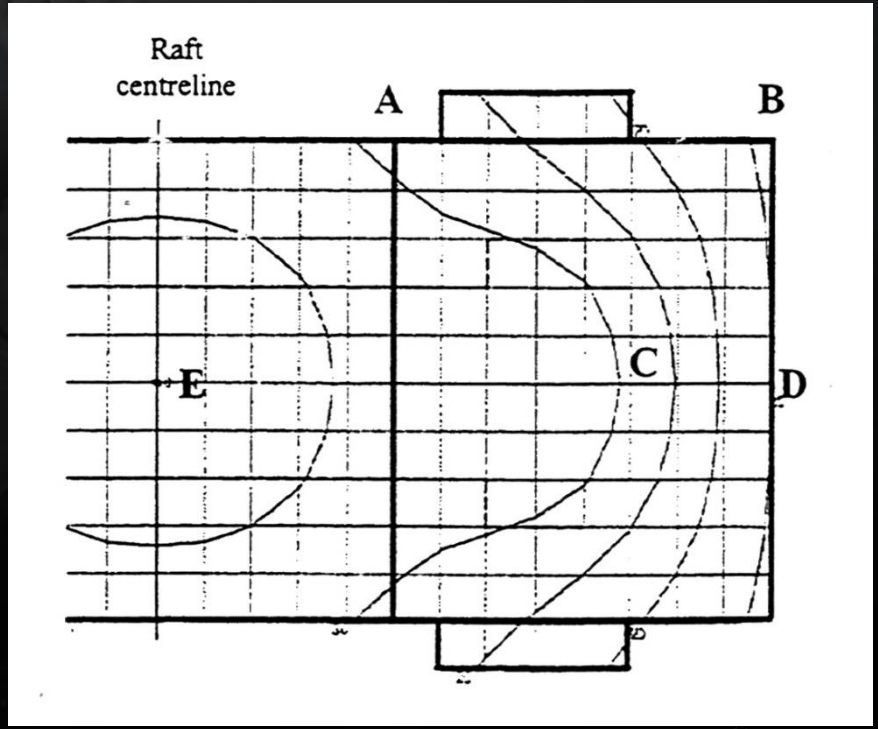
Beam spacing at corners

Nominal beam spacing of 5 m
Bay window extension less than 1.5 m



Fall point A to B 22 mm
Fall point C to D 18 mm
Fall point E to B 31 mm

Nominal beam spacing of 5 m
Beam continuous along perimeter



Fall point A to B 14 mm
Fall point C to D 14 mm
Fall point E to B 26 mm

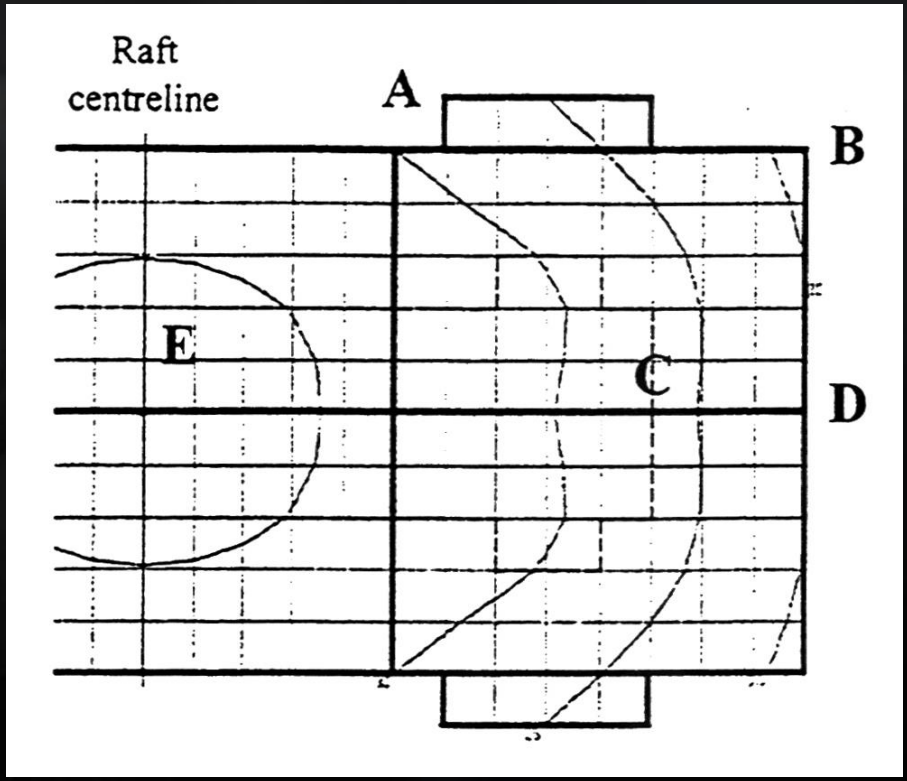
SRIA
Steel Reinforcement Institute of Australia

Requirements for rafts and slabs

Beam spacing at corners

Nominal beam spacing of 5 m
Additional internal beam

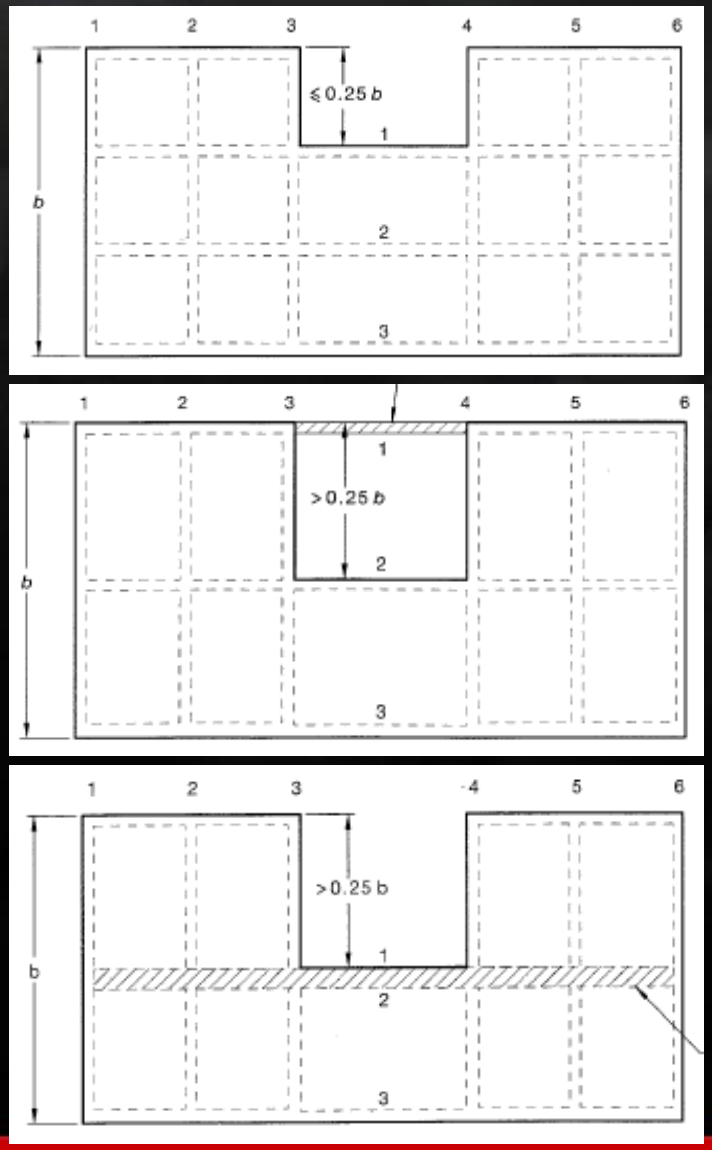
Fall point A to B	11 mm
Fall point C to D	7 mm
Fall point E to B	17 mm

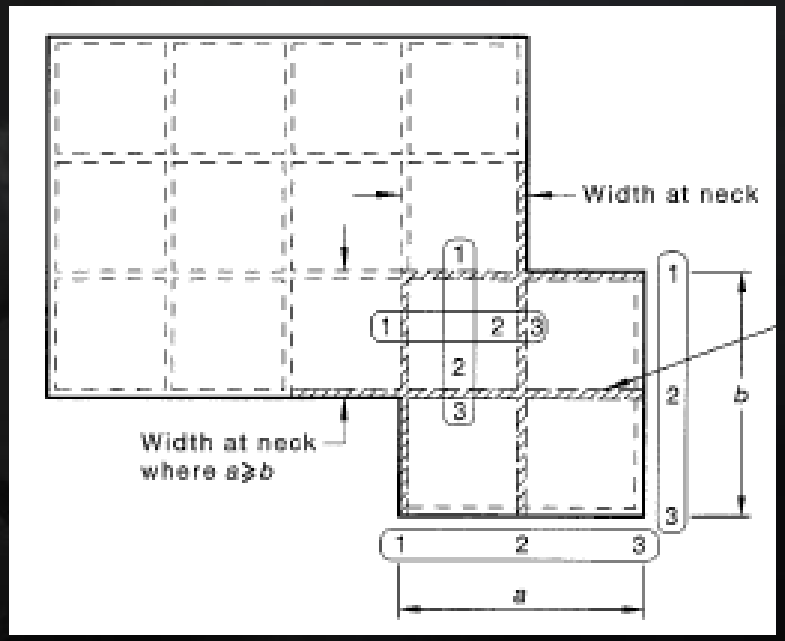


SRIA
Steel Reinforcement
Institute of Australia

Requirements for rafts and slabs

Beam continuity in rafts – maintain stiffness





Arrangement of stiffening beams

(Figure C5.5 from AS 2870 - 2011)

SRIA
Steel Reinforcement Institute of Australia

Requirements for Pad and Strip Footings

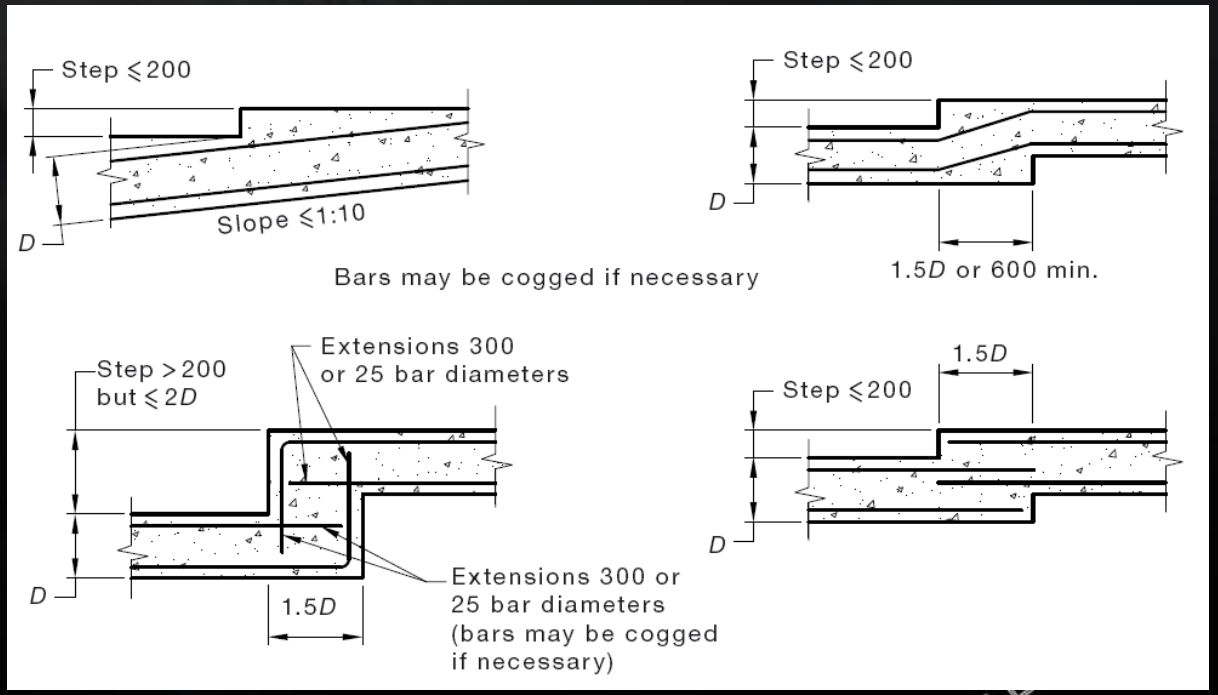
Concrete – as for rafts and slabs

Reinforcement – covered

Stepping of strip footings

Acceptable methods of stepping strip footings

(Figure 5.6 from AS 2870 - 2011)



SRIA
Steel Reinforcement Institute of Australia

Requirements in Aggressive Soils

Saline and sulphate soils

Western Sydney

Wagga Wagga NSW

Efflorescence is more common sign of soil salinity

SRIA
Steel Reinforcement Institute of Australia

Requirements in Aggressive Soils

Requirements in Aggressive Soils – Clause 5.5

Two choices:

1. Isolate the concrete or masonry member from the aggressive soil
2. Use appropriate concrete strength and cover

Isolation of Concrete

Provide damp-proof membrane up to ground or finished paving level

- Extend membrane from under slab up to this point
- Lap membrane from under slab with suitable damp-proofing material (0.5 mm thick) or liquid-applied waterproofing compound applied to face of concrete and extend up to finished ground or paving level.

Requirements in Aggressive Soils

Extend membrane from under slab up to finished ground or paving level

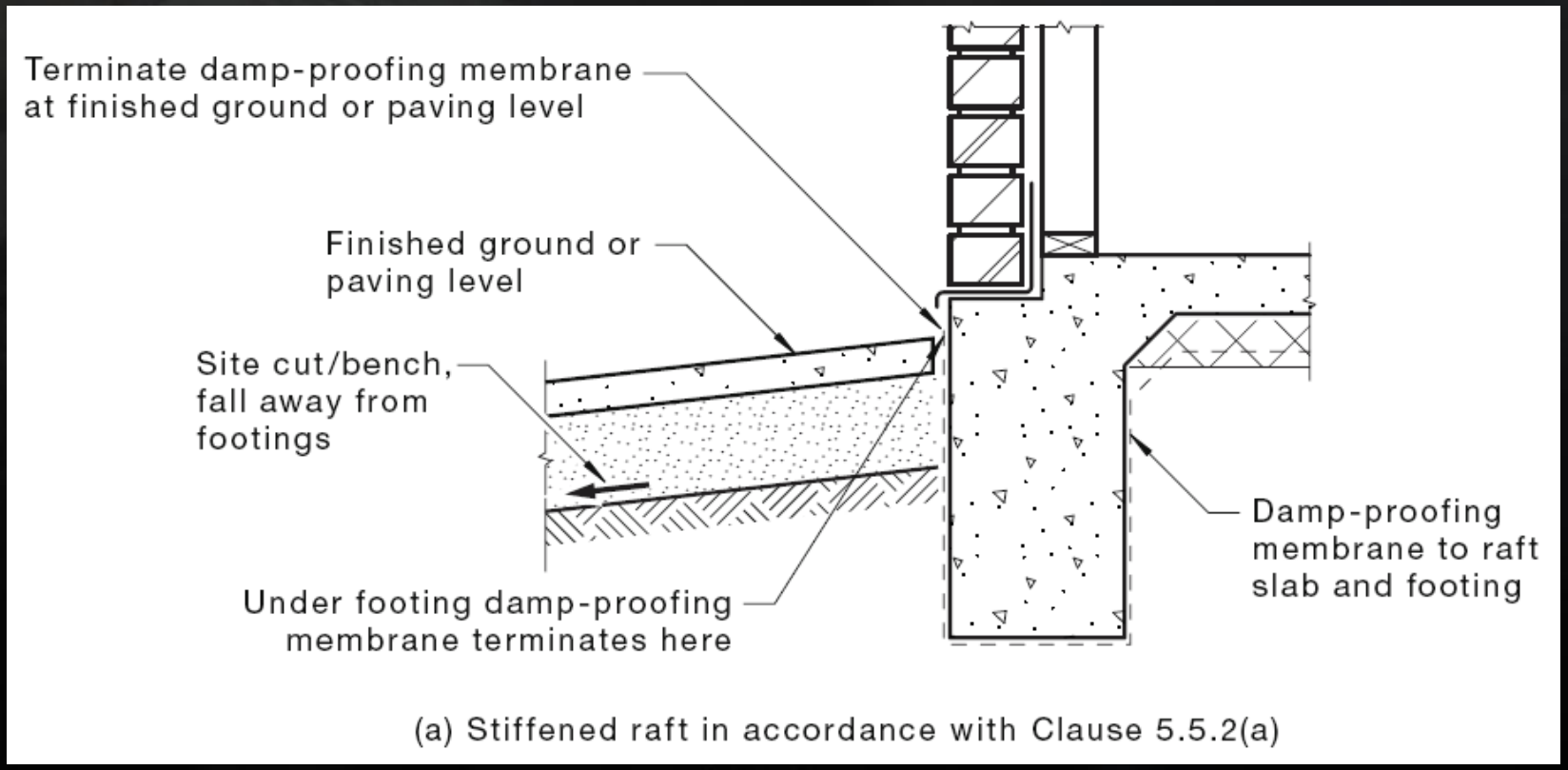


Figure 5.7 Use of damp-proofing membrane for slab protection

(from AS 2870 - 2011)

SRIA
Steel Reinforcement Institute of Australia

Requirements in Aggressive Soils

Some situations may be difficult to rectify

SRIA
Steel Reinforcement Institute of Australia

Requirements in Aggressive Soils

Appropriate concrete strength and detailing – Consistent with AS 3600 - 2009

Step 1 Determine appropriate exposure classification for saline soils

Exposure classification for concrete in saline soils (from Table 5.1 of AS 2870-2011)

Saturated extract electrical conductivity (EC_e), dS/m	Exposure classification
<4	A1
4-8	A2
8-16	B1
>16	B2

Measuring salinity

Courtesy Sydney Environmental & Soil Laboratories P/L

SRIA
Steel Reinforcement Institute of Australia

Requirements in Aggressive Soils

Appropriate concrete strength and detailing

Step 1 Determine appropriate exposure classification for sulfate soils

Exposure classification for concrete in sulfate soils (after Table 5.2 of AS 2870 - 2011)

Exposure conditions			Exposure classification	
Sulfate (expressed as SO_4)		pH	Soil conditions A	Soil conditions B
In soil ppm	In groundwater ppm			
<5000	<1000	> 5.5	A2	A1
5000-10 000	1000-3000	4.5 - 5.5	B1	A2
10 000-20 000	3000-10 000	4 - 4.5	B2	B1
>20 000	>10 000	< 4	C2	B2

SRIA
Steel Reinforcement Institute of Australia

Requirements in Aggressive Soils

Appropriate concrete strength and detailing

Step 2 Determine required concrete strength and curing

Minimum design characteristic strength ( ) and curing requirements for concrete (after Table 5.3 of AS 2870 - 2011)

Exposure classification	Minimum MPa	Minimum initial curing requirement
A1	20	Cure continuously for at least 3 days
A2	25	
B1	32	Cure continuously for at least 7 days
B2	40	
C1	≥50	
C2	≥50	

Standard designs only apply to 20 and 25 MPa concrete
Clause 3.1.1 of AS 2870

SRIA
Steel Reinforcement Institute of Australia

Requirements in Aggressive Soils

Appropriate concrete strength and detailing

Step 3 Determine minimum reinforcement cover

Minimum reinforcement cover for concrete (after Table 5.4 of AS 2870 - 2011)

Exposure classification	Minimum cover in saline soils (mm)	Minimum cover in sulfate soils (mm)
A1	No change	40
A2	45	50
B1	50	60
B2	55	65
C1	Not applicable to salinity	70
C2	Not applicable to salinity	85

SRIA
Steel Reinforcement Institute of Australia

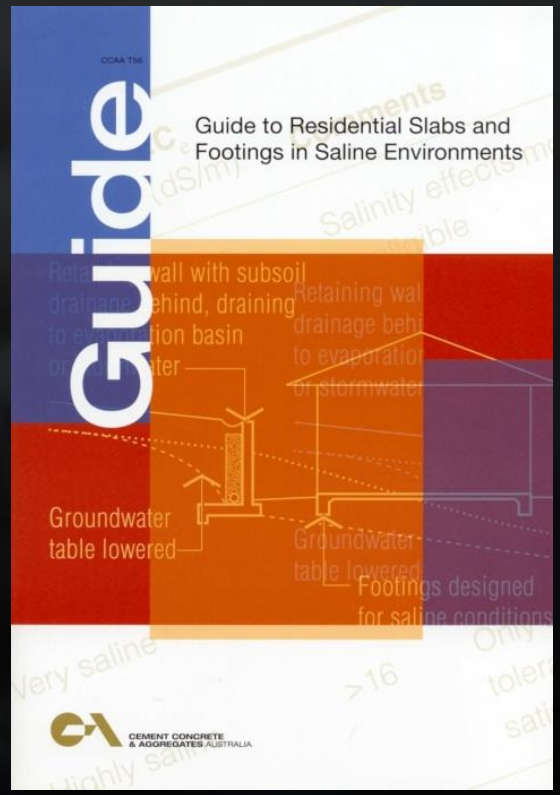
Requirements in Aggressive Soils

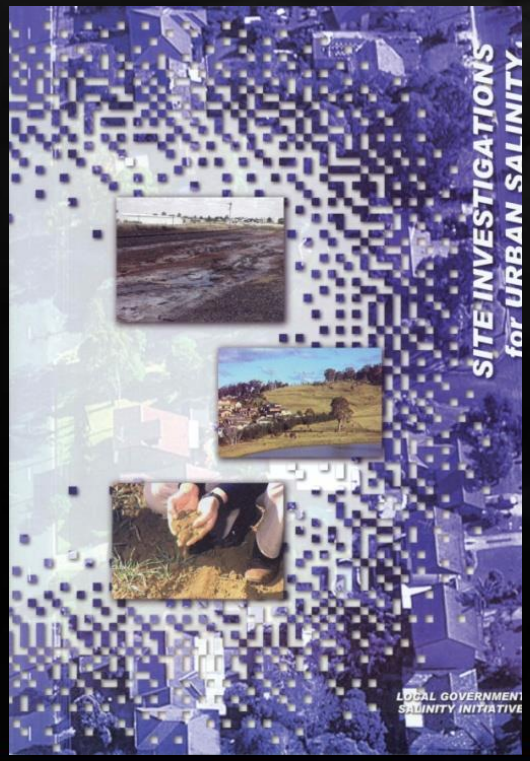
Further Information

1. CCAA Guide to Residential Slabs and Footings in Saline Environments

   www.ccaa.com.au

2. Local Government Salinity Initiative





SRIA
Steel Reinforcement Institute of Australia

Section 6 Construction requirements

Excavations

- If permanent, retain material or batter sides
- If temporary, ensure adequate support of footings is maintained

Construction of slabs

- Filling – controlled and rolled
- Foundations – Natural soil of 50 kPa bearing capacity for slabs
  - Natural soil of 100 kPa bearing capacity for edge footings not tied to a footing slab
  - stepping and sloping of edge beams
  - blinding layer of sand only required for aggressive soils
- Sloping Sites – details of cut and fill
  - stepping of slabs and beams
  - where design of pier-and-slab required

SRIA
Steel Reinforcement Institute of Australia

Section 6 Construction requirements

Construction of slabs (continued)

- Walls retaining fill under slab
- Fixing of reinforcement and void formers
- Placing, compaction and curing of concrete

  The concrete shall be transported, placed, compacted and cured in accordance with good building practice.

Construction of strip/pad footings – Foundations – 100kPa minimum

Additional requirements for **moderately**, highly and extremely reactive sites

- Penetrations through footings - sleeved
- Drainage - water not allowed to pond
- Flexible joints in drains - highly and extremely reactive sites (same as Clause 5.6.4)

SRIA
Steel Reinforcement Institute of Australia

Additional requirements for Class M, H1, H2 and E Sites

Masonry detailing – control joints

Variations in foundation material – part of footing on rock

Drainage requirements – near or under footings

Plumbing requirements – Clause 5.6.4 (b) and 6.6 (e) (i)

Flexible joints to drains

- commence within 1 m of the building perimeter
- accommodate movement up to y_s in any direction
- be set at mid-position of their range at time of installation

  ie movement range of 0.5 y_s from the initial setting

SRIA
Steel Reinforcement Institute of Australia

Additional requirements for Class M, H1, H2 and E Sites

Flexible joints to drains

Steel Reinforcement Institute of Australia

Placing, Compaction and Curing of Concrete

Concrete to comply with AS 1379 Specification and supply of concrete

Ensures good quality concrete, but not final product

Main quality issues

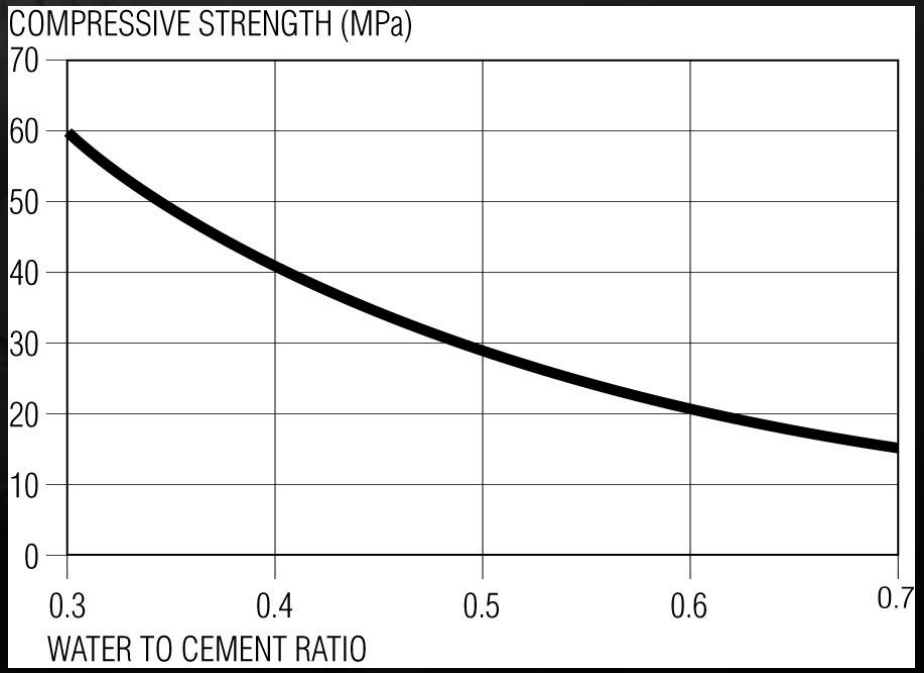
- Addition of excess water
- Compaction
- Curing
- Tolerances

SRIA
Steel Reinforcement Institute of Australia

Placing, Compaction and Curing of Concrete

Addition of excess water on-site

Should be avoided - reduces strength



w/c ratio vs strength

SRIA
Steel Reinforcement Institute of Australia

Placing, Compaction and Curing of Concrete

Addition of excess water on-site

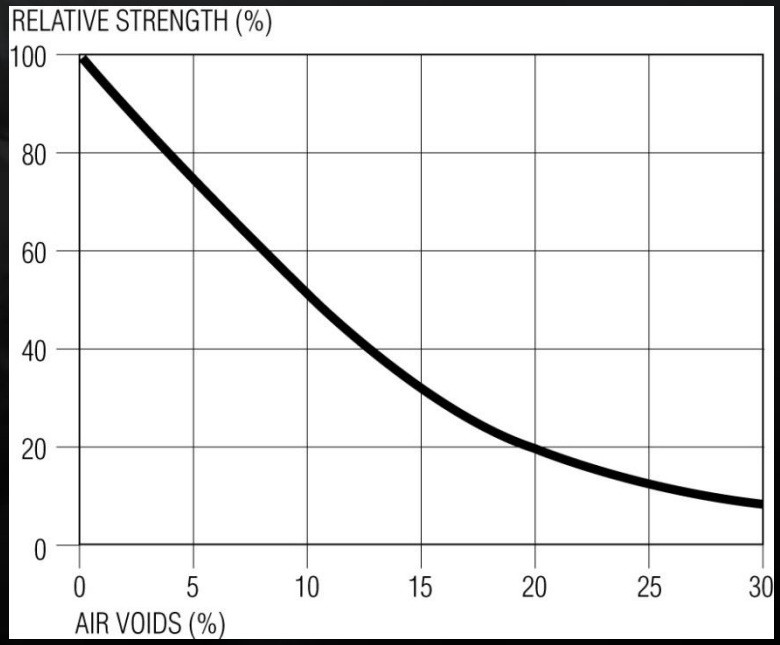
- Produces Laitance/efflorescence
- May result in Flaking
- Increases risk of Cracking
  - both plastic and long-term drying shrinkage

Steel Reinforcement Institute of Australia

Placing, Compaction and Curing of Concrete

Compaction

Expels entrapped air – improves strength and reduces risk of cracking



Loss of Strength through incomplete compaction

SRIA
Steel Reinforcement Institute of Australia

Placing, Compaction and Curing of Concrete

Compaction

Lack of compaction reduces durability and strength

SRIA
Steel Reinforcement Institute of Australia

Placing, Compaction and Curing of Concrete

Curing

- Application of water to or retention of water in concrete
- Improves strength
- Reduces permeability
- Reduces risk of cracking and crack widths

Add water to concrete
(must be continuous)

Retain water in concrete

Steel Reinforcement
Institute of Australia

Placing, Compaction and Curing of Concrete

Curing

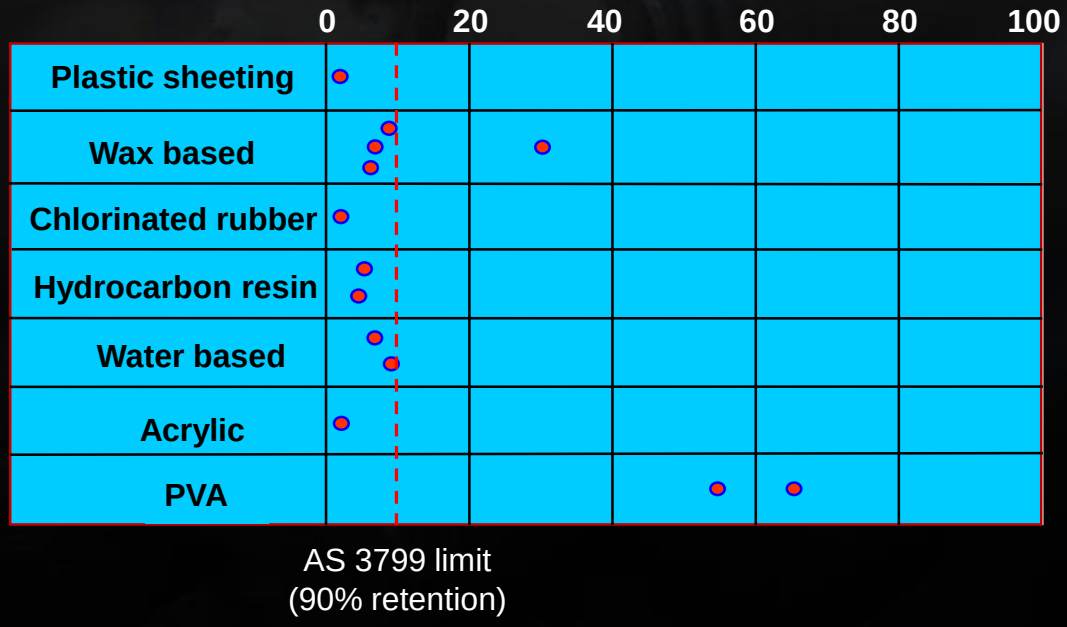
- Important for aggressive soils

  Table 5.3 Curing requirements specified

  Clause 5.5.3(d) Curing methods detailed

- Curing compounds to comply with AS 3799

72 Hour Moisture Loss (as % of untreated sample)

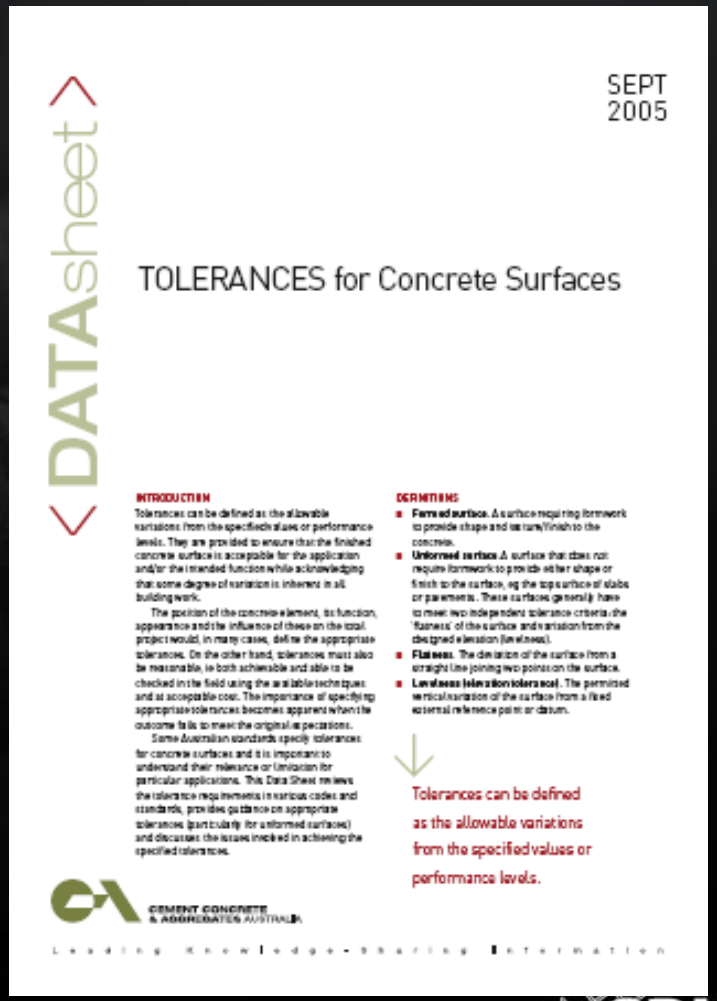


SRIA
Steel Reinforcement Institute of Australia

Placing, Compaction and Curing of Concrete

Surface Tolerances

- Not specified in AS 2870-2011
- Guidance given in CCAA Data Sheet
  - Measurement
  - Standards and specifications
  - Specifying tolerances
  - Achieving tolerances
  - Rectification


DATAsheet

SEPT 2005

TOLERANCES for Concrete Surfaces

INTRODUCTION

Tolerances can be defined as the allowable variations from the specified values or performance levels. They are provided to ensure that the finished concrete surface is acceptable for the application and/or the intended function while acknowledging that some degree of variation is inherent in all building work.

The position of the concrete element, its function, appearance and the influence of these on the total project would, in many cases, define the appropriate tolerances. On the other hand, tolerances must also be reasonable, ie both achievable and able to be checked in the field using the available techniques and at acceptable cost. The importance of specifying appropriate tolerances becomes apparent when the outcome fails to meet the original expectations.

Some Australian standards specify tolerances for concrete surfaces and it is important to understand their relevance or limitation for particular applications. This Data Sheet reviews the tolerance requirements in various codes and standards, provides guidance on appropriate tolerances (particularly for unformed surfaces) and discusses the issues involved in achieving the specified tolerances.

DEFINITIONS

- **Formed surface.** A surface requiring formwork to provide shape and texture/finish to the concrete.
- **Unformed surface.** A surface that does not require formwork to provide either shape or finish to the surface, eg the top surface of slabs or pavements. These surfaces generally have to meet two independent tolerance criteria: the 'flatness' of the surface and variation from the designed elevation (levelness).
- **Flatness.** The deviation of the surface from a straight line joining two points on the surface.
- **Levelness (elevation) tolerance.** The permitted vertical variation of the surface from a fixed external reference point or datum.

Tolerances can be defined as the allowable variations from the specified values or performance levels.

CEMENT CONCRETE & AGGREGATES AUSTRALIA

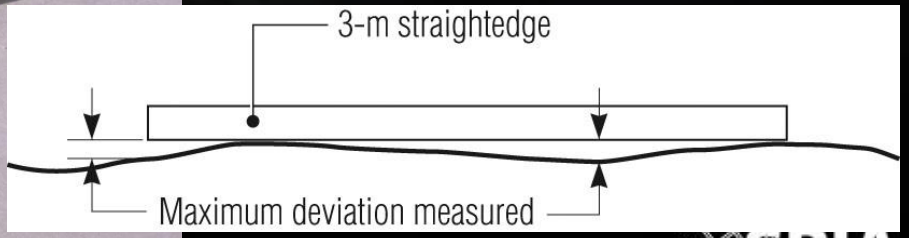
Leading Knowledge-Sharing Information

SRIA
Steel Reinforcement Institute of Australia

Placing, Compaction and Curing of Concrete

Surface Tolerances

- Flatness – the deviation of the surface from a straight line joining two points on the surface
- Typically measured using 3-m straightedge for residential work



SRIA
Steel Reinforcement Institute of Australia

Placing, Compaction and Curing of Concrete

What are reasonable tolerances?

- CCAA Data Sheet
  - Flatness – 12 mm maximum deviation from 3-m straightedge
  - Surface level – to be within ± 10 mm of specified level
- Victorian Building Authority (referenced by Fair Trading NSW) Guide to Standards and Tolerances, 2007
  - Flatness – in any 2 m length ≤ 4 mm (Section 2.08)
    - in any room ≤ 10 mm (Section 2.08)
  - Level – within 40 mm of documented RL or FFL (Section 2.07)
    - entire floor within 20 mm (Section 2.08)
- Tolerances for unformed surfaces should be specified

SRIA
Steel Reinforcement Institute of Australia

Cover

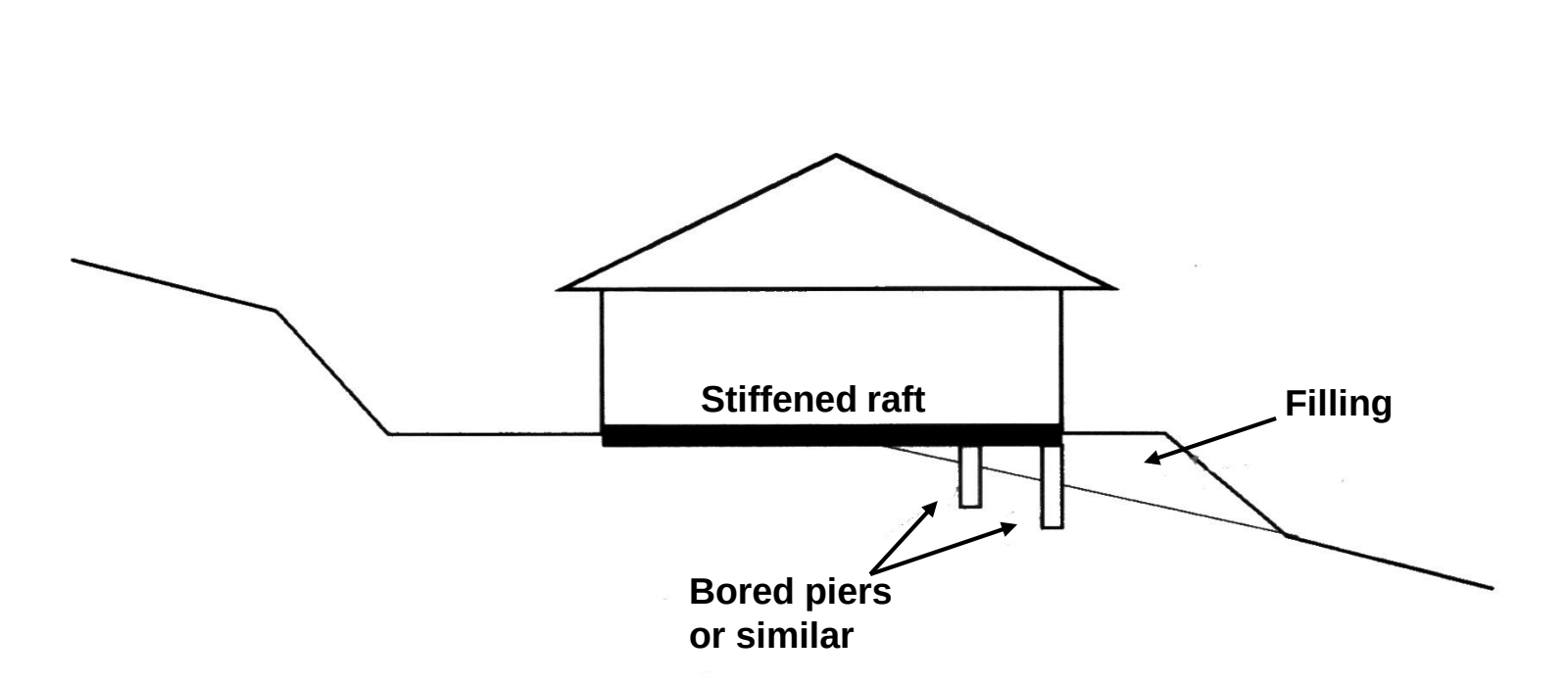
Must be set prior to placement of concrete – AS/NZS 2425: 2015

Steel Reinforcement Institute of Australia

Combined Footing Systems

Is mixed construction allowed? eg deepened footings and stiffened raft

For Class M and H sites, only one standard design shall be used (Clause 3.1.1)



SRIA
Steel Reinforcement
Institute of Australia

Standard Designs

Equivalent construction - Table 3.1 of AS 2870

Actual construction		Equivalent construction
External walls	Internal walls	
Single-leaf masonry		
Reinforced single-leaf masonry	Articulated masonry on Class A and Class S sites, or framed	Articulated masonry veneer
Reinforced single-leaf masonry	Articulated masonry or reinforced single-leaf masonry	Masonry veneer
Reinforced single-leaf masonry	Masonry	Articulated full masonry
Articulated single-leaf masonry	Articulated masonry	Articulated full masonry
Articulated single-leaf masonry	Masonry	Articulated full masonry
Other single-leaf masonry	Framed	Articulated full masonry
Other single-leaf masonry	Masonry	Full masonry
Mixed construction		
Full masonry	Framed	Articulated full masonry
Articulated full masonry	Framed	Masonry veneer
Articulated rendered or sheet clad frame	Framed	Articulated masonry veneer
Precast concrete panels		
Reinforced concrete panel		Articulated masonry veneer
Earth wall construction		
Infill panels of earth wall construction		Articulated masonry veneer
Loadbearing earth wall construction		Articulated full masonry

Design Parameters

Differential footing movement, Δ

Footing design must satisfy both limits in Table 4.1

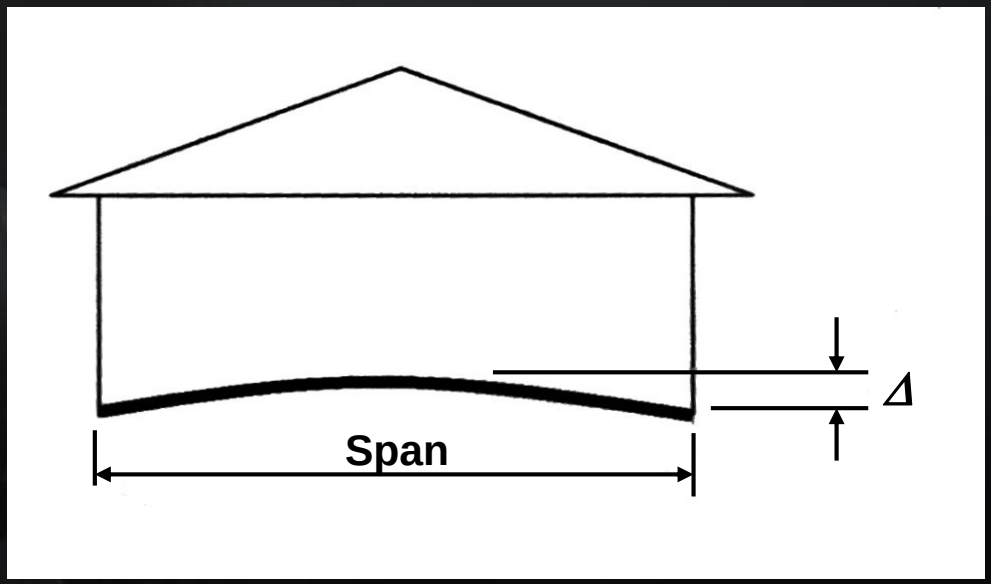


Table 4.1 of AS 2870 - 2011

Type of construction	Maximum differential deflection, as a function of span, mm	Maximum differential deflection, mm
Clad frame	L/300	40
Articulated masonry veneer	L/400	30
Masonry veneer	L/600	20
Articulated full masonry	L/800	15
Full masonry	L/2000	10

SRIA
Steel Reinforcement Institute of Australia

Standard Designs – Figure 3.1 (in part)

Site class	Type of construction	Edge and internal beams				
		Depth (D) mm	Bottom reinforcement		Top bar reinforcement	Max beam spacing cc m
			Mesh	Bar alternative		
Class A	Clad frame	300	3-L8TM	2N12	-	-
	Articulated masonry veneer	300	3-L8TM	2N12	-	-
	Masonry veneer	300	3-L8TM	2N12	-	-
	Articulated full masonry	400	3-L8TM	2N12	-	-
	Full masonry	500	3-L8TM	2N12	-	-
Class S	Clad frame	300	3-L8TM	2N12	-	-
	Articulated masonry veneer	300	3-L8TM	2N12	-	-
	Masonry veneer	300	3-L11TM	3N12	-	-
	Articulated full masonry	500	3-L11TM	3N12	2N12	-
	Full masonry	700	2x3-L11TM	3N16	2N16	5
Class M	Clad frame	300	3-L11TM	3N12	-	6
	Articulated masonry veneer	400	3-L11TM	3N12	-	6
	Masonry veneer	400	3-L11TM	3N12	-	5
	Articulated full masonry	625	3-L11TM	3N12	2N12	4
	Full masonry	950	2x3-L11TM	3N16	2N16	4
Class M-D	Clad frame	400	3-L11TM	3N12	-	5
	Articulated masonry veneer	400	3-L11TM	3N12	1N12	4
	Masonry veneer	500	3-L12TM	3N12	2N12	4
	Articulated full masonry	650	3-L11TM	2N16	2N16	4
	Full masonry	1050	2x3-L11TM	3N16	3N16	4
Class H1	Clad frame	400	3-L11TM	3N12	-	5
	Articulated masonry veneer	400	3-L11TM	3N12	1N12	4
	Masonry veneer	500	3-L11TM	3N12	3N12	4
	Articulated full masonry	750	2x3-L11TM	3N16	2N16	4
	Full masonry	1050	2x3-L12TM	3N16	3N16	4
Class H1-D	Clad frame	400	3-L11TM	3N12	1N12	4
	Articulated masonry veneer	500	3-L11TM	3N12	2N12	4
	Masonry veneer	650	2x3-L11TM	3N16	1N16	4
	Articulated full masonry	800	2x3-L11TM	3N16	2N16	4
	Full masonry	1100	2x3-L12TM	3N16	3N16	4
Class H2	Clad frame	550	3-L11TM	3N12	2N12	4
	Articulated masonry veneer	600	3-L12TM	3N12	2N12	4
	Masonry veneer	750	2x3-L11TM	3N16	2N16	4
	Articulated full masonry	1000	2x3-L11TM	3N16	2N16	4
	Full masonry	-	-	-	-	-
Class H2-D	Clad frame	550	2x3-L11TM	3N16	2N16	4
	Articulated masonry veneer	700	2x3-L11TM	3N16	2N16	4
	Masonry veneer	750	2x3-L11TM	3N16	2N16	4
	Articulated full masonry	1000	2x3-L11TM	3N16	2N16	4
	Full masonry	-	-	-	-	-

SRIA
Reinforcement
ute of Australia

Modification of Standard Design Simplified Method (Clause 4.5)

Design parameters within the following range (Clause 4.5.1)

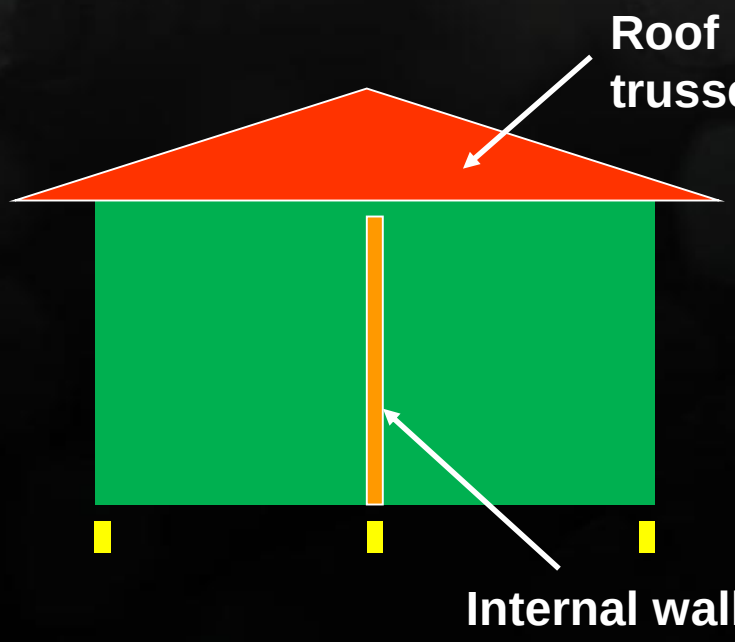
Design Parameter	Range
y_s	10 mm to 70 mm if H_s > 3 m or 10 mm to 100 mm if H_s < 3 m
Δ	5 mm to 50 mm
Span	5 m to 30 m
Beam spacing	≤ 1.25 values in Figure 3.1 Clause 5.3.9 shall apply at external corners of the building. For Class E sites the beam spacing shall not exceed 5 m.
Beam depth	250 mm to 1200 mm
Minimum depth of any beam	≥ 0.8 max. beam depth
Beam width	110 mm to 400 mm
Design distributed load	≤ 10 kPa
Design edge line load	≤ 25 kN/m

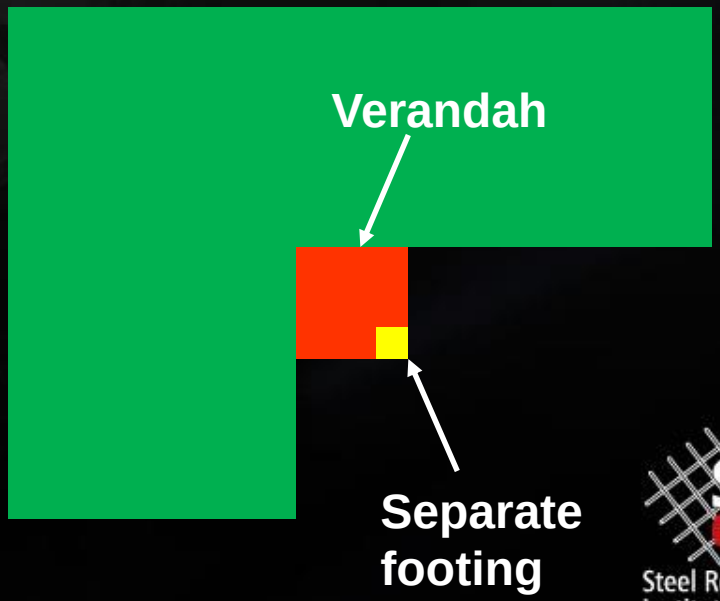
SRIA
Steel Reinforcement Institute of Australia

Detailing Issues

Site considerations

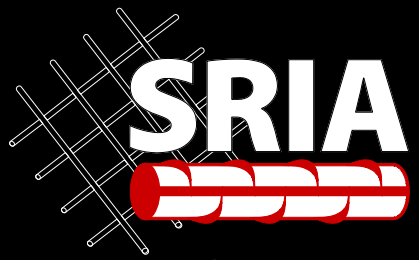
- Verandahs
- Trussed roofs
- Maintenance of drainage
- Gardens and watering
- Plumbing leaks





SRIA
Steel Reinforcement Institute of Australia

Thank You



Steel Reinforcement
Institute of Australia