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Consulting Engineers

ABODE HOTEL BLACKTOWN

Amalgamated Holdings Limited

Section J DTS Compliance Report

Project No : 7220

Revision : B

REVISION SCHEDULE

[illegible]

Note: Revisions to the text of this specification section subsequent to Tender Issue are indicated with a vertical line and Revision number in the right margin.

Modified text -

eg: The electricity supply shall be a 415/240 volts, 3 phase, 4 wire, 50 Hertz system

B

Deleted text, no longer applicable -

eg: ~~The electricity supply shall be a 415/240 volts, 3 phase, 4 wire, 50 Hertz system~~

B

EXECUTIVE SUMMARY

This report reviews the proposed Abode Hotel at Cricketers Arms Road, Blacktown against the Deemed-to-Satisfy requirements of BCA Section J 2010.

The development is divided into two building classification types – Class 9b for the Ground level and Class 3 for levels 1 and 2 accommodation areas.

The development is located in BCA climate zone 6.

The following information and recommendations are outlined within this report.

- Confirmation of spaces required to comply with BCA Section J fabric and glazing requirements
- Recommendations of the minimum insulation performance of various building elements
- Recommendations of glazing and shading requirements to achieve compliance with BCA requirements
- Confirmation of compliance to applicable parts of Section J

The table below summarises the proposed building construction of the development and the insulation to meet the BCA Section J compliance.

Element	Description	BCA Required R-value	R-value Without Insulation	Min. R-value Insulation
Roof	Concrete Roof	3.2	0.55	2.65
External Wall	Pre-cast Concrete	2.8	0.53	2.27
Internal Wall	Pre-cast Concrete	1.0	0.61	0.39
Floor	No BCA Min. Requirement			

The proposed external glazing of the development has been assessed for BCA Section J compliance. Using the proposed glass types listed in the table below, results from the assessment indicate that all the facades on all levels of the development are compliant with Section J. Description of the glazing areas, shading and façade orientations are outlined within this report.

Glass Type	Location	U-value (W/m ² K)	SHGC
G James 6.38mm Solect Green	North, East & West facades	3.6	0.49
G James 6.38mm Solect Clear	South façade	3.6	0.68

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1 INTRODUCTION

The following report has been prepared by Donnelley Simpson Cleary to assess compliance with Section J of the Building Code of Australia (BCA) of the proposed Abode Hotel at Cricketers Arms Road, Blacktown. The report presents the findings of a review of the proposed building design, compared with the relevant Deemed-to-Satisfy (DTS) clauses of Section J and outlines the requirements related to the design of the building services. The areas of non-compliance are analysed and recommendations are made and reviewed to obtain compliance.

1.1 BCA SECTION J COMPLIANCE

Section J of the BCA 2010 sets regulations for energy efficiencies for all types of buildings with respect to the building's construction, design and activity. The BCA offers two compliance methods that differ in complexity and flexibility. The two compliance methods are:

- Deemed-to-Satisfy Compliance
- JV3 – Verification using a referenced building

This report will provide an assessment of building fabric and glazing according to DTS provisions. The following works were carried out in order to assess DTS compliance:

- Determine the applicable BCA Section J requirement for the climate zone and building class
- Undertake a desk top design review of
 - the current architectural documentation to assess compliance for envelope thermal performance
 - the current services documentation to assess compliance for mechanical, electrical and hydraulic services
- Provide recommendations to achieve compliance with DTS provisions

1.2 BUILDING CLASSIFICATION & CLIMATE ZONE

The development is divided into two building classification types – Class 9b for the Ground level and Class 3 for levels 1 and 2 for the accommodation areas.

The development is located in Blacktown which falls under the BCA climate zone 6.

1.3 DOCUMENTATION USED IN REVIEW

The following PTI Architecture drawings were used for the evaluation:

Table 1 – Reference Documents

DWG No.	Rev.	Title	Author
ADA02	C	Site Plan	VD
ADA03	C	Lower Ground Floor Plan	VD
ADA04	B	Ground Floor Plan	VD
ADA05	B	First Floor Plan	VD
ADA06	B	Second Floor Plan	VD
ADA07	B	Roof Plan	VD
ADA08	B	Elevations	VD
ADA09	B	Elevations	VD
ADA10	B	Sections	VD

2 SECTION J REVIEW

The objective of the BCA Section J is to reduce the greenhouse gas emissions. Section J states that a building, including its services, must have features to the degree necessary that facilitate the efficient use of energy.

There are two options to meet the performance requirements of Section J.

- Deemed-To-Satisfy – method states that a building must comply with the relevant performance requirements.
- JV3 – Verification method states that the annual energy consumption of a proposed building and its services must not be more than that of a reference building.

If the building design and functions does not comply with the DTS provisions the JV3 method can be used to achieve compliance, which requires the use of computer simulation.

2.1 DEEMED-TO-SATISY PROVISIONS

The Deemed-to-Satisfy provisions within Section J of the BCA outline the following:

- Part J1 Building Fabric – Minimum thermal performance constructions for roofs, ceilings, roof lights, walls, and floors in the relevant climate zone.
- Part J2 External Glazing – Minimum thermal performance for the glazing in the relevant climate zone.
- Part J3 Building Sealing – Provisions to reduce the loss of conditioned air and restrict unwanted infiltration to a building.
- Part J4 Air Movement – Air movement and ventilation provisions applicable only to Class 2 and 4 buildings.
- Part J5 Air-Conditioning and Ventilation Systems – Requirements to ensure these services are used and use energy in an efficient manner.
- Part J6 Artificial Lighting and Power – Requirements for lighting and power to ensure energy is used efficiently within a building.
- Part J7 Hot Water Supply – Restrictions for hot water supply design except for solar systems within climate zones 1, 2 and 3.
- Part J8 Access For Maintenance

2.2 SECTION J APPLICABLE PARTS

2.2.1 Part J1 – Building Fabric

Section J part J1 outlines the minimum requirements of building envelope. The envelope is defined by the BCA as parts of a building's fabric that separate a conditioned space or habitable room from the exterior of the building or a non-conditioned space.

The following section reviews the proposed building fabric and the recommended insulation to meet the minimum required R-value. As the building fabric design is currently not finalised some constructions are not known and hence assumptions have been made.

Roof and Ceiling Construction

For roof and ceiling constructions that form part of the building envelope in the proposed development the minimum thermal resistance is 3.2m²K/W.

The following table describes the concrete roof with suspended ceiling construction. Excluding insulation the total R-value is $0.55\text{m}^2\text{K/W}$, falling short by $2.65\text{m}^2\text{K/W}$ from the minimum required thermal resistance. To achieve compliance, it is recommended that roof bulk insulation of R1.5 and ceiling bulk insulation of R1.3 be installed as part the roof/ceiling construction. Alternatively, a single layer of R2.8 roof bulk insulation can be installed under the concrete.

The total calculated thermal resistance of the roof/ceiling construction with the recommended insulation is $3.35\text{m}^2\text{K/W}$, meeting the minimum requirement for an external roof.

Table 2 – Concrete Roof Construction

Construction Layer	Nominal Thickness (mm)	Thermal Resistance ($\text{m}^2\text{K/W}$)
Outside Air Film (7.0m/s wind assumed)	–	0.04
Solid Concrete	100	0.07
Bulk Insulation with Reflective Foil	70	1.50
Ceiling Air Space	300	0.22
Bulk Insulation - glasswool	55	1.30
Plasterboard Ceiling	13	0.06
Inside Air Film (still air assumed)	–	0.16
Total R-Value		3.35

External Wall Construction

For external wall constructions that form part of the building envelope in the proposed development the minimum thermal resistance is $2.8\text{m}^2\text{K/W}$.

The following table describes the external concrete wall with plasterboard construction. Excluding insulation the total R-value is $0.53\text{m}^2\text{K/W}$, falling short by $2.27\text{m}^2\text{K/W}$ from the minimum required thermal resistance. To achieve compliance, it is recommended that bulk insulation of R1.43 and bulk insulation of R0.9 be installed as part the external wall construction. Alternatively, a single layer of R2.3 bulk insulation can be installed adjacent to the plasterboard.

The total calculated thermal resistance of the external wall construction with the recommended insulation is $2.86\text{m}^2\text{K/W}$, meeting the minimum requirement for an external wall.

Table 3 – External Concrete Wall Construction

Construction Layer	Nominal Thickness (mm)	Thermal Resistance ($\text{m}^2\text{K/W}$)
Outside Air Film (7.0m/s wind assumed)	–	0.04
Solid Concrete	200	0.14
Bulk Insulation - polystyrene foam	40	1.43
Air Gap (Non Reflective Unventilated)	30	0.17
Bulk Insulation - polystyrene foam	25	0.90
Plasterboard	13	0.06
Inside Air Film (still air assumed)	–	0.12
Total R-Value		2.86

Internal Wall Construction

Internal wall constructions that form part of the building envelope which separates conditioned and non-conditioned spaces in climate zone 6 is required to achieve a minimum thermal resistance of $1.0\text{m}^2\text{K/W}$.

The following table describes the internal concrete wall with plasterboard construction. Excluding insulation the total R-value is $0.61\text{m}^2\text{K/W}$, falling short by $0.39\text{m}^2\text{K/W}$ from the minimum required

thermal resistance. To achieve compliance, it is recommended that bulk insulation of R0.9 be installed as part of the internal wall construction.

The total calculated thermal resistance of the internal wall construction with the recommended insulation is 1.51m²K/W, meeting the minimum requirement for an internal wall.

Table 4 – Internal Concrete Wall Construction

Construction Layer	Nominal Thickness (mm)	Thermal Resistance (m ² K/W)
Inside Air Film (still air assumed)	–	0.12
Solid Concrete	200	0.14
Air Gap (Non Reflective Unventilated)	30	0.17
Bulk Insulation - polystyrene foam	25	0.90
Plasterboard	13	0.06
Inside Air Film (still air assumed)	–	0.12
Total R-Value		1.51

Marked up drawings showing external and internal walls forming the envelope are shown in Appendix A.

Roof Lights

There are no roof lights (sky lights) that form part of the envelope of a conditioned space within the proposed development.

Floors

There are no requirements for floor construction of the development unless a concrete slab on ground incorporates an in-slab heating or cooling system. Should this be the case, the insulation must:

- have a minimum R-value of 1.0m²K/W; and
- be water resistant; and
- be continuous from the adjacent finished ground level
 - a) to a minimum depth of 300mm; or
 - b) for the full depth of the vertical edge of the concrete slab-on-ground.

2.2.2 Part J2 – Glazing

The Australian Building Codes Board (ABCB) provides the BCA Glazing Calculator for determining the amount of glazing permitted on each storey of each building façade using proposed types of glass for the development.

Within the glazing calculator there are two methods of calculations available, of which Option A has been selected for this development. Option B is only used in a situation where the external walls have limited space for insulation, in which case the glazing is required to have higher performance to compensate for the lesser amount of wall insulation.

The following table lists the proposed glass types and the performance values used in the glazing calculator. Results from the glazing calculator are shown in Appendix B.

Table 5 – Glazing Performance Values

Glass Type	U-value (W/m ² K)	SHGC	Light Transmittance
G James 6.38mm Solect Green	3.6	0.49	71%
G James 6.38mm Solect Clear	3.6	0.68	81%

The glass types shown in the table above have been selected due to the high solar performance, but still maintaining relative high level of light transmittance, as required by the development.

The selected glass types have been assessed to achieve glazing compliance for the proposed development. Other glass types of equal or better solar performance (i.e. U-value and SHGC not exceeding those listed in the above table) may also be selected for the development. Note that any specified U-value and SHGC (Solar Heat Gain Coefficient) must be in accordance to the Australian Fenestration Rating Council (AFRC) Protocol & Procedures as required by the BCA.

The following table summarises the proposed glazing types for the development that achieves compliance.

Table 6 – Glazing Compliance Summary

Level	Façade	Glass Type	U-value (W/m ² K)	SHGC
Ground	N	G James 6.38mm Solect Green	3.6	0.49
	E	G James 6.38mm Solect Green	3.6	0.49
	S	G James 6.38mm Solect Clear	3.6	0.68
	W	G James 6.38mm Solect Green	3.6	0.49
First	N	G James 6.38mm Solect Green	3.6	0.49
	E	G James 6.38mm Solect Green	3.6	0.49
	S	G James 6.38mm Solect Clear	3.6	0.68
	W	G James 6.38mm Solect Green	3.6	0.49
Second	N	G James 6.38mm Solect Green	3.6	0.49
	E	G James 6.38mm Solect Green	3.6	0.49
	S	G James 6.38mm Solect Clear	3.6	0.68
	W	G James 6.38mm Solect Green	3.6	0.49

The performance of the south facing façade differs from the other orientations as the south glazing does not receive sufficient solar penetration as the other orientations. Consequently, the south façade requires glass that has a higher SHGC, but still a low U-value, than that required by the other orientations.

Furthermore, the less external shading to the south façade the more beneficial as this reduces the heating loads and improves daylight penetration.

2.2.3 Part J3 – Building Sealing

Part J3 of the BCA outlines construction provisions to limit unconditioned air infiltrating into conditioned spaces and also limit conditioned air from escaping.

Clause J3.2 refers to chimneys and flues which are not applicable to this development.

Clause J3.3 refers to roof lights which are not applicable to this development.

Clause J3.4 outlines that a seal to restrict air infiltration must be fitted to each edge of doors, openable windows or the like that separate conditioned spaces from non-conditioned spaces or external areas. This provision is not required for windows complying with Australian Standard AS2047, louvred windows or doors, and fire doors. The seal required may be a foam or rubber

compressible strip, fibrous seal or the like. The main entrance to the development must have an airlock, self-closing door, revolving door or the like.

Clause J3.5 outlines that any miscellaneous exhaust systems must be fitted with a sealing device such as a self closing damper when serving a conditioned space or habitable room.

Clause J3.6 outlines for the conditioned areas that the roofs, walls floors and any openings such as for doors and windows must be constructed to minimise air leakage. The construction must enclose conditioned spaces by close fitting internal lining systems at the ceiling, wall and floor junctions or by sealing through caulking, skirting, architraves, cornices or the like. The requirements of this clause do not apply to openings, grilles and the like necessary for smoke hazard management.

Clause J3.7 outlines that if evaporative cooling is used, the system must be fitted with self-closing non-return dampers.

2.2.4 Part J4 – Air Movement

Part J4 of the BCA is not applicable to this development. It only applies to a habitable room in a sole-occupancy unit of a class 2 building, or a class 4 part of a building.

2.2.5 Part J5 – Air Conditioning and Ventilation Systems

Part J5 of the BCA outlines the performance requirements for air conditioning and ventilation systems to ensure these services operate in an efficient manner.

Donnelley Simpson Cleary shall design the air conditioning and ventilation systems to ensure compliance with Part J5 of the BCA Section J.

2.2.6 Part J6 – Artificial Lighting and Power

Part J6 of the BCA outlines the performance requirements for illumination power density and the efficient use of lighting power and controls.

Donnelley Simpson Cleary shall design the artificial lighting systems to ensure compliance with Part J6 of the BCA Section J.

2.2.7 Part J7 – Hot Water Supply

Part J7 of the BCA outlines the provisions for the energy efficient use of hot water supply systems.

Clause J7.2 of Part J7 states that a hot water supply system for food preparation or sanitary purposes must be designed and installed in accordance with Section 8 of AS/NZS 3500.4.

Donnelley Simpson Cleary shall design the hot water supply systems to ensure compliance with Part J7 of the BCA Section J.

2.2.8 Part J8 – Access for Maintenance and Facilities for Monitoring

Part J8 of the BCA outlines the provisions for access to all plant, equipment and components that require maintenance. Provisions to access for maintenance shall be in accordance to Part I2 of the BCA.

BCA Part I2 outlines the components of services which include:

- adjustable or motorised shading devices;

- time switches and motion detectors;
- room temperature thermostats;
- plant thermostats such as on boilers and refrigeration units;
- motorised dampers and control valves;
- reflectors, diffusers and lamps of light fittings;
- heat transfer equipment;

Donnelley Simpson Cleary shall design for access for maintenance and facilities for monitoring to ensure compliance with Part J8 of the BCA Section J.

3 LIMITATIONS OF THIS REPORT

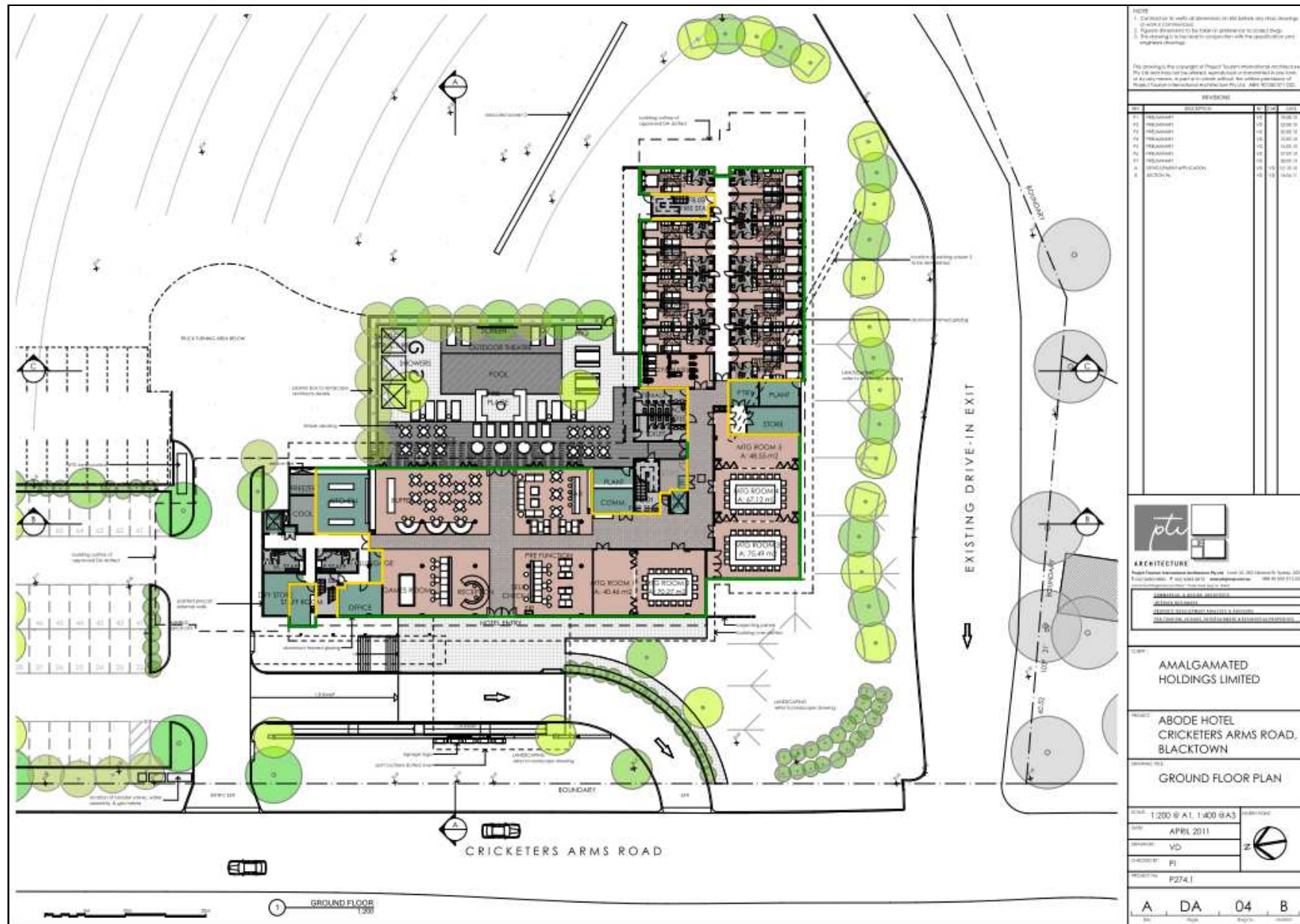
This report is intended as a guide to assist with the application of the BCA Section J. It should be read in conjunction with the BCA 2010 and specific applications may vary during the design development of the project.

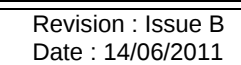
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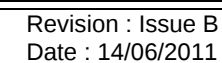
APPENDIX A: ENVELOPE MARKUP DRAWINGS

Key

-  External Wall Min. R-Value 3.2 m²K/W
-  Internal Wall Min. R-Value 1.0 m²K/W







APPENDIX B: GLAZING CALCULATOR RESULTS

Glazing Calculator – Ground Level

BCA VOLUME ONE GLAZING CALCULATOR (first issued with BCA 2010) HELP

Building name/description: **Abode Hotel Blacktown** Application: **other** Climate zone: **6**

Storey: **Ground** Facade areas:

	N	NE	E	SE	S	SW	W	NW	Internal
Option A	132m²		229m²		189m²		267m²		
Option B									n/a
Glazing area (A)	29.1m²		72.2m²		68.4m²		83.2m²		

Number of rows preferred in table below: **10** (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 U-Value (AFRC)	SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S _w)	Cooling (S _c)	Area used (m²)	Element share of % of allowance used
1	Gym	N		2.70		11.07	3.6	0.49	2.000	4.200	0.48	1.50	0.99	0.93	11.07	36% of 98%
2	Bedrooms N	N		1.00		18.00	3.6	0.49	2.000	3.200	0.00	2.20	1.00	1.00	18.00	64% of 98%
3	East façade	E		3.00		70.70	3.6	0.49	5.000	3.000	1.67	0.00	0.08	0.32	70.70	97% of 84%
4	Corridor E	E		1.50		1.50	3.6	0.49				0.00	1.00	1.00	1.50	3% of 84%
5	Bedrooms S	S		1.00		24.00	3.6	0.68	1.000	3.200	0.00	2.20	1.00	1.00	24.00	35% of 65%
6	Offices façade S	S		3.00		44.40	3.6	0.68	1.500	4.200	0.36	1.20	0.97	0.95	44.40	65% of 65%
7	Staff Room W	W		1.00		2.34	3.6	0.49	4.600	1.700	2.71	0.70	0.48	0.47	2.34	3% of 99%
8	West shaded entry	W		3.50		34.30	3.6	0.49	15.000	3.700	4.05	0.20	0.21	0.36	34.30	44% of 99%
9	West façade	W		3.50		40.86	3.6	0.49	3.000	4.200	0.71	0.70	0.89	0.83	40.86	47% of 99%
10	MTG Room 3 W	W		3.00		5.65	3.6	0.49	3.000	4.200	0.71	1.20	0.89	0.83	5.65	7% of 99%

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 

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Glazing Calculator – Level 1

BCA VOLUME ONE GLAZING CALCULATOR (first issued with BCA 2010) HELP

Building name/description: **Abode Hotel Blacktown** Application: **Class 3** Climate zone: **6**

Storey: **First** Facade areas:

	N	NE	E	SE	S	SW	W	NW	Internal
Option A	151m²		173m²		151m²		181m²		
Option B									n/a
Glazing area (A)	22.2m²		30.8m²		36m²		38.6m²		

Number of rows preferred in table below: **10** (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 U-Value (AFRC)	SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S _w)	Cooling (S _c)	Area used (m²)	Element share of % of allowance used
1	Rooms north facing	N		1.00		22.15	3.6	0.49				0.00	1.00	1.00	22.15	100% of 87%
2	Rooms east facing	E		1.00		30.75	3.6	0.49				0.00	1.00	1.00	30.75	100% of 99%
3	Rooms south facing	S		1.00		36.00	3.6	0.68				0.00	1.00	1.00	36.00	100% of 55%
4	Rooms west facing	W		1.00		38.61	3.6	0.49				0.00	1.00	1.00	38.61	100% of 94%
5																
6																
7																
8																
9																
10																

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Glazing Calculator – Level 2

BCA VOLUME ONE GLAZING CALCULATOR (first issued with BCA 2010) HELP

Building name/description: **Abode Hotel Blacktown** Application: **Class 3** Climate zone: **6**

Storey: **Second**

Facade areas:

	N	NE	E	SE	S	SW	W	NW	Internal
Option A	151m ²		173m ²		151m ²		181m ²		
Option B									n/a
Glazing area (A)	22.2m ²		30.8m ²		36m ²		38.6m ²		

Number of rows preferred in table below: **10** (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 (m ²)	Total U-Value (AFRC)	SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S _H)	Cooling (S _C)	Area used (m ²)	Element share of % of allowance used
1	Rooms north facing	N		1.00		22.15	3.6	0.49	2.000	2.300	0.87	1.30	0.97	0.80	22.15	100% of 63%
2	Rooms east facing	E		1.00		30.75	3.6	0.49	2.000	2.300	0.87	1.30	0.93	0.86	30.75	100% of 85%
3	Rooms south facing	S		1.00		36.00	3.6	0.68	1.000	2.300	0.43	1.30	0.98	0.96	36.00	100% of 56%
4	Rooms west facing	W		1.00		38.61	3.6	0.49	2.000	2.300	0.87	1.30	0.92	0.85	38.61	100% of 84%
5																
6																
7																
8																
9																
10																

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