BUILD RIGHT

Sizing of top plates

A COUPLE OF ERRORS IN THE COLUMN HEADINGS FOR NZS 3604:2011 *TIMBER-FRAMED BUILDINGS* TABLE 8.16 HAVE LEFT SOME SCRATCHING THEIR HEADS. HERE'S SOME POINTERS TO GET USERS BACK ON TRACK.

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TO CORRECTLY USE NZS 3604:2011, it helps to first correct two column headings in Table 8.16(b):

- Change 'Maximum spacing of trusses or rafters' to 'Maximum spacing of floor joists'.
- 'Maximum loaded dimension of wall' should read 'Maximum loaded dimension of wall supporting roof'.

Start with a question

What does the top plate support (see Figure 1)? This leads to the correct part of Table 8.16 to use:

- Where the top plate supports the rafters or trusses of a single or top storey – use Table 8.16(a).
- Where the top plate supports the mid-floor of 2 storeys – use Table 8.16(b).
- Where the top plate is part of a subfloor frame supporting a single storey – use Table 8.16(b).
- Where the top plate is part of a subfloor frame supporting 2 storeys – use Table 8.16(c).

Other considerations

Limited substitution

Top plates can not be substituted with built-up members unless shown in Table 8.16. For example, where the table requires 90 × 70 mm, a built-up member of 2/90 × 35 mm is not permitted.

Positioned over studs

Table 8.16 doesn't apply where rafters/trusses or floor joists are positioned directly over the studs below. In this situation, the top plate must be at least the same width as the studs and a minimum of 35 mm thick.

Bracing line maximum distance

Clause 8.7.4.2 requires a maximum distance of 5 m between bracing lines where the top plate is the boundary of a proposed ceiling and the ceiling is less than 600 kg/m³.

This can be extended up to 6 m when an additional 140 × 35 mm is added to the 90 × 45 mm top plate and fixed at 500 mm centres with either 2/100 × 3.75 mm hand-driven nails or 3/90 × 3.15 mm gun nails. This needs to be the same grade as the top plate.

Note: 10 mm standard plasterboard is about 700 kg/m³, so bracing lines up to 6 m would be allowed using the top plate options in Table 8.16,that is, 90 × 35 mm added to 90 × 45 mm.

Truss supports

Table 8.16 allows for some top plate selections to have a truss supported within 150 mm of the supporting studs. Alternatively, the truss/rafter can sit anywhere on the plate in relation to the studs. The following examples use 'anywhere'.

Example 1 – Table 8.16(a)

The first example is for a single-storey or upper storey frame supporting a roof, so Table 8.16(a) is used. The parameters are:

- heavy roof
- 600 mm stud spacing
- truss position is anywhere
- truss spacing is 900 mm
- loaded dimension of wall is 6 m.

Using Table 8.16(a), work through the steps (see Figure 2):

- Step 1 – Select the relevant column by choosing:
  - heavy roof
  - 600 mm stud spacing column.
- Step 2 – Select the relevant row(s) by looking at:
  - the truss position of anywhere
  - 900 mm truss spacing
  - checking if these provide a loaded dimension of 6 m in the column selected in step 1.
- Step 3 – Read off the required top plate size in the first two columns of the selected row.

In this case, a 90 × 45 mm top plate is required with a 90 × 45 mm dwang under the top plate at the position of trusses or rafters. See NZS 3604:2011 Figure 8.13 for dwang fixings.

Alternatively, consider studs at 400 mm centres. This would require a double 90 × 45 mm top plate or a 90 × 45 mm with an additional 90 × 35 mm plate attached (fixed as referenced above). This option would require the 90 × 35 mm to be replaced with a 140 × 35 mm added to the top plate when bracing lines at right angles to the wall exceed 5 m spacing or if the ceiling is less than the 600 kg/m³ (standard 10 mm plasterboard is approximately 700 kg/m³).

Example 2 – Table 8.16(b)

The second example is for the lower of 2 storeys supporting a mid-floor or a subfloor stud wall supporting one storey. The parameters are:

- heavy roof
- stud spacing is 600 mm centres
- loaded dimension of wall supporting floor is 2.4 m
- floor joists at 400 mm centres
- loaded dimension of 6 m for the wall above the floor that is supporting the roof.

Using Table 8.16(b), work through the steps (see Figure 3(a)):

- Step 1 – Select the relevant column by choosing:
  - heavy roof
  - 600 mm stud spacing column.
- Step 2 – Select the relevant row(s) by looking at:
  - loaded dimension of the wall supporting the floor, i.e. 2.4 m or more – choose 3 m
  - maximum floor joist spacing of 400 mm
  - checking if these provide a loaded dimension of 6 m in the column selected in step 1. ➤

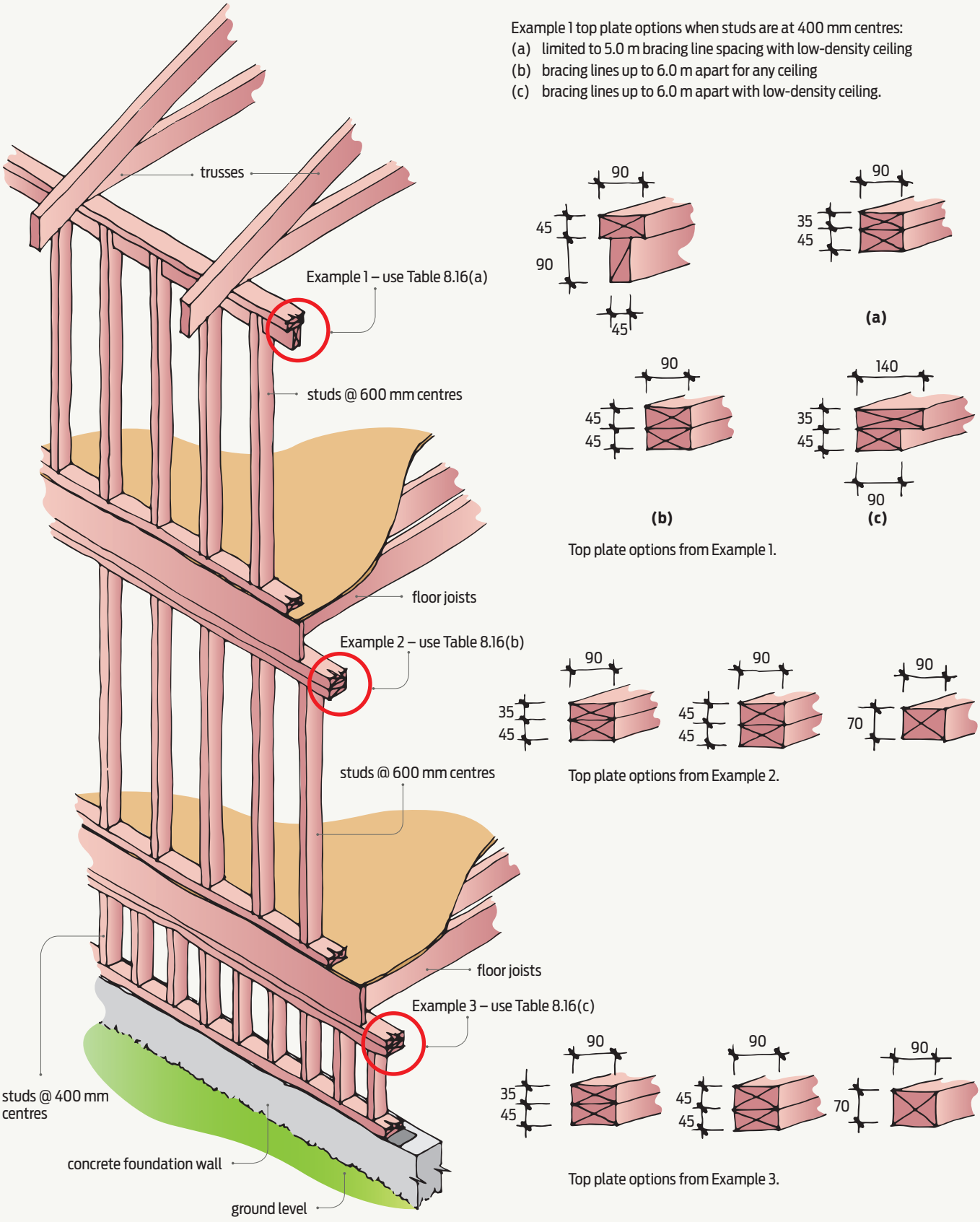


Figure 1 **Top plate options.**

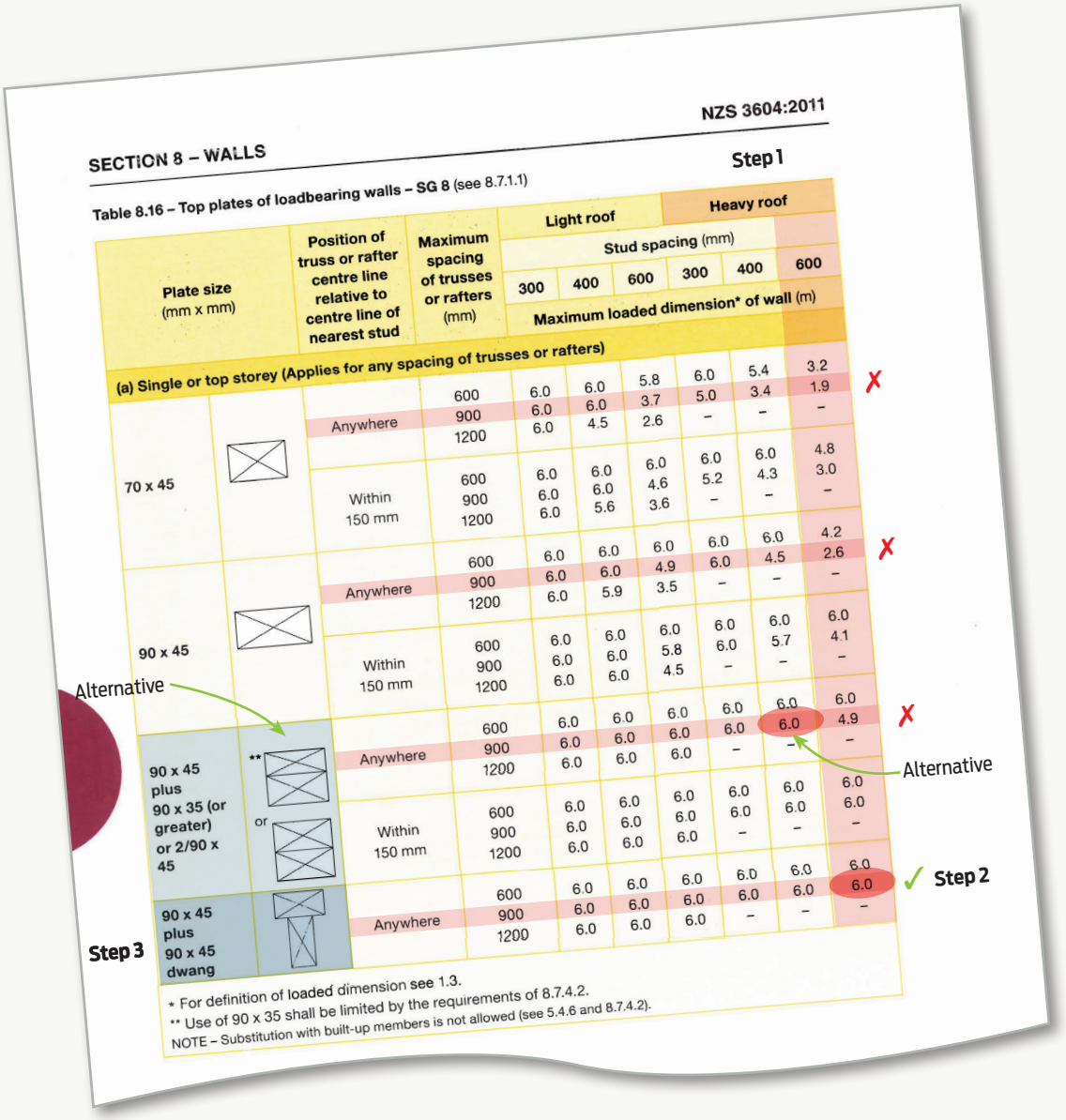


Figure 2 **Example 1 using NZS 3604:2011 Table 8.16(a). Provided by Standards New Zealand under licence 001106.**

- Step 3 – Read off the required top plate size in the first two columns of the selected row(s). In this case, three options are available:
  - 90 × 45 mm plus 90 × 45 mm
  - 90 × 70 mm
  - 90 × 45 mm plus 90 × 35 mm (this can only be used if the bracing lines at right angles to the walls are at 5 m centres or less).

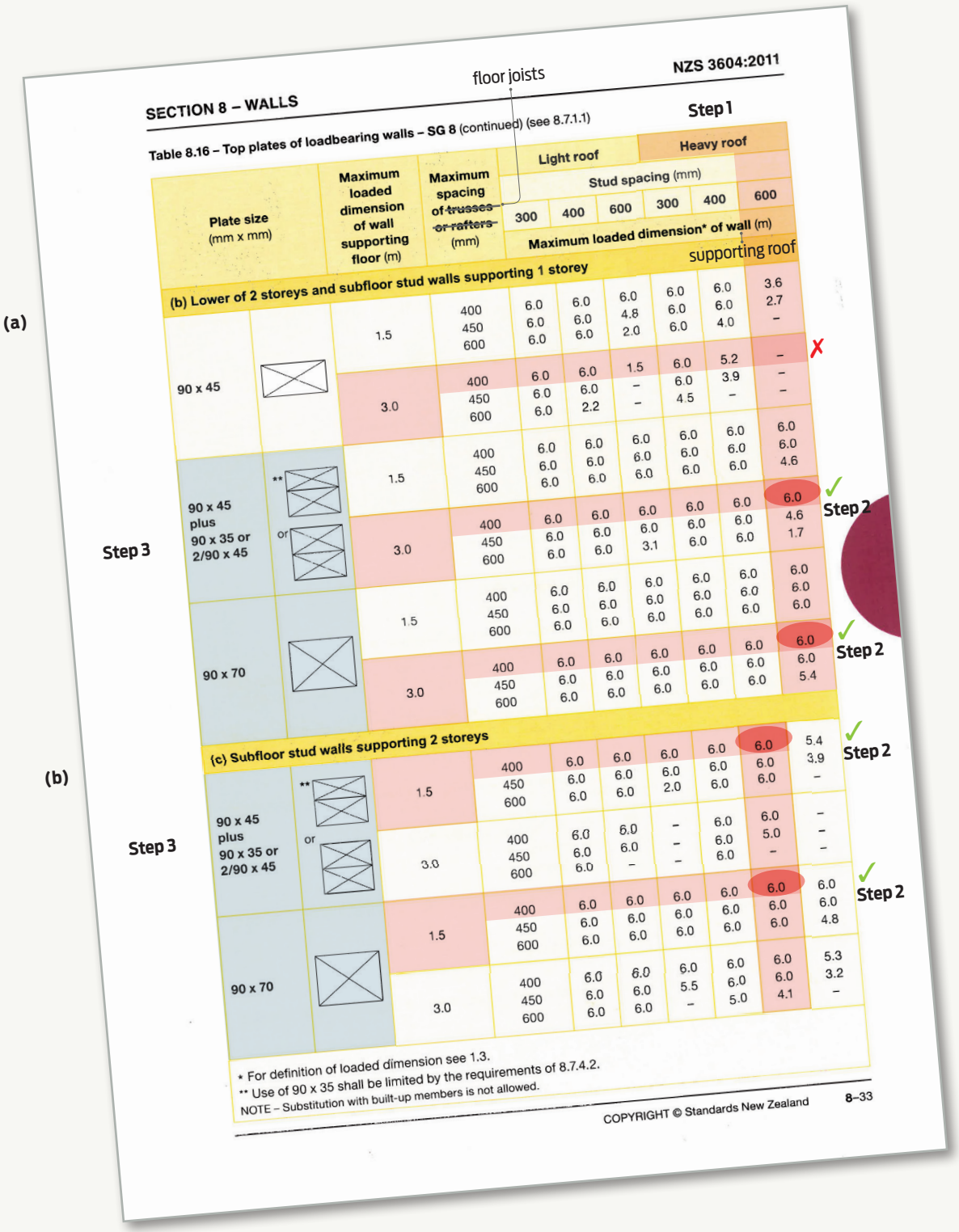
Example 3 – Table 8.16(c)

In the final example, the top plate is in a subfloor wall supporting 2 storeys. The parameters are:

- heavy roof
- stud spacing is 400 mm centres
- loaded dimension of wall supporting the floor is 1.3 m
- joist spacing is 400 mm centres
- loaded dimension of wall supporting roof is 6 m.

Using Table 8.16(c), work through the steps (see Figure 3(b)):

- Step 1 – Select the relevant column by choosing:
  - heavy roof
  - 400 mm stud spacing column.
- Step 2 – Select the relevant row(s) by looking at:
  - loaded dimension, i.e. 1.3 m or more – choose 1.5 m
  - maximum floor joist spacing of 400 mm
  - checking if these provide a loaded dimension of 6 m in the column selected in step 1.
- Step 3 – Read off the required top plate size in the first two columns of the selected row(s). In this case three options are available:
  - 90 × 45 mm plus 90 × 45 mm
  - 90 × 70 mm
  - 90 × 45 mm plus 90 × 35 mm – this can be used as the bracing lines in subfloors are a maximum of 5 m centres and would therefore comply with the requirements of clause 8.7.4.2.



SECTION 8 – WALLS

NZS 3604:2011

floor joists

Step 1

Table 8.16 – Top plates of loadbearing walls – SG 8 (continued) (see 8.7.1.1)

Plate size (mm x mm)	Maximum loaded dimension of wall supporting floor (m)	Maximum spacing of ~~trusses or rafters~~ (mm)	Light roof: Stud spacing (mm) 300	400	600	Heavy roof: Stud spacing (mm) 300	400	600
			Maximum loaded dimension* of wall (m) supporting roof					
(b) Lower of 2 storeys and subfloor stud walls supporting 1 storey								
90 x 45	1.5	400	6.0	6.0	6.0	6.0	6.0	3.6
		450	6.0	6.0	4.8	6.0	6.0	2.7
		600	6.0	6.0	2.0	6.0	4.0	–
	3.0	400	6.0	6.0	1.5	6.0	5.2	–
		450	6.0	6.0	–	6.0	3.9	–
		600	6.0	2.2	–	4.5	–	–
90 x 45 plus 90 x 35 or 2/90 x 45 ** or	1.5	400	6.0	6.0	6.0	6.0	6.0	6.0
		450	6.0	6.0	6.0	6.0	6.0	6.0
		600	6.0	6.0	6.0	6.0	6.0	4.6
	3.0	400	6.0	6.0	6.0	6.0	6.0	6.0
		450	6.0	6.0	6.0	6.0	6.0	4.6
		600	6.0	6.0	3.1	6.0	6.0	1.7
90 x 70	1.5	400	6.0	6.0	6.0	6.0	6.0	6.0
		450	6.0	6.0	6.0	6.0	6.0	6.0
		600	6.0	6.0	6.0	6.0	6.0	6.0
	3.0	400	6.0	6.0	6.0	6.0	6.0	6.0
		450	6.0	6.0	6.0	6.0	6.0	6.0
		600	6.0	6.0	6.0	6.0	6.0	5.4
(c) Subfloor stud walls supporting 2 storeys								
90 x 45 plus 90 x 35 or 2/90 x 45 ** or	1.5	400	6.0	6.0	6.0	6.0	6.0	5.4
		450	6.0	6.0	6.0	6.0	6.0	3.9
		600	6.0	6.0	2.0	6.0	6.0	–
	3.0	400	6.0	6.0	–	6.0	6.0	–
		450	6.0	6.0	–	6.0	5.0	–
		600	6.0	–	–	6.0	–	–
90 x 70	1.5	400	6.0	6.0	6.0	6.0	6.0	6.0
		450	6.0	6.0	6.0	6.0	6.0	6.0
		600	6.0	6.0	6.0	6.0	6.0	4.8
	3.0	400	6.0	6.0	6.0	6.0	6.0	5.3
		450	6.0	6.0	6.0	6.0	6.0	3.2
		600	6.0	6.0	5.5	5.0	4.1	–

* For definition of loaded dimension see 1.3.
** Use of 90 x 35 shall be limited by the requirements of 8.7.4.2.
NOTE – Substitution with built-up members is not allowed.

(a)

Step 3

Step 2

(b)

Step 3

Step 2

Step 2

Step 2

Figure 3 (a) Example 2 using NZS 3604:2011 Table 8.16(b).
(b) Example 3 using NZS 3604:2011 Table 8.16(c). Provided by Standards New Zealand under licence 001106.