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Slips, Trips & Falls
Australian Building Codes Board

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1	Matt Figgis	Matt Figgis	26.02.10
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3	Matt Figgis	Matt Figgis	01.07.10
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1 Executive Summary

Turner and Townsend have been requested to carry out a study into the proposed changes to the 'Slips, Trips & Falls Building Codes' and in particular, analyse the cost implications on various construction techniques compared to the existing standard.

There are 5 areas that are required to be analysed as expressly requested and discussed in Appendix B of the RFQ issued 18 January 2010. Responses to each of these categories has been addressed in section 2 below.

2 Proposed Building Code Changes

2.1 Handrails to staircases

Proposed Change

Requirements to have handrails installed to all stairs in Class 1 buildings (houses) and class 2,3 and 4 Sole Occupancy units (Apartments, flats, hotels, motels, caretaker units and the like) at a height of 865mm

Turner & Townsend deliverable

T&T will cost up the supply and installation of handrails to building classes 1,2,3 and 4 (of assumed size) but to exclude any common areas.

Cost Implication

Type	4m Handrail	5m Handrail	6m Handrail
Hardwood timber	\$264 each	\$330 each	\$400 each
Anodised Aluminium	\$1,000 each	\$1,250 each	\$1,500 each
Steel with PVC sheathing	\$670 each	\$840 each	\$1,000 each

Assumptions

- Each premises has a split level within its demise
- Cost per unit
- Cost are approximate, given no specific specification and current as at 1Q2010
- Cost includes installation, contractors on-costs (preliminaries) @ 15%, professional fees at 15%
- Costs exclude GST

2.2 Stair risers & goings

Proposed Change

Reducing the spread between the maximum and minimum of stair riser and going dimensions. Applicable to all Classes of buildings

Turner & Townsend deliverable

T&T will cost up extra over supply and installation costs (per staircase) of the changes to a) concrete stairs, b) steel / concrete stairs & c) timber stairs.

T&T will also make statement on the effect to the NLA of properties.

Cost Implication

Type 1

Class	Assumed Slab to Slab height (m)	Existing codes		Proposed codes		Extra Cost or Saving in red per flight (\$)	
		Riser Average (mm)	Going Average (mm)	Riser Average (mm)	Going Average (mm)	In-situ Concrete	Timber
		150 No.	300 No.	165 No.	320 No.		
1	3	20	20	18	18	\$55	-\$109
2	3	20	20	18	18	\$55	-\$109
3	3.5	23	23	21	21	\$65	-\$127
4	3	20	20	18	18	\$55	-\$109
5	4	27	27	24	24	\$74	-\$145
6	4	27	27	24	24	\$74	-\$145
7	5	33	33	30	30	\$92	-\$181
8	5	33	33	30	30	\$92	-\$181
9a	4	27	27	24	24	\$74	-\$145
9b	5	33	33	30	30	\$92	-\$181
9c	3	20	20	18	18	\$55	-\$109
10	3.5	23	23	21	21	\$65	-\$127

Type 2

Class	Assumed Slab to Slab height (m)	Existing codes		Proposed codes		Extra Cost or Saving in red per flight (\$)	
		Riser Average (mm)	Going Average (mm)	Riser Average (mm)	Going Average (mm)	In-situ Concrete	Timber
		180 No.	250 No.	180 No.	280 No.		
1	3	17	17	17	17	\$83	\$66
2	3	17	17	17	17	\$83	\$66
3	3.5	19	19	19	19	\$97	\$77
4	3	17	17	17	17	\$83	\$66
5	4	22	22	22	22	\$111	\$87
6	4	22	22	22	22	\$111	\$87
7	5	28	28	28	28	\$138	\$109
8	5	28	28	28	28	\$138	\$109
9a	4	22	22	22	22	\$111	\$87
9b	5	28	28	28	28	\$138	\$109
9c	3	17	17	17	17	\$83	\$66
10	3.5	19	19	19	19	\$97	\$77

Type 3

Class	Assumed Slab to Slab height (m)	Existing codes		Proposed codes		Extra Cost or Saving in red per flight (\$)	
		Riser Average (mm)	Going Average (mm)	Riser Average (mm)	Going Average (mm)	In-situ Concrete	Timber
		190 No.	250 No.	180 No.	280 No.		
1	3	16	16	17	17	\$83	\$131
2	3	16	16	17	17	\$83	\$131
3	3.5	18	18	19	19	\$97	\$153
4	3	16	16	17	17	\$83	\$131
5	4	21	21	22	22	\$111	\$174
6	4	21	21	22	22	\$111	\$174
7	5	26	26	28	28	\$138	\$218
8	5	26	26	28	28	\$138	\$218
9a	4	21	21	22	22	\$111	\$174
9b	5	26	26	28	28	\$138	\$218
9c	3	16	16	17	17	\$83	\$131
10	3.5	18	18	19	19	\$97	\$153

Note that it was not possible to establish a cost impact for steel/concrete staircases, as it would involve significant design input from others to make the analysis meaningful.

Assumptions

- Staircase width 1.1m
- Reo content per m³ of concrete = 130kg/m³
- Timber cost based on hypothetical increase in material only. Any tread or going over 250mm will attract a disproportionate increase in cost due to the standard timber supply dimension being breached. No costs for these are available. Increase in timber cost on Type 1 assumed 3%, Type 2 assumed 3% and Type 3 assumed 2%.
- Slab to slab heights recorded in the table above are deemed appropriate for the class.
- Landings and potential additional strengthening for larger staircases have been excluded from the analysis
- Costs are approximate, given no specific specification and current as at 1Q2010
- Cost includes installation, contractors on-costs (preliminaries) @ 15%, professional fees at 15%
- Costs exclude GST

Impact on NLA: The following table represents the impact on proposed changes to the Nett Lettable Area for hypothetical rooms of 20m² and 30m² respectively:-

Type 1

Class	Assumed Slab to Slab height (m)	Existing floor area usage (1.1m wide) m ²	Proposed floor area usage (1.1m wide) m ²	Increase in available floor area due to proposed codes (assuming room size 20m ²) (%)	Increase in available floor area due to proposed codes (assuming room size 30m ²) (%)
1	3	6.6	6.4	1.00	0.67
2	3	6.6	6.4	1.00	0.67
3	3.5	7.7	7.5	1.17	0.78
4	3	6.6	6.4	1.00	0.67
5	4	8.8	8.5	1.33	0.89
6	4	8.8	8.5	1.33	0.89
7	5	11.0	10.7	1.67	1.11
8	5	11.0	10.7	1.67	1.11
9a	4	8.8	8.5	1.33	0.89
9b	5	11.0	10.7	1.67	1.11
9c	3	6.6	6.4	1.00	0.67
10	3.5	7.7	7.5	1.17	0.78

Type 2

Class	Assumed Slab to Slab height (m)	Existing floor area usage (1.1m wide) m ²	Proposed floor area usage (1.1m wide)	Increase in available floor area due to proposed codes (assuming room size 20m ²) (%)	Increase in available floor area due to proposed codes (assuming room size 30m ²) (%)
1	3	4.6	5.1	-2.75	-1.83
2	3	4.6	5.1	-2.75	-1.83
3	3.5	5.3	6.0	-3.21	-2.14
4	3	4.6	5.1	-2.75	-1.83
5	4	6.1	6.8	-3.67	-2.44
6	4	6.1	6.8	-3.67	-2.44
7	5	7.6	8.6	-4.58	-3.06
8	5	7.6	8.6	-4.58	-3.06
9a	4	6.1	6.8	-3.67	-2.44
9b	5	7.6	8.6	-4.58	-3.06
9c	3	4.6	5.1	-2.75	-1.83
10	3.5	5.3	6.0	-3.21	-2.14

Type 3

Class	Assumed Slab to Slab height (m)	Existing floor area usage (1.1m wide) m ²	Proposed floor area usage (1.1m wide)	Increase in available floor area due to proposed codes (assuming room size 20m ²) (%)	Increase in available floor area due to proposed codes (assuming room size 30m ²) (%)
1	3	4.3	5.1	-3.96	-2.64
2	3	4.3	5.1	-3.96	-2.64
3	3.5	5.1	6.0	-4.62	-3.08
4	3	4.3	5.1	-3.96	-2.64
5	4	5.8	6.8	-5.27	-3.52
6	4	5.8	6.8	-5.27	-3.52
7	5	7.2	8.6	-6.59	-4.40
8	5	7.2	8.6	-6.59	-4.40
9a	4	5.8	6.8	-5.27	-3.52
9b	5	7.2	8.6	-6.59	-4.40
9c	3	4.3	5.1	-3.96	-2.64
10	3.5	5.1	6.0	-4.62	-3.08

2.3 865mm Balustrade

Proposed Change

An 865mm high balustrade or other barrier to be provided when the surface beneath an openable window is >1m (previously 4m)

Turner & Townsend deliverable

T&T to supply unit rates for Juliet balcony's and cost of infilling risk zone with different construction materials.

Cost Implication

Powder coated aluminium balcony with safety glass infill	\$550 ea
Powder coated aluminium framework balcony with vertical balusters	\$410 ea
Plasterboard on metal frame, insulation, brick outer skin wall construction	\$265 ea
Plasterboard on metal frame, insulation, brick/render/paint outer skin wall	\$265 ea
6.38 Laminated safety glass in lieu of 4mm float glass	\$ 50 ea

In the scenario of an opening full height window / sliding door situation, with the proposed changes, the bottom 865mm will need to be fixed / toughened. This will necessitate the incorporation of a transom between the fixed and opening portions. Due to the possibility of so many design variables, it is not possible to provide commentary on the cost impact of this scenario.

Assumptions

- o Juliet balconies 1200mm wide x 1000mm high
- o Opening 1000mm wide x 1000mm high
- o Access platform assumed same for each construction method, therefore excluded from costs
- o New construction rather than refurbishment / retrofitting
- o Cost per unit
- o Cost are approximate, given no specific specification and current as at 1Q2010
- o Cost includes installation, contractors on-costs (preliminaries) @ 15%, professional fees at 15%
- o Costs exclude GST

2.4 Non climbable zone

Proposed Change

A requirement to have a non-climbable zone between a height of 150mm and 750mm off the floor for balustrades more than 1m above the surface beneath.

Turner & Townsend deliverable

T&T to investigate cost implication of changing from horizontal systems to vertical systems.

Cost Implication

The existing codes state that a 125mm sphere cannot pass through the balustrade, and spacing's between support rails must not exceed 900mm. Given these parameters there is minimal difference between in the actual cost of the "barrier wire/rod" in either a vertical or horizontal system.

However, in the vertical system we believe there would be a need to provide an additional support bar at the bottom of the balustrade. – In the horizontal system there is no need as the lowest wire/bar is supported by vertical bars which are required in both circumstances.

Therefore, the cost impact of a vertical system is approximately \$50/m

Assumptions

- New construction rather than refurbishment / retrofitting
- Cost per m
- Cost are approximate, given no specific specification and current as at 1Q2010
- Cost includes installation, contractors on-costs (preliminaries) @ 15%, professional fees at 15%
- Costs exclude GST

2.5 Single steps not to exceed 180mm

Proposed Change

Regulating single steps including door thresholds to a height not more than 180mm, but with no minimum height.

Turner & Townsend deliverable

T&T to provide commentary on implications of this change to both new build projects and refurbishments.

Cost Implication

In new projects we do not believe there will be any impact as building owners will build to within code.

However, in existing buildings there would be “dead” zones which cannot be supported by construction techniques. The first zone is between the 180mm minimum height and 300mm height requiring 2 steps (of minimum 150mm each). If 2 levels differ by this range (180mm to 300mm), the potential remedial options would be:-

- Increase the lower floor level including taking up existing floor finishes and skirtings (if any), provide new floor and then replace floor finishes or provide new if original finish not usable.
- Decrease the lower floor level including taking up existing floor finishes and skirtings (if any), hack up floor and sub-base material, provide new floor and then replace floor finishes or provide new if original finish not usable. Then provide 2 steps and associated handrail.
- Alternatively the higher floor level could be raised or lowered to similar scope as described above.

These remedial treatments to existing premises could be extremely difficult and expensive. In some circumstance they may not be possible without altering the foundations.

The ABCB have advised of other “dead” zones between 360- 450mm, 540 – 600mm and 720 – 750mm. In each of these circumstances staircases cannot be built as the proposed minimum & maximum riser height is 150mm and 180mm, and risers heights must be constant. Where these height ranges occur, the floors of the properties will either need to be raised or lowered by the appropriate amount.

3 Information used

The following information has been used in the preparation of this estimate:-

Drawings / Information	Date Received
ABCB Schedule of proposed changes (Attachment B or RFQ)	18.01.2010
T&T / ABCB Meeting clarifying scope of commission	27.01.2010
T&T confirmation of scope included in Contract	29.01.2010
ABCB Schedule of assumptions for riser and goings	24.06.2010

4 Assumptions

- As listed in each analysis in Section 2
- T&T are not designers and therefore our analysis is based on reasonably industry knowledge of building practices.