Sustainable Thermal Solutions
STS

NCC Section J Report

Boarding House

102 Broomfield St
CABRAMATTA NSW 2166

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Version	Date	Approved by
2 (final)	11 November 2020	Bruce Carr

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1 INTRODUCTION

This report assesses the proposed development for its compliance with Section J energy efficiency provisions of the National Construction Code (NCC) 2016 Volume 1. These provisions will apply or all new (and altered) construction work.

This report will detail the measures required to achieve compliance and will be required as part of the submission to the council or the consent authority for the Construction Certificate application.

2 APPLICATION

NSW J(B) states that Class 3 and Class 5 to 9 building must comply with the provisions of the national Section J.

Therefore, the Section J Deemed-to-Satisfy (DTS) provisions of the NCC 2016 Amendment 1 (Volume One) have been applied for the assessment of this project and this report will outline what measures are required for this building to comply.

The DTS provisions consist of 7 Parts.

This report is concerned with the following parts:

- Part J1: Building Fabric
- Part J2: Glazing
- Part J3: Building Sealing
- Part J6: Artificial Lighting and Power
- Part J7: Hot Water Supply
- Part J8: Access for Maintenance

The following sections will not form part of this report, as they will require the expertise of specialist service consultants:

- Part J5: Air-conditioning and Ventilations Systems

(Note: Part J4 has been removed from NCC since 2010)

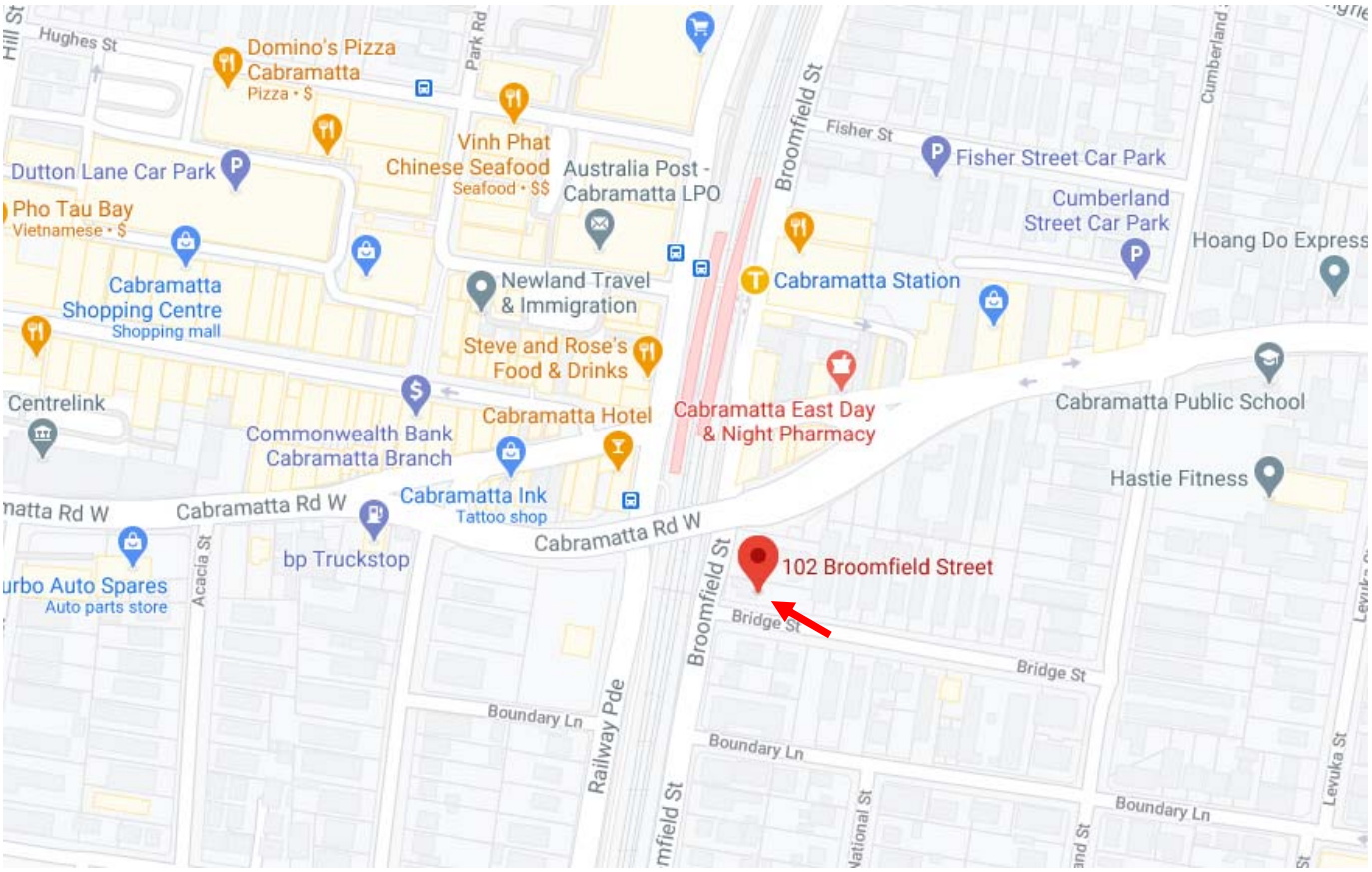
3 BUILDING DETAILS

The title, address and location details for the project are as follows:

Project: Boarding House

Address: 102 Broomfield St CABRAMATTA NSW 2166

Authority: Fairfield City Council



Climate zone: 6 (*Mild Temperate*)

- This climate zone is characterised by low diurnal temperatures near the coast to high diurnal ranges inland.
- Four distinct seasons: Summer and winter can exceed human comfort range, spring and autumn are ideal for human comfort
- Mild to cool winters with low humidity, hot to very hot summers with moderate humidity

Description: A new 5 storey Boarding House consisting of 36 self-contained rooms is being built at the above address. There is a 2 level basement car park directly under the ground floor. There is also a Common Room on the ground level. There will be new glazing on all facades. As all rooms will be conditioned, the glazing and external (envelope) walls are required to comply with the NCC.

Building class: **Class 3**: "*a residential building, other than a building of Class 1 or 2, which is a common place of long term or transient living for a number of unrelated persons including a boarding house, guest house…"*

References:

a) Plans:

URBAN LINK

Project No.: 19-029. Issue Date: 5/11/2020

Version C: 04/11/2020

Drawing Numbers: DA001, DA1001, DA1002, DA1003, DA2001, DA2002, DA2003, DA2004, DA2005, DA2006, DA2007, DA2101, DA2103, DA2104, DA2105, DA2106, DA3001, DA3002, DA3003, DA4001, DA6001.

b) National Construction Code 2016 Vol. 1 (Amendment 1)

4 SUMMARY AND CERTIFIER CHECK:

Below is a summary of the energy efficiency actions required to meet the requirements of the NCC. Details are available in each relevant section.

Element	Insulation Requirements	Action	Certifier Check
Ceiling/Roof	Insulation is required in the concrete roof of level 4	Add minimum insulation of **R2.62** (or **R2.84** if insulation fills the cavity above the plasterboard)	
External Walls	Insulation is required in the external walls: Ground-L3: face brick/air space/ 120mm AFS. Level 4: 6mm fibre sheet cladding, 90mm stud frame, 10mm plaster.	 Add minimum insulation of **R1.66** in cavity (or **R1.83** if insulation fills the cavity) Add minimum insulation of **R2.38** in cavity (or **R2.55** if insulation fills the cavity)	
Walls other than External: (dividing conditioned & non-conditioned space	Party wall between the units and the lifts/ stairwells: These are constructed of 200mm AFS on a stud frame and lined internally with plasterboard	Add minimum insulation of **R0.47** in stud frame	
Floor	Insulation is required only in the suspended concrete floor of all ground floor rooms and some of level 1 rooms that are above 'open air'.	Install minimum insulation of **R1.7**	
External Glazing	Refer to Section 6 for required glazing specifications	Ensure that a certificate of compliance is supplied with the windows.	

J3: Building Sealing

Sealing of new doors and windows is required. Refer to the relevant sections below for details.

J5: Air Conditioning and Ventilation Systems:

Refer to the design and installation requirements of the Mechanical Engineer or trade contractor's specifications.

J6: Artificial Lighting and Power:

See Section 10 further requirements on interior lighting and control.

J7: Hot Water Supply and

Hot water system to be installed in accordance with Part B2 of NCC Volume 3 – Plumbing Code of Australia.

J8: Accesses for Maintenance

A building or sole occupancy unit with a floor area of more than 500 m^2 must have the facility to record the consumption of gas and electricity.

Following is the detail of each part of Section J of the NCC:

Parts J1 – J3 are applicable only to NEW or ALTERED building works forming part of the external envelope around conditioned areas and the envelope separating the conditioned space from un-conditioned space.

5 PART J1: BUILDING FABRIC

The NCC Part J1 is concerned with the following 4 provisions:

- J1.3 – Roof and ceiling construction
- J1.4 – Roof lights
- J1.5 – Walls
- J1.6 – Floors

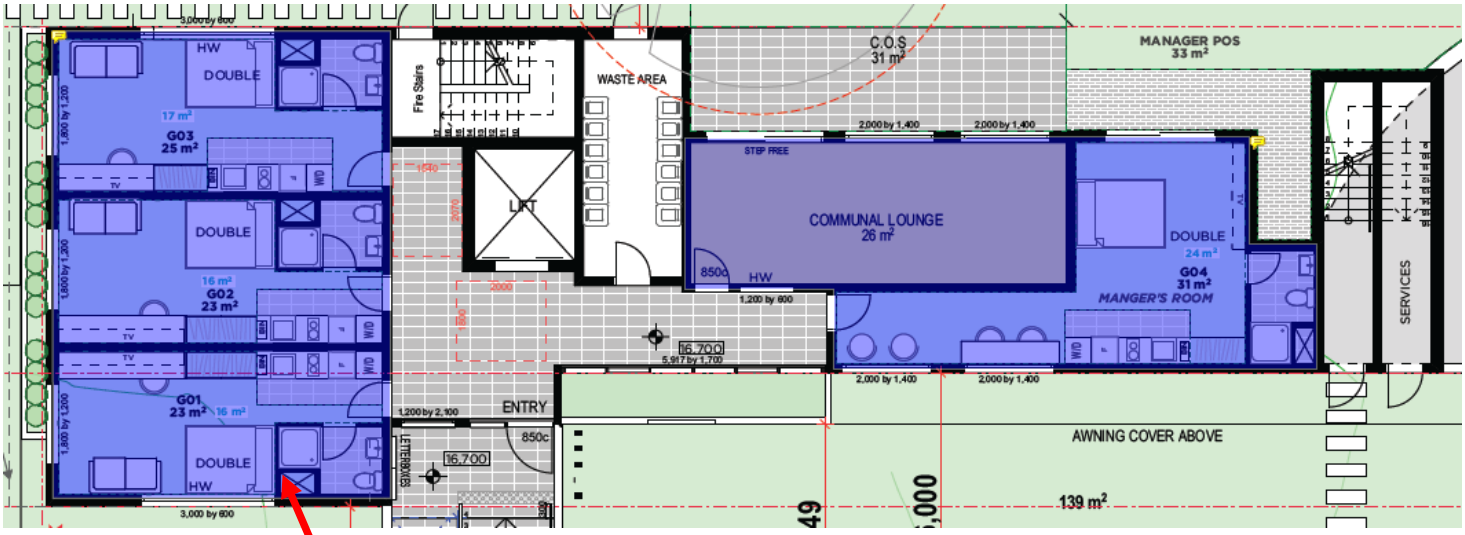
The provisions in Part J1 apply to the conditioned spaces in the proposed development. The NCC uses the term 'envelope' to demarcate the conditioned space from non-conditioned space and the exterior of the building. A space is deemed to be conditioned if the air contained will be actively heated or cooled by an air-conditioning service (see definitions at the end of this report).

The diagram below shows the building envelope (Figure 5.1). The conditioned area is shown with light blue shading. This is the boundary between the conditioned and non-conditioned zones (or outdoor space). Note that each boarding room complete with its own bathroom (irrespective of whether it has an operable window or not) is a Sole Occupancy Unit (SOU).

Figure 5.1 (Floor Plans):

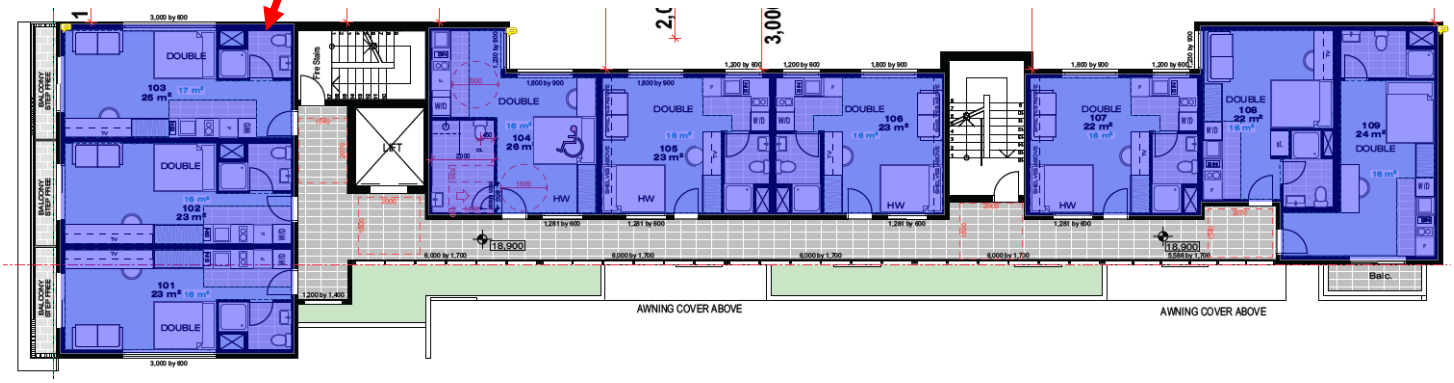
True North

Ground:

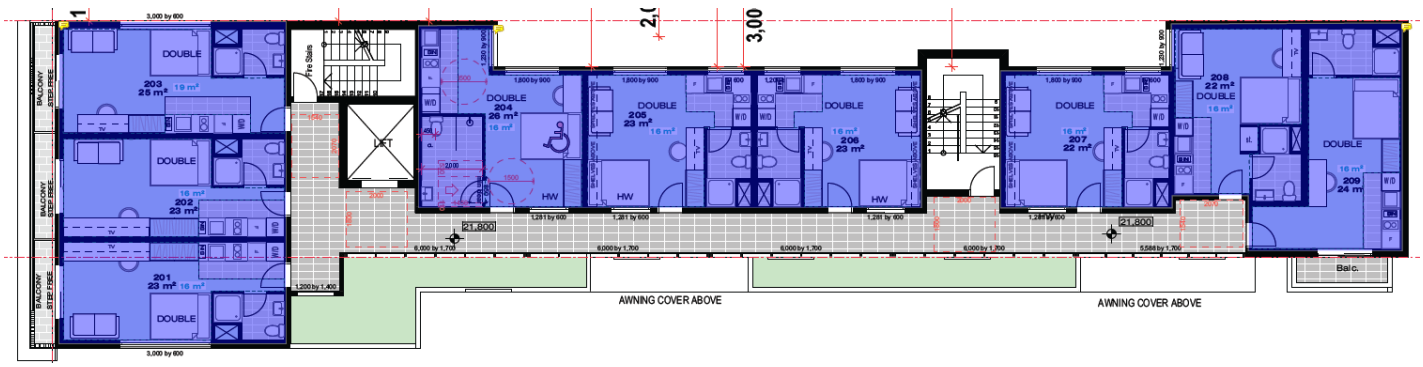


Conditioned Zones

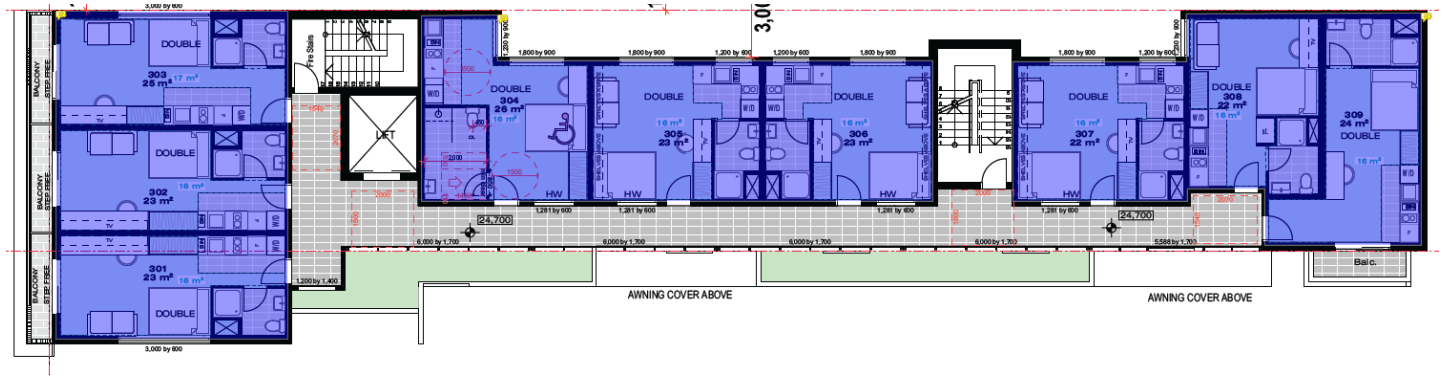
Level 1:



Level 2:



Level 3:



Level 4:

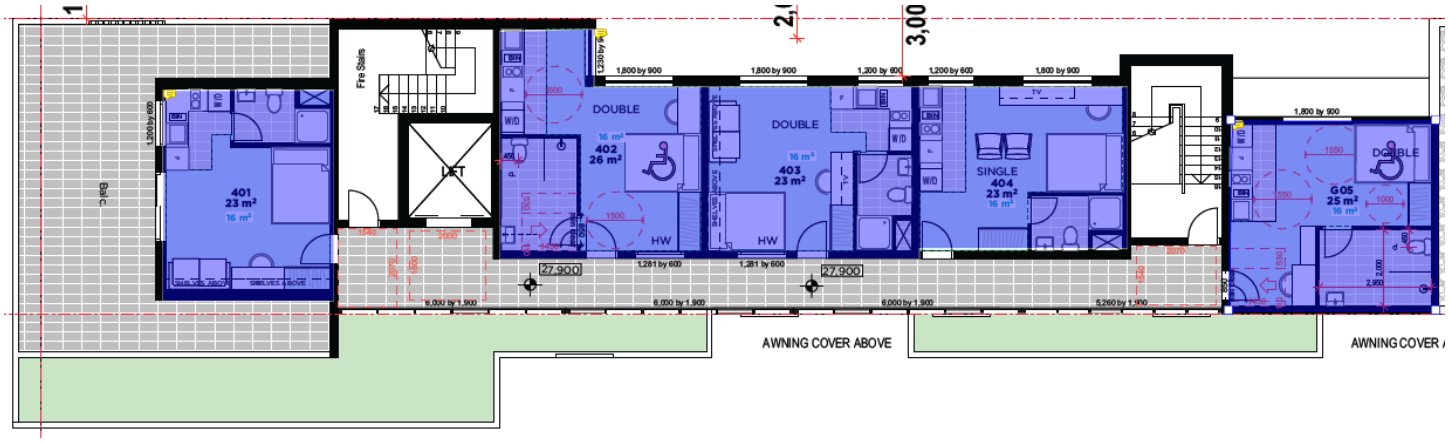
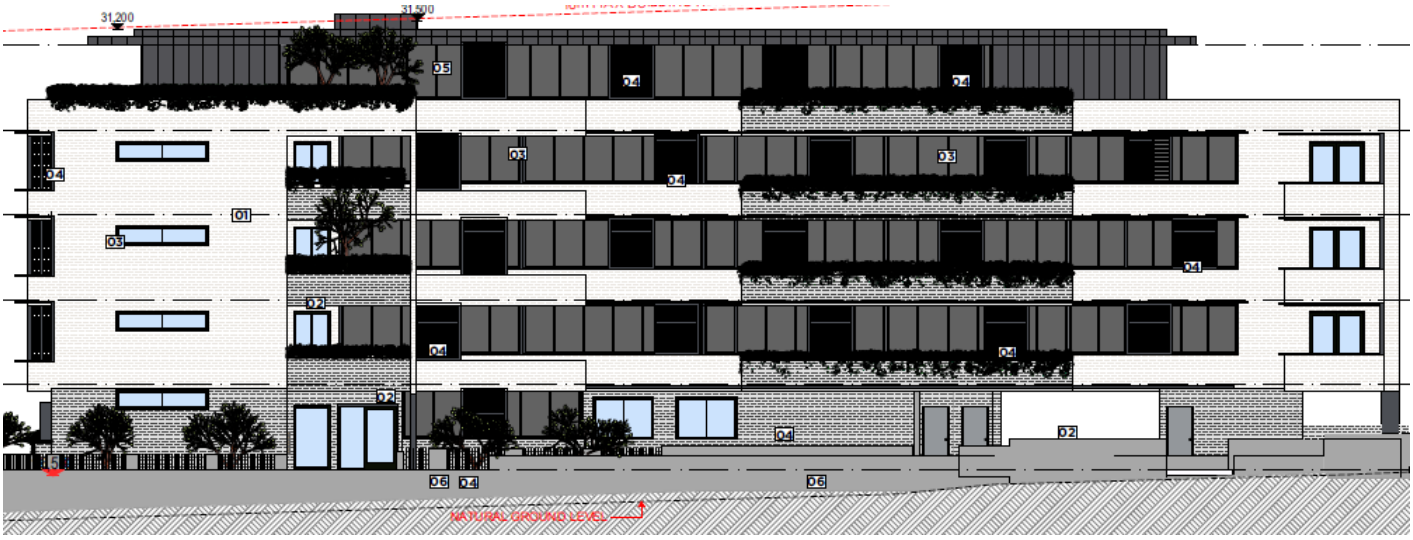


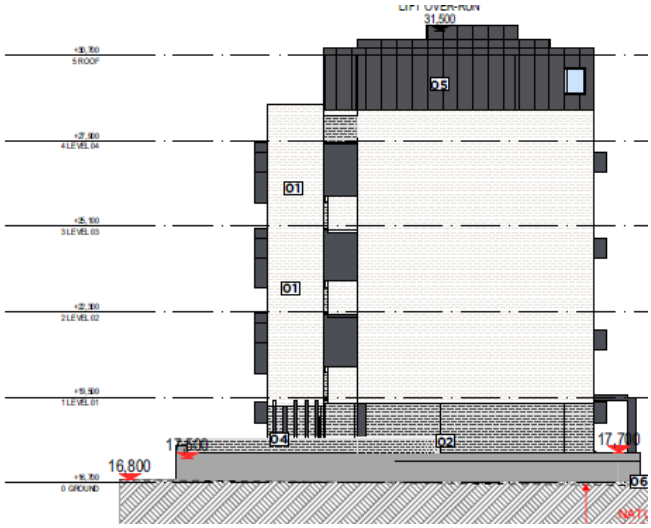
Figure 5.2 (Elevations):

South:



North:

West & East:



5.1 J1.3: ROOF AND CEILING CONSTRUCTION

5.1.1 Roof and ceiling insulation requirement

A building's roof & ceiling in climate zone 6 is required to achieve a minimum total R-value of 3.2 in the downward direction with a solar absorbance value of not more than 0.4 (light).

The roof will be a concrete roof to 5 degrees with a suspended ceiling under and an external waterproof membrane below a concrete tiled walking surface above

	Roof Type: Solid concrete roof to 5°, suspended plaster ceiling	***R-Value (heat flow direction: downwards)***
1	Outdoor air film (7m/s)	0.04
2	Waterproof membrane, rubber synthetic (4mm, 961 kg/m^3)	0.03
3	Solid Concrete (100mm, 2400 kg/m^3)	0.07
4	Ceiling Air Space (100mm to 300mm, non-reflective)	0.22
5	Plasterboard (10mm)	0.06
6	Indoor air film (still air)	0.16
	Total *R-Value*	**0.58**

Table 5.1a:

R-Value for Roof & Ceiling Construction	**Insulation R-Value Requirements**	**Action to Achieve Compliance**
0.58	**3.2** required: Additional insulation needed is: 3.2 – 0.58 = **2.62**	Add minimum insulation of **R2.62** to the ceiling below the concrete tiled walking surface above
Assuming the insulation fills the air space between the concrete and plasterboard (air space = 0.22). 0.58 - 0.22 = 0.36	**3.2** Required. Additional R-Value is 3.2 - 0.36 = **2.84**	Addition minimum insulation of **R2.84** to the ceiling below the concrete tiled walking surface above

The insulation requirement in the table above assumes there will be no reduction in the added insulation to accommodate exhaust fans, flues or an insulation free area required for recessed downlights.

However, if such a reduction is necessary for the reasons above, the remaining insulation R-Value must be increased to compensate for this loss. The table below shows the adjusted figure for the required insulation, dependant on the percentage of insulation free area.

Percentage of ceiling area uninsulated	0.5% to less than 1.0%	1.0% to less than 1.5%	1.5% to less than 2.0%	2.0% to less than 2.5%	2.5% to less than 3.0%	3.0% to less than 4.0%	>4%
Adjusted minimum required insulation to be added	3.4	3.6	3.9	4.2	4.6	5.7	Not permitted

5.2 J1.4: ROOF LIGHTS

5.1.1 Roof light performance requirement

This Part is not applicable as there are no roof lights planned over the conditioned zones.

5.3 J1.5: WALLS: NEW EXTERNAL WALLS.

5.3.1 Requirement

Each part of an external wall that is part of the envelope must satisfy Table J1.5 of the NCC. The 'envelope' of a building separates a conditioned space or habitable room from the **exterior** of the building or a non-conditioned space.

The 'conditioned' spaces are indicated in Figure 5.1 with light blue shading. The walls surrounding this required to reach a minimum R-Value of **2.8** in climate zone 6.

The external wall construction is as follows:

i) Ground to Level 3: The external walls are constructed of face brick, cavity & 120mm AFS.
ii) Level 4: 6mm fibre sheet cladding, 90mm stud frame, 10mm plaster.

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	i) Wall type: Face brick, cavity & 120mm AFS.	***R-Value***
1	Outdoor air film (7m/s)	0.04
2	Masonry (110mm clay brick: 1690 kg/m^3)	0.17
3	Cavity & air space (20mm to 50mm, non-reflective and unventilated)	0.17
4	6mm fibre cement (1360 kg/m^3)	0.03
5	108mm solid core concrete	0.08*
6	6mm fibre cement (1360 kg/m^3)	0.03
7	Indoor air film (still air)	0.12
	Total *R-Value*	**0.64**

NB: *This is calculated from table J1.5(d) NCC where 125mm of solid concrete provides an R-Value of 0.09. For 108mm solid concrete, this equates to an R-Value of 0.08.

The following options in table 5.3a below will achieve compliance:

Table 5.3a:

Insulation Provided by Construction	**Required R-Value**	**#Reduced by R0.5**	**Required Action to Achieve Compliance**
0.64	**2.8** Required. Additional R-Value is 2.8 – 0.64 = **2.16**	2.16 – 0.5 = **1.66**	Add minimum insulation of **R1.66**
If the insulation fills the air space between the brick and AFS (air space = 0.17). **0.64 - 0.17 = 0.47**	**2.8** Required. Additional R-Value is 2.8 – 0.47 = **2.33**	2.33 – 0.5 = **1.83**	Addition minimum insulation of **R1.83**

 # NB: The minimum *Total R-Value* in is reduced for a wall with a surface density of not less than 220 kg/m2 by 0.5. As this wall is cavity brick and AFS wall, this is greater than 220 kg/m^2.

	ii) **Wall Type:** Timber Wall – external 6mm fibre sheet cladding, 90mm stud frame, 10mm plaster	***R-Value*** ***(heat flow direction: downwards)***
1	Outdoor air film (7m/s)	0.04
2	Fibre-cement (6mm)	0.03
3	Air gap (90mm non-reflective and unventilated)	0.17
4	Plasterboard, gypsum	0.06
5	Indoor air film	0.12
	Total *R-Value*	**0.42**

The following table outlines the action required to achieve compliance:

R-Value for Wall Construction	**Insulation R-Value Requirements**	**Action to Achieve Compliance**
0.42	**2.8** Required. Additional R-Value is 2.8 - 0.42 = **2.38**	Add minimum insulation of **R2.38**.
Assuming the insulation fills the air space between the plasterboard and fibre cement (air space = 0.17). 0.42 - 0.17= **0.25**	**2.8** Required. Additional R-Value is 2.8 - 0.25 = **2.55**	Addition minimum insulation of **R2.55**

5.4 J1.5: WALLS: WALLS OTHER THAN AN EXTERNAL WALL

5.3.1 Requirement:

This part of the NCC is for walls that separate a conditioned space from a non-conditioned space **excluding an external wall**. This applies to the party walls separating the habitable rooms with the fire stairs and lifts.

This wall must satisfy Table J1.5b of the NCC. Where the adjacent enclosed space has ventilation of not more than 1.5 air changes per hour of outside air changes during occupied hours and any glazing in the external fabric as required by Part J2 is required to achieve a minimum R-Value of **1.0** in climate zone 6.

The party walls that divide the habitable rooms with the lift & stairwells are constructed of 200mm concrete, a stud frame and lined internally with plasterboard. According to Figure 2 in specification J1.5 of the NCC, the typical R-Value of this wall is 0.53.

Wall type: AFS 200mm on a stud frame and lined internally with plasterboard		***R-Value***
1	Outdoor air film	0.04
2	200mm solid core concrete	*0.14
3	Cavity & air space (20mm to 50mm, non-reflective and unventilated)	0.17
4	Plasterboard gypsum (10mm)	0.06
5	Indoor air film (still air)	0.12
	Total *R-Value*	**0.53**

NB: *This is calculated from table J1.5(d) NCC where 125mm of solid concrete provides an R-Value of 0.09. For 200mm solid concrete, this equates to an R-Value of 0.14.

The following options in table 5.3a below will achieve compliance:

Table 5.3a:

Insulation Provided by Construction	**Required R-Value**	**Required Action to Achieve Compliance**
0.53	**R1.0** Required. Additional R-Value is 1.0 - 0.53 = **0.47**	Install minimum insulation of **R0.47**

5.5 J1.6: FLOORS

5.5.1 Floor insulation requirement

Table J1.6 of NCC shows the minimum total R-Value for floors of conditioned spaces.

a) **Suspended Concrete Floor**: As per the NCC (Table J1.6), a suspended floor without an in-slab heating or cooling system where the non-conditioned space is unenclosed and where mechanically ventilated by more than 1.5 air changes per hour is required to achieve an **R-Value of 2.0** in the downward direction in climate zone 6.

This would apply to:

- All ground floor rooms above the unenclosed basement car park.
- Level 1 rooms above open air and carpark entry: Rooms 107, 108, 109 & parts of units 104, 105 & 106.

	Floor type: Concrete suspended floor	***R-Value***
1	Indoor air film	0.16
2	Solid Concrete (150mm, 2400 kg/m^3)	0.10
3	Outdoor air film	0.04
	Total *R-Value*	**0.30**

The following options in table 5.3a below will achieve compliance:

Table 5.3a:

Insulation Provided by Construction	**Required R-Value**	**Required Action to Achieve Compliance**
0.30	**R2.0** Required. Additional R-Value is 2.0 - 0.30 = **1.70**	Addition minimum insulation of **R1.7**.

b) The remaining rooms on level 1, 2, 3 & 4 contain a suspended **floor above conditioned space** (which is therefore not required to be insulated).

6 PART J2: GLAZING

6.1 Glazing calculator

The NCC Volume 1 glazing calculator (last issued with 2014) has been used to demonstrate compliance of the glazing with Section J.

The glazing calculator spreadsheets below show the maximum area of glass that can be used on each façade, the type of glass and the shading devices that have been included in the calculations.

		***Minimum Requirements (incl. frame)**		**Additional Shading Devices Required**	
Level	**Orientation**	**U-Value**	**SHGC**		**#Typical Glazing**
Ground	N S W	7.0 5.9 4.9	0.35 0.60 0.35	None	Single glazed low-e tinted Single glazed clear Single glazed low-e tinted
L1, L2 & L3	N, S & E W	7.0 2.5	0.70 0.25		Single glazed clear Double glazed low-e tinted
L4	N, E & S W	7.0 4.3	0.70 0.35		Single glazed clear Single glazed low-e tinted

The performance figures & specifications are indicative only and may vary depending on the chosen manufacturer & supplier.

***The glazing manufacturer must provide performance data to show that the selected glazing complies with the values in the table through the WERS certification.**

NB: The following links to the WERS website provides information on the window manufacturers which are certified under WERS and the energy rating of each of their glazing products: http://www.wers.net/

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: Boarding House: 102 Broomfield St Cabramatta NSW 2166

Application: Class 3

Climate zone: 6

Storey: Ground

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	54.7m²				55.1m²		30.9m²		
Option B									n/a
Glazing area (A)	*19.4m²*				*8.12m²*		*6.48m²*		

Number of rows preferred in table below: 12 *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device	Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	G03	N		0.60	3.00		7.0	0.35	0.000			0.00	1.00	1.00	1.80	13% of 99%
2	Communal	N		2.40	2.60		7.0	0.35	0.800	2.600	0.31	0.20	0.97	0.85	6.24	34% of 99%
3	Communal	N		1.40	2.00		7.0	0.35	0.800	1.600	0.50	0.20	0.92	0.72	2.80	11% of 99%
4	Communal	N		1.40	2.00		7.0	0.35	0.800	1.600	0.50	0.20	0.92	0.72	2.80	11% of 99%
5	G04	N		2.40	2.40		7.0	0.35	0.800	2.600	0.31	0.20	0.97	0.85	5.76	31% of 99%
6	G04	S		1.40	2.00		5.9	0.60	0.000			0.00	1.00	1.00	2.80	34% of 99%
7	G04	S		1.40	2.00		5.9	0.60	0.000			0.00	1.00	1.00	2.80	34% of 99%
8	Communal	S		0.60	1.20		5.9	0.60	3.000	0.800	3.75	0.20	0.64	0.60	0.72	10% of 99%
9	G01	S		0.60	3.00		5.9	0.60	0.000			0.00	1.00	1.00	1.80	22% of 99%
10	G01	W		1.20	1.80		4.9	0.35	0.900	1.600	0.56	0.40	0.84	0.76	2.16	33% of 100%
11	G02	W		1.20	1.80		4.9	0.35	0.900	1.600	0.56	0.40	0.84	0.76	2.16	33% of 100%
12	G03	W		1.20	1.80		4.9	0.35	0.900	1.600	0.56	0.40	0.84	0.76	2.16	33% of 100%

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters. While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all. Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.

if inputs are valid

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: Boarding House: 102 Broomfield St Cabramatta NSW 2166

Application: Class 3

Climate zone: 6

Storey: Level 1

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	94.6m²		42m²		96.4m²		36.4m²		
Option B									n/a
Glazing area (A)	*10.4m²*	.....	*1.11m²*	.....	*9.19m²*	.....	*14.1m²*		

Number of rows preferred in table below: 19 *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	103	N		0.60	3.00		7.0	0.70	0.000			0.00	1.00	1.00	1.80	17% of 91%
2	104	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
3	105	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
4	105	N		0.60	1.20		7.0	0.70	0.000			0.00	1.00	1.00	0.72	7% of 91%
5	106	N		0.60	1.20		7.0	0.70	0.000			0.00	1.00	1.00	0.72	7% of 91%
6	106	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
7	107	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
8	107	N		0.60	1.20		7.0	0.70	0.000			0.00	1.00	1.00	0.72	7% of 91%
9	104	E		0.90	1.23		7.0	0.70	0.000			0.00	1.00	1.00	1.11	100% of 23%
10	109	S		2.40	1.80		7.0	0.70	1.200	2.600	0.46	0.20	0.91	0.86	4.32	45% of 80%
11	107	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
12	106	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
13	105	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
14	104	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
15	101	S		0.60	3.00		7.0	0.70	0.000			0.00	1.00	1.00	1.80	18% of 80%
16	108	W		0.90	1.23		2.5	0.25	0.000			0.00	1.00	1.00	1.11	9% of 100%
17	101	W		2.40	1.80		2.5	0.25	1.200	2.600	0.46	0.20	0.88	0.82	4.32	30% of 100%
18	102	W		2.40	1.80		2.5	0.25	1.200	2.600	0.46	0.20	0.88	0.82	4.32	30% of 100%
19	103	W		2.40	1.80		2.5	0.25	1.200	2.600	0.46	0.20	0.88	0.82	4.32	30% of 100%

if inputs are valid

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: Boarding House: 102 Broomfield St Cabramatta NSW 2166

Application: Class 3

Climate zone: 6

Storey: Level 2

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	94.6m²		42m²		96.4m²		36.4m²		
Option B									n/a
Glazing area (A)	*10.4m²*		*1.11m²*		*9.19m²*		*14.1m²*		

Number of rows preferred in table below: 19 *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	203	N		0.60	3.00		7.0	0.70	0.000			0.00	1.00	1.00	1.80	17% of 91%
2	204	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
3	205	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
4	205	N		0.60	1.20		7.0	0.70	0.000			0.00	1.00	1.00	0.72	7% of 91%
5	206	N		0.60	1.20		7.0	0.70	0.000			0.00	1.00	1.00	0.72	7% of 91%
6	206	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
7	207	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
8	207	N		0.60	1.20		7.0	0.70	0.000			0.00	1.00	1.00	0.72	7% of 91%
9	204	E		0.90	1.23		7.0	0.70	0.000			0.00	1.00	1.00	1.11	100% of 23%
10	209	S		2.40	1.80		7.0	0.70	1.200	2.600	0.46	0.20	0.91	0.86	4.32	45% of 80%
11	207	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
12	206	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
13	205	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
14	204	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
15	201	S		0.60	3.00		7.0	0.70	0.000			0.00	1.00	1.00	1.80	18% of 80%
16	208	W		0.90	1.23		2.5	0.25	0.000			0.00	1.00	1.00	1.11	9% of 100%
17	201	W		2.40	1.80		2.5	0.25	1.200	2.600	0.46	0.20	0.88	0.82	4.32	30% of 100%
18	202	W		2.40	1.80		2.5	0.25	1.200	2.600	0.46	0.20	0.88	0.82	4.32	30% of 100%
19	203	W		2.40	1.80		2.5	0.25	1.200	2.600	0.46	0.20	0.88	0.82	4.32	30% of 100%

if inputs are valid

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: Boarding House: 102 Broomfield St Cabramatta NSW 2166

Application: Class 3

Climate zone: 6

Storey: Level 3

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	94.6m²		42m²		96.4m²		36.4m²		
Option B									n/a
Glazing area (A)	*10.4m²*		*1.11m²*		*9.19m²*		*14.1m²*		

Number of rows preferred in table below: 19 *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device	Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	303	N		0.60	3.00		7.0	0.70	0.000			0.00	1.00	1.00	1.80	17% of 91%
2	304	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
3	305	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
4	305	N		0.60	1.20		7.0	0.70	0.000			0.00	1.00	1.00	0.72	7% of 91%
5	306	N		0.60	1.20		7.0	0.70	0.000			0.00	1.00	1.00	0.72	7% of 91%
6	306	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
7	307	N		0.90	1.80		7.0	0.70	0.000			0.00	1.00	1.00	1.62	16% of 91%
8	307	N		0.60	1.20		7.0	0.70	0.000			0.00	1.00	1.00	0.72	7% of 91%
9	304	E		0.90	1.23		7.0	0.70	0.000			0.00	1.00	1.00	1.11	100% of 23%
10	309	S		2.40	1.80		7.0	0.70	1.200	2.600	0.46	0.20	0.91	0.86	4.32	45% of 80%
11	307	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
12	306	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
13	305	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
14	304	S		0.60	1.28		7.0	0.70	2.600	0.800	3.25	0.20	0.64	0.60	0.77	9% of 80%
15	301	S		0.60	3.00		7.0	0.70	0.000			0.00	1.00	1.00	1.80	18% of 80%
16	308	W		0.90	1.23		2.5	0.25	0.000			0.00	1.00	1.00	1.11	9% of 100%
17	301	W		2.40	1.80		2.5	0.25	1.200	2.600	0.46	0.20	0.88	0.82	4.32	30% of 100%
18	302	W		2.40	1.80		2.5	0.25	1.200	2.600	0.46	0.20	0.88	0.82	4.32	30% of 100%
19	303	W		2.40	1.80		2.5	0.25	1.200	2.600	0.46	0.20	0.88	0.82	4.32	30% of 100%

if inputs are valid

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

HELP

Building name/description: Boarding House: 102 Broomfield St Cabramatta NSW 2166

Application: Class 3

Climate zone: 6

Storey: Level 4

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	72.5m²		21.8m²		72.5m²		21.2m²		
Option B									n/a
Glazing area (A)	*7.92m²*		*1.11m²*		*1.54m²*		*5.04m²*		

Number of rows preferred in table below: 11 *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	402	N		0.90	1.80		7.0	0.70	1.400	1.300	1.08	0.40	0.48	0.41	1.62	18% of 35%
2	403	N		0.90	1.80		7.0	0.70	1.400	1.300	1.08	0.40	0.48	0.41	1.62	18% of 35%
3	403	N		0.60	1.20		7.0	0.70	1.400	1.700	0.82	1.10	0.93	0.71	0.72	14% of 35%
4	404	N		0.60	1.20		7.0	0.70	1.400	1.700	0.82	1.10	0.93	0.71	0.72	14% of 35%
5	404	N		0.90	1.80		7.0	0.70	1.400	1.300	1.08	0.40	0.48	0.41	1.62	18% of 35%
6	405	N		0.90	1.80		7.0	0.70	2.500	1.300	1.92	0.40	0.02	0.31	1.62	19% of 35%
7	402	E		0.90	1.23		7.0	0.70	23.000	1.300	####	0.40	0.17	0.36	1.11	100% of 28%
8	403	S		0.60	1.28		7.0	0.70	2.700	1.000	2.70	0.40	0.64	0.60	0.77	50% of 20%
9	402	S		0.60	1.28		7.0	0.70	2.700	1.000	2.70	0.40	0.64	0.60	0.77	50% of 20%
10	401	W		2.40	1.80		4.3	0.35	1.900	2.800	0.68	0.40	0.78	0.70	4.32	86% of 100%
11	401	W		0.60	1.20		4.3	0.35	1.900	1.700	1.12	1.10	0.77	0.69	0.72	14% of 100%

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters. While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all. Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.

if inputs are valid

7 PART J3: BUILDING SEALING

7.1 J3.1: APPLICATION OF PART

The deemed-to-satisfy provisions of this Part apply to elements forming the envelope of a Class 2 to 9 building, other than:

a) a building in climate zones 1, 2, 3 and 5 where the only means of air-conditioning is by using an evaporative cooler; or

b) a permanent building opening, in a space where a gas appliance is located, that is necessary for the safe operation of a gas appliance; or

c) a building or space where the mechanical ventilation required by Part F4 provides sufficient pressurisation to prevent infiltration; or

d) parts of buildings that cannot be fully enclosed

7.2 J3.4: EXTERNAL WINDOWS AND DOORS

A seal to restrict air infiltration must be fitted to each edge of a new door, openable window or the like forming part of the envelope of a conditioned space or the external fabric of a habitable room or public area.

Above requirements do not apply to:

a) Windows complying with AS2047 (Windows in Buildings – Selection and Installation) or

b) A fire door or smoke door or

c) A roller shutter door, roller shutter grill or other security or device installed only for out-of-hours security

The seal on the bottom of an external swing door must be a draft protection device and for the other edges of an external door or edges of an openable window may be foam or rubber compression strip, fibrous seal or the like.

As per Clause J3.4d, an entrance to a building, if leading to a conditioned space must have an air lock, self-closing door, revolving door or the like. If the floor space of the conditioned space where the entrance door leads is less than 50m2, then this clause does not apply.

7.3 J3.5: EXHAUST FANS

As required by F4.5 of Volume 1 NCC, each “sanitary compartment, bathroom or shower” must have natural ventilation or mechanical ventilation or an air-conditioning system complying with AS 1668.2 and AS/NZS 3666.1.

A miscellaneous exhaust fan, such as a bathroom or domestic kitchen exhaust fan, must be fitted with a sealing device such as a self-closing damper or the like when serving a conditioned space or a habitable room in climate zone 6.

7.4 J3.6: CONSTRUCTION OF ROOFS, WALLS AND FLOORS

Roofs, ceilings, walls, floors and any opening such as a window frame, door frame, roof light frame or the like must be constructed to minimise air leakage when forming part of the envelope or the internal fabric of a habitable room or a public area in climate zones 4 to 8. This must be constructed by:

- enclosing by internal lining systems that are close fitting at ceiling, wall and floor junctions or,
- sealed by caulking, skirting, architraves, cornices or the like.

Penetrations for wiring, piping etc forming part of the building envelope must also be sealed against air leakage.

8 PART J4

This part is blank as it was removed by the NCC in a previous version.

9 PART J5: AIR CONDITIONING AND VENTILATION SYSTEMS

Refer to the Mechanical Engineer’s documentation for compliance requirements for air-conditioning.

10 PART J6: ARTIFICIAL LIGHTING AND POWER

J6.2 Artificial Lighting

For artificial lighting, the aggregate design illumination power load must not exceed the sum of the allowances obtained by multiplying the 'area' of each space by the adjusted 'illumination power density' (IPD) – see last column on the following page for the total maximum Watts allowable for each room. This excludes any emergency lighting, signage or display cabinet lighting.

Table A:

Unit No.	Level	Unadjusted IPD	Area (per unit)	Adjusted IPD	*Control Factor	**#Max Power (W) Per Unit**
Basement Carpark	Basement 2	6	628.0	5.5	0.9	**3842**
Services	Basement 2	5	9.3	8.6	1.0	**80**
Basement Carpark	Basement 1	6	624.0	5.4	0.9	**3715**
Services	Basement 1	5	12.8	8.2	1.0	**105**
Managers Room (G04)	Ground	9	31.0	14.0	1.0	**435**
Communal Lounge	Ground	10	26.5	15.5	1.0	**410**
Corridor	Ground	8	26.0	8.0	0.7	**297**
Room G01, G02	Ground	5	23.0	7.8	1.0	**179**
Room G03	Ground	5	25.0	7.7	1.0	**192**
Room 101, 102	Level 1	5	23.0	7.8	1.0	**179**
Room 103	Level 1	5	25.0	7.7	1.0	**192**
Room 104	Level 1	5	26.0	7.7	1.0	**200**
Room 105, 106	Level 1	5	23.0	7.6	1.0	**176**
Room 107	Level 1	5	22.0	7.7	1.0	**170**
Room 108	Level 1	5	22.0	7.8	1.0	**171**
Room 109	Level 1	5	24.0	8.0	1.0	**191**
Corridor	Level 1	8	51.0	8.0	0.7	**583**
Room 201, 202	Level 2	5	23.0	7.8	1.0	**179**
Room 203	Level 2	5	25.0	7.7	1.0	**192**
Room 204	Level 2	5	26.0	7.7	1.0	**200**
Room 205, 206	Level 2	5	23.0	7.6	1.0	**176**
Room 207	Level 2	5	22.0	7.7	1.0	**170**
Room 208	Level 2	5	22.0	7.8	1.0	**171**
Room 209	Level 2	5	24.0	8.0	1.0	**191**
Corridor	Level 2	8	51.0	8.0	0.7	**583**
Room 301, 302	Level 3	5	23.0	7.8	1.0	**179**
Room 303	Level 3	5	25.0	7.7	1.0	**192**
Room 304	Level 3	5	26.0	7.7	1.0	**200**
Room 305, 306	Level 3	5	23.0	7.6	1.0	**176**
Room 307	Level 3	5	22.0	7.7	1.0	**170**
Room 308	Level 3	5	22.0	7.8	1.0	**171**
Room 309	Level 3	5	24.0	8.0	1.0	**191**
Corridor	Level 3	8	51.0	8.0	0.7	**583**

Room 401	Level 4	5	23.0	7.8	1.0	**179**
Room 402	Level 4	5	26.0	7.8	1.0	**203**
Room 403, 404	Level 4	5	23.0	7.8	1.0	**179**
Room 405	Level 4	5	25.0	7.7	1.0	**193**
Corridor	Level 4	8	35.0	8.0	0.7	**400**

J 6.3 INTERIOR ARTIFICIAL LIGHTING AND CONTROL

Artificial lighting of a room or space must be individually operated by a switch or other control device. An artificial lighting switch must be located in a visible position, in the room or space being switched or in an adjacent room or space from where the lighting being switched is visible.

An occupant activated device such as a room security device, a motion detector in accordance with Specification J6, or the like, must be provided in sole occupancy units of Class 3, other than where the accommodation is for people with a disability or the aged, in order to cut power of the artificial lighting, air conditioning, local exhaust fans and bathroom heaters when the sole occupancy unit is unoccupied.

J 6.4 INTERIOR DECORATIVE AND DISPLAY LIGHTING

Interior decorative and display lighting, such as for a foyer mural or art display, must be controlled-

a) Separately from other artificial lighting; and

b) By a manual switch for each area other than when the operating times of the displays are the same in an area, in which case they may be combined.

c) By a time switch in accordance with Specification J6 where the display exceeds 1Kw.

J6.5 ARTIFICIAL LIGHTING AROUND THE PERIMETER OF A BUILDING

This provision specifies that artificial lighting to the perimeter of a building must:

i) be controlled by:

a) a daylight sensor or

b) a time switch that is capable of switching on and off electric power to the system at variable pre-programmed times and on variable pre-programmed days; and

ii) when the total perimeter lighting loads exceeds 100W:

a) have an average light source efficacy of not less than 60 Lumens/W or,

b) be controlled by a motion detector in accordance with Specification J6, and

iii) when used for decorative purposes, such as façade lighting or signage lighting, have a separate time switch in accordance with Specification with J6.

The requirements in ii) above do not apply to emergency lighting in accordance with Part E4.

11 PART J7: HOT WATER SUPPLY

If a new hot water system is being installed for food preparation or sanitary purposes, other than a solar hot water system, then it must be designed and installed in accordance with Part B2 of NCC Volume 3 – Plumbing Code of Australia.

12 PART J8: FACILITIES FOR ENERGY MONITORING

12.1 J8.3: FACILITIES FOR ENERGY MONITORING

A building or sole occupancy unit with a floor area of more than 500 m^2 must have the facility to record the consumption of gas and electricity.

A building with a floor area of more than 2,500 m^2 must have the facility to record individually the energy consumption of:

a) Air conditioning plant
b) Artificial lighting
c) Appliance power
d) Central hot water supply &
e) Internal transport devices including lifts, escalators and travelators where there is more than one serving the building &
f) Other ancillary plant

The provisions above do not apply to a Class 2 building with a floor area of more than 2,500m^2 where the total area of the common areas is less than 500m^2.

13 DEFINITIONS

The following definitions from the 2016 NCC (Volume 1) are relevant to this Section J Report:

Envelope

Parts of a building's fabric that separate a conditioned space or habitable room from -

(a) the exterior of the building; or

(b) a non-conditioned space including -

(i) the floor of a rooftop plant room, lift-machine room or the like; and

(ii) the floor above a carpark or warehouse; and

(iii) the common wall with a carpark, warehouse or the like.

Habitable room

Means a room used for normal domestic activities, and:

(a) includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom; but

(b) excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes-drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.

Conditioned space

Means a space within a building, including a ceiling or under-floor supply air plenum or return air plenum, where the environment is likely, by the intended use of the space, to have its temperature controlled by air-conditioning, but does not include:

(a) a non-habitable room of a Class 2 building or Class 4 part of a building in which a heater with a capacity of not more than 1.2 kW or 4.3 MJ/hour provides the air-conditioning; or

(b) a space in a Class 6, 7, 8 or 9b building where the input power to an air-conditioning system is not more than 15 W/m2 or 15 J/s.m2 (54 KJ/hour.m2)

(c) a lift shaft

Air-conditioning

A service that actively cools or heats the air within a space, but does not include a service that directly cools or heats cold rooms, hot rooms or; maintains specialised conditions for equipment or processes, where this is the main purpose of the service.

Bulk Insulation

Has a high resistance to the flow of heat by conduction. It includes Fibreglass, Rockwool, Glass Wool, Polyester, expanded or extruded polystyrene or other similar materials.

R-Value (m^2. K/W)

Means the thermal resistance of a component calculated by dividing its thickness by its thermal conductivity.

End of report