BCA 2016 - Section J Compliance Report

Project Name:	Community Centre
Address:	392 Galston Road GLASTON NSW 2159
Building Classification:	Class 9b – Assembly Building
Climate Zone:	6 – Mild temperate

Prepared By:

Document Owner(s)	Project/Organisation Role
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1.0	16/11/2018	Brad Hoad	Section 96

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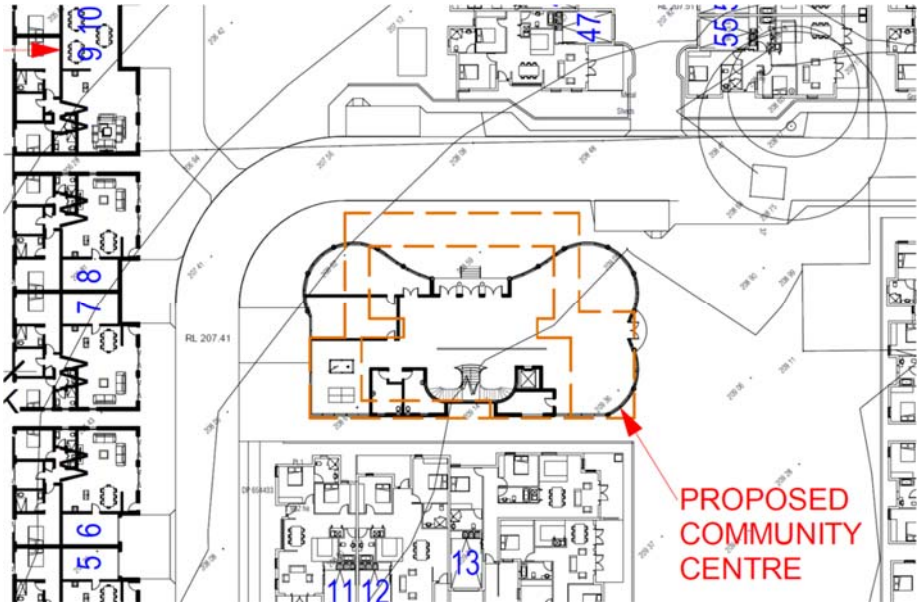
1 REPORT PURPOSE

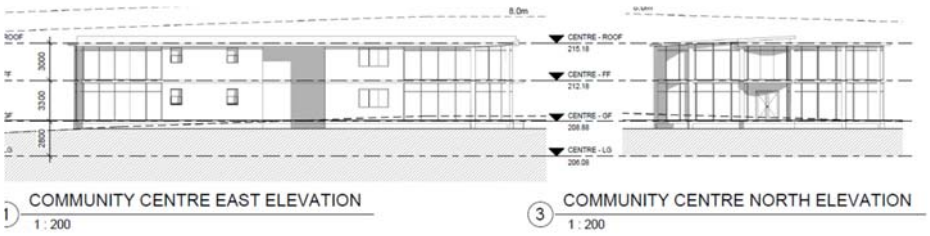
The purpose of this report is to determine or outline the necessary requirements of the project for compliance with section J of 2016 Building Code of Australia (BCA) Volume 1 which forms part of the National Construction Code (NCC).

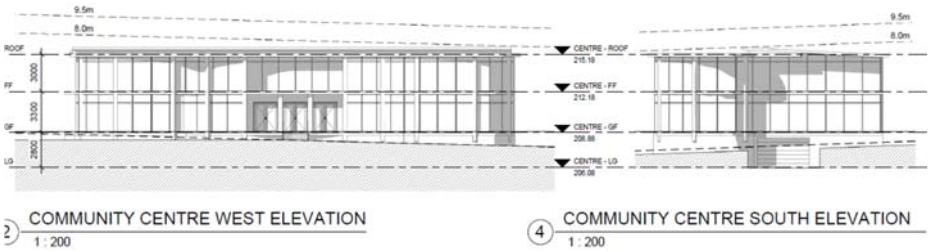
This report should be read in conjunction with BCA Volume 1.

2 PROJECT TYPE

The proposal is for approval to provide a newly constructed Class 9b building adjacent to several Class 1 buildings which have been assessed under Basix.







3 SECTION J OVERVIEW

The objective of Section J is to reduce Greenhouse Gas Emissions (GGE).

Its function is to reduce greenhouse gas emissions, to the degree necessary;

(a) a building, including its services, is to be capable of efficiently using energy; and

(b) a building's services for heating are to obtain their energy from;

(i) a low greenhouse gas intensity source; or

(ii) an on-site renewable energy source; or

(iii) another process as reclaimed energy.

3.1 Performance Requirements

3.1.1 JP1

A building, including its services, must have, to the degree necessary, features that facilitate the efficient use of energy appropriate to;

(a) the function and use of the building and services; and

(b) the internal environment; and

(c) the geographic location of the building; and

(d) the effects of nearby permanent features such as topography, structures and buildings; and

(e) solar radiation being;

(i) utilised for heating; and

(ii) controlled to minimise energy for cooling; and

(f) the sealing of the building envelope against air leakage; and

(g) the utilisation of air movement to assist heating and cooling; and

(h) the energy source of the services.

3.1.2 JP3

Heating such as for a conditioned space must, to the degree necessary, obtain energy from;

(a) a source that has a greenhouse gas intensity that does not exceed 100 g CO2-e/MJ of thermal energy load; or

(b) an on-site renewable energy source; or

(c) another process as reclaimed energy.

4 COMPLIANCE SUMMARY

This is a brief summary of compliance, please refer to the details of the report of further information on the construction methods and assumptions used throughout the report.

Part	Name	Description
J1.3	Roof and ceiling construction	Metal roof, anticon blanket and R2.5 glasswool insulation
J1.5	External Walls	Bricks with a surface density greater than 220kg/m2 and 25mm K8 Kooltherm Cladding with R2.5 glasswool insulation in frame
J1.5	Separating Walls	Refer FRL & acoustic requirements determined by others, minimum R1.0
J1.6	Floors	Nil requirements for the slab on ground section, 25mm K10 Kooltherm soffit boards to carpark
J2.0	Glazing	Refer to Section 5.2 & Appendix 5.9 Compliance with AS2047
J3.2	Chimneys & Flues	Damper/flap to seal chimney/flue
J3.3	Roof Lights	Not applicable
J3.4	Windows & Doors	External doors with door seals and a self-closing function
J3.5	Exhaust fans	Self-sealing device to exhaust fans
J5.2	Air Conditioning	Refer to Section 5.5
J6.2	Artificial Lighting	Refer to Section 5.6 & Appendix 5.9
J7.2	Hot Water Supply	Compliance with AS3500.4, Refer to Section 5.7
J8.3	Energy Monitoring	Refer Section 5.8

5 COMPLIANCE DETAILS

A Building Solution will comply the BCA if it satisfies the performance requirements. The performance requirements can only be achieved by;

a) complying with the Deemed to Satisfy Provisions; or
b) formulating an Alternative Solution which;
    i. complies with the Performance Requirements; or
    ii. is shown to be at least equivalent to the Deemed to Satisfy Provisions; or
c) a combination of both (a) and (b).

This project aims to comply with the Deemed to Satisfy Provisions.

5.1 Application of Section J

Performance Requirements JP1 and JP3 are satisfied by complying with;

(a) for reducing the heating or cooling loads of a Class 2 to 9 building, Parts J1, J2 and J3; and

(b) for air-conditioning and ventilation, Part J5; and

(c) for artificial lighting and power, Part J6; and

(d) for heated water supply and swimming pool and spa pool plant, Part J7; and

(e) for facilities for monitoring, Part J8.

5.2 J1 Building Fabric

The application of this part applies to the building elements forming the Envelope of a Conditioned Space of the building.

Envelope, for the purposes of Section J, means the 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 car park or warehouse; and
    iii. the common wall with a car park, warehouse or the like.

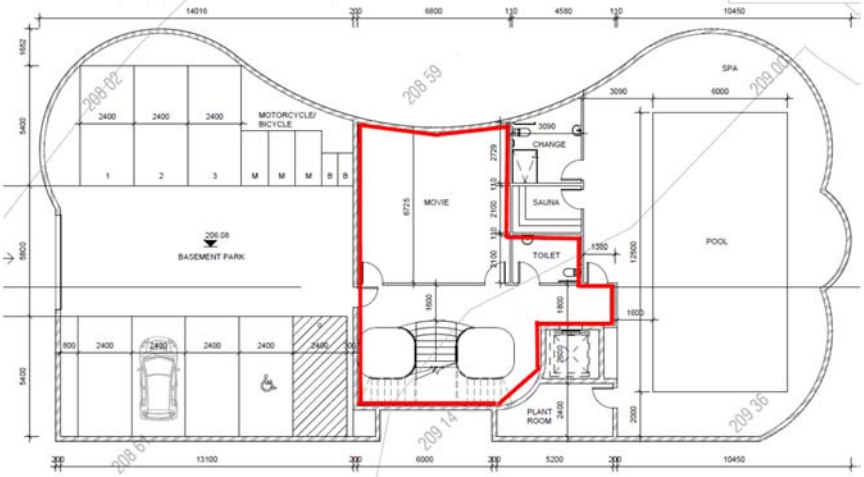
Conditioned space means a space within a building, including a ceiling or under-floor supply air plenum or return air plenum, where the environment is likely, by the intended use of the space, to have its temperature controlled by air-conditioning, but does not include

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 energy to an air conditioning system is not more than 15 W/m2 or 15 J/s.m2 (54 KJ/hour.m2).

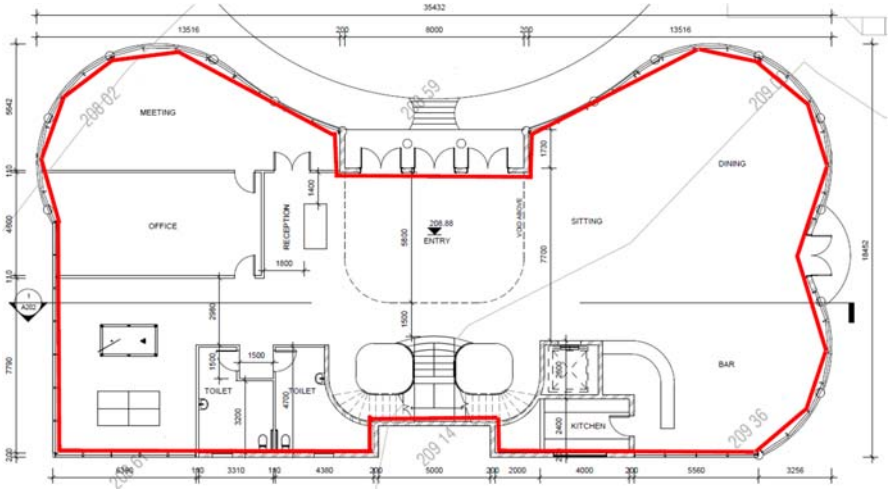
Whilst the lift shaft is unconditioned for the purposes of this report it may be included within the areas identified as conditioned and the wall performance/separation is addressed in the wall details section.

The pool enclosure is fully enclosed however it is separated by external walls to the inside of the building hence is considered unconditioned for the purposes of this report as the water temperature (thermal mass) will set the air temperature of this room.

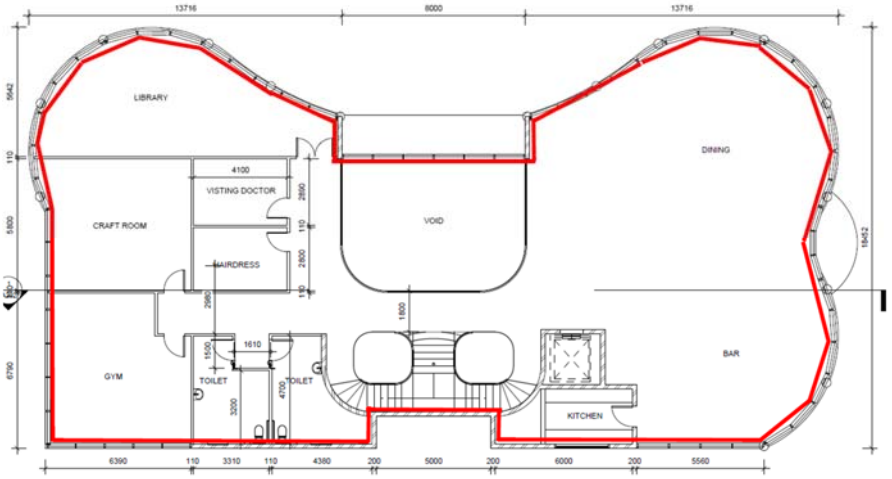
For this project the Envelope and Conditioned Areas are identified as;



Basement



Ground Floor



First Floor


8.0m
CENTRE - ROOF
215.18
CENTRE - FF
212.18
CENTRE - GF
208.88
CENTRE - LG
206.08
3000
3300
2800
1 COMMUNITY CENTRE EAST ELEVATION
1 : 200
3 COMMUNITY CENTRE NORTH ELEVATION
1 : 200
9.5m
8.0m
2 COMMUNITY CENTRE WEST ELEVATION
1 : 200
4 COMMUNITY CENTRE SOUTH ELEVATION
1 : 200

Elevations

5.2.1 J1.2 Thermal construction — general

(a) Where required, insulation must comply with AS/NZS 4859.1 and be installed so that it;

(i) abuts or overlaps adjoining insulation other than at supporting members such as studs, noggings, joists, furring channels and the like where the insulation must be against the member; and

(ii) forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and

(iii) does not affect the safe or effective operation of a service or fitting.

(b) Where required, reflective insulation must be installed with;

(i) the necessary airspace to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and

(ii) the reflective insulation closely fitted against any penetration, door or window opening; and

(iii) the reflective insulation adequately supported by framing members; and

(iv) each adjoining sheet of roll membrane being;

(A) overlapped not less than 50 mm; or

(B) taped together.

(c) Where required, bulk insulation must be installed so that;

(i) it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and

(ii) in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.

(d) Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in BCA Specification J1.2.

5.2.2 J1.3 Roof & Ceiling Construction

A roof or ceiling that forms part of the envelope, must achieve the following minimum total R-Value for the direction of heat flow;

- Light colour roof (solar absorption <0.4) R3.2 downwards
- Medium clour roof (solar absorption >0.4 & <0.6) R3.7 downwards
- Dark colour roof (solar absorption >0.6) R4.2 downwards

The roof and ceiling construction method for this project is to be timber framed (conventional or truss) which achieves a construction R value of R0.54 downwards for metal roof sheeting.

For the purposes of the report we have assumed Dark as the worst colour for the climate zone and sarking will be installed.

Double sided antiglare sarking/anticon blanket and the associated air gaps in a unventilated roof with a downwards direction of heat flow achieves an R value of R1.659 for metal roof sheeting.

Therefore for a metal sheet roof the added bulk R value required is R4.2 less construction R0.54 less sarking R1.659 = R2.001.

The most common method of achieving this is;

- ✓ R 2.5 Glasswool ceiling insulation (or higher)

Subject to the lighting specification it is recommended that if recessed downlights are installed then this R value is increased to;

- R3.0 Glasswool for Fluro/LED downlights (assuming a loss of insulation for gaps of 1%)
- R5.0 Glasswool for Halogen downlights (assuming a loss of insulation for gaps of 5%)

5.2.3 J1.4 Roof lights

Not applicable.

5.2.4 J1.5 Walls

Walls that form part of the envelope, except for;

(i) opaque non-glazed openings in external walls such as doors (including garage doors), vents, penetrations, shutters and the like; and

(ii) glazing; and

(iii) an earth retaining wall or earth-berm, in other than climate zone 8.

For this project walls shall achieve a minimum total R value of;

- R2.8 for external walls generally
- R2.3 for external walls with a surface density of more than 220kg/m2
- R2.3 for the south facing external walls
- R1.0 for internal walls bounding a conditioned space and an unconditioned space

The wall construction method for this project is to be cavity brick, this type of construction has a construction R value of R0.74 and wall frame with cladding, this type of construction has a construction R value of R0.42.

Cavity Brick, therefore R2.8 – R0.74 = R2.06

If bricks with surface density lower than 220kg/m2 are used either bulk or reflective insulation within the cavity. Typical methods would be either;

- ✓ 40mm K8 Kooltherm board between the skins; or
- ✓ 100mm of granulated Rockwool between the skins

Cavity brick (with a high surface density) Therefore R2.3 – R0.74 = R1.56

If bricks with a surface density higher than 220kg/m2 (typically dry pressed bricks) are used either bulk or reflective insulation within the cavity. Typical methods would be either;

- ✓ 25mm K8 Kooltherm board between the skins; or
- ✓ 70mm of granulated Rockwool between the skins

The recommended method of achieving this is;

- ✓ Bricks with a surface density greater than 220kg/m2 and 25mm K8 Kooltherm

Cladding, therefore R2.8 – R0.42 = R2.38

The recommended method of achieving this is;

- ✓ R2.5 Glasswool with a permeable membrane (recommended James Hardie wall wrap)

5.2.5 J1.6 Floors

Floors that form part of the envelope must achieve a minimum total R value of 0 downwards for slab on ground construction and a total R value of 1.0 downwards for suspended floor construction.

The construction methods of the floor for this project appear to be slab on ground without an in slab heating system and a suspended floor above the carpark area, hence requiring an R value.

Typical methods would be either;

- ✓ Nil requirements for the slab on ground section and the intermediate floors, and either of the following for the suspended floor between the basement garage & ground floor;
- ✓ 25mm K10 Kooltherm board directly fixed to the slab soffit
  or
- ✓ 40mm expanded polystyrene board directly fixed to the slab soffit

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5.3 J2 - Glazing

5.3.1 J2.4 Glazing

Refer to appendix 5.9.

The proposed external windows are aluminium framed, three types shall be utilized, please refer to plans for locations;

- Type 1 thermally broken double glazed low e Uw 2.0 & shgc 0.6
  - Facing SW
- Type 2 thermally broken double glazed low e Uw 2.0 & shgc 0.21
  - Facing N, NW, NE, W & E
- Type 3 double glazed low e Uw 3.3 & shgc 0.68
  - Facing S

For further information on glazing please visit www.wers.net

5.3.2 J2.5 Shading

The eaves meet the requirements of J2.5 (a) for P & H for the first floor.

5.4 J3 – Building Sealing

5.4.1 J3.1 Application

Applies to elements forming the envelope.

5.4.2 J3.2 Chimneys and flues

The chimney or flue of an open solid-fuel burning appliance must be provided with a damper or flap that can be closed to seal the chimney or flue.

5.4.3 J3.3 Roof lights

(a) A roof light must be sealed, or capable of being sealed, when serving;

(i) a conditioned space; or

(ii) a habitable room in climate zones 4, 5, 6, 7 or 8.

(b) A roof light required by (a) to be sealed, or capable of being sealed, must be constructed with;

(i) an imperforate ceiling diffuser or the like installed at the ceiling or internal lining level; or

(ii) a weatherproof seal; or

(iii) a shutter system readily operated either manually, mechanically or electronically by the occupant.

5.4.4 J3.4 Windows and doors

(a) A seal to restrict air infiltration must be fitted to each edge of a door, openable window or the like forming part of;

(i) the envelope of a conditioned space; or

(ii) the external fabric of a habitable room or public area in climate zones 4, 5, 6, 7 or 8.

(b) The requirements of (a) do not apply to;

(i) a window complying with AS 2047; or

(ii) a fire door or smoke door; or

(iii) a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security.

(c) A seal required by (a);

(i) for the bottom edge of an external swing door, must be a draft protection device; and

(ii) for the other edges of an external door or the edges of an openable window or other such opening, may be a foam or rubber compression strip, fibrous seal or the like.

(d) An entrance to a building, if leading to a conditioned space must have an airlock, self-closing door, revolving door or the like, other than;

(i) where the conditioned space has a floor area of not more than 50 m^2; or

(ii) where a café, restaurant, open front shop or the like has;

(A) a 3 m deep un-conditioned zone between the main entrance, including an open front, and the conditioned space; and

(B) at all other entrances to the café, restaurant, open front shop or the like, self- closing doors.

5.4.5 J3.5 Exhaust fans

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) a conditioned space; or

(b) a habitable room in climate zones 4, 5, 6, 7 or 8.

5.4.6 J3.6 Construction of roofs, walls and floors

(a) 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 in accordance with (b) when forming part of;

(i) the envelope; or

(ii) the external fabric of a habitable room or a public area in climate zones 4, 5, 6, 7 or 8.

(b) Construction required by (a) must be;

(i) enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or

(ii) sealed by caulking, skirting, architraves, cornices or the like.

(c) The requirements of (a) do not apply to openings, grilles or the like required for smoke hazard management.

5.4.7 J3.7 Evaporative coolers

Not applicable.

5.5 J5 – Air Conditioning Systems & Ventilation Systems

5.5.1 J5.2 Air Conditioning Systems

(a) Control;

(i) An air-conditioning system;

(A) must be capable of being deactivated when the building or part of a building served by that system is not occupied; and

(B) when serving more than one air-conditioning zone or area with different heating or cooling needs, must;

(aa) thermostatically control the temperature of each zone or area; and

(bb) not control the temperature by mixing actively heated air and actively cooled air; and

(cc) limit reheating to not more than;

(AA) for a fixed supply air rate, a 7.5 K rise in temperature; and

(BB) for a variable supply air rate, a 7.5 K rise in temperature at the nominal supply air rate but increased or decreased at the same rate that the supply air rate is respectively decreased or increased; and

(C) which provides the required mechanical ventilation, other than in process-related applications where humidity control is needed, must have an outdoor air economy cycle;

(aa) in climate zone 4, 5, 6, 7 or 8, when the air-conditioning system capacity is more than 35 kWr; and

(D) which contains more than one water heater, chiller or coil, must be capable of stopping the flow of water to those not operating; and

(E) except for a packaged air-conditioning system, must have a variable speed fan when its supply air quantity is capable of being varied; and

(F) when serving a sole-occupancy unit in a Class 3 building, must not operate when any external door of the sole-occupancy unit that opens to a balcony or the like, is open for more than one minute.

(ii) When an air-conditioning system is deactivated, any motorised outside air and return dampers must close.

(iii) Compliance with (i) must not adversely affect;

(A) smoke hazard management measures required by Part E2; and

(B) ventilation required by Part E3 and Part F4.

(b) Fans - Fans of an air-conditioning system must comply with BCA Specification J5.2a.

(c) Pumps;

(i) An air-conditioning system, where water is circulated by pumping at more than 2 L/s, must be designed so that the maximum pump power to the pump complies with BCA Table J5.2.

(ii) An air-conditioning system pump that is rated at more than 3 kW of pump power and circulates water at more than 2 L/s must be capable of varying its speed in response to varying load.

(iii) A spray water pump of an air-conditioning system's closed circuit cooler or evaporative condenser must not use more than 150 W of pump power for each L/s of spray water circulated.

(d) Insulation;

(i) The ductwork of an air-conditioning system must be insulated and sealed in accordance with BCA Specification J5.2b.

(ii) Piping, vessels, heat exchangers and tanks containing heating or cooling fluid that are part of an air-conditioning system, other than those with insulation levels covered by MEPS, must be insulated in accordance with BCA Specification J5.2c.

(e) Space heating - A heater used for air-conditioning or as part of an air-conditioning system must comply with BCA Specification J5.2d.

(f) Energy efficiency ratios;

(i) refrigerant chillers used as part of an air-conditioning system; and

(ii) packaged air-conditioning equipment, must comply with BCA Specification J5.2e.

2. Energy efficiency ratios

(a) An *air-conditioning* system refrigerant chiller with a capacity not more than 350 kWr must have an energy efficiency ratio complying with Table 2a when determined in accordance with AHRI 550/590.

Table 2a MINIMUM ENERGY EFFICIENCY RATIO FOR REFRIGERANT CHILLERS

Equipment	Minimum energy efficiency ratio ($W_r/W_{input\ power}$)	
	For full load operation	For integrated part load
Water cooled chiller	4.2	5.2
Air cooled or evaporatively cooled chiller	2.5	3.4

(b) Package *air-conditioning* equipment with a capacity of not less than 65 kWr, including a split unit and a heat pump, must have a minimum energy efficiency ratio when cooling complying with Table 2b when tested in accordance with AS/NZS 3823.1.2 at test condition T1.

Table 2b MINIMUM ENERGY EFFICIENCY RATIO FOR PACKAGED AIR-CONDITIONING EQUIPMENT

Equipment	Minimum energy efficiency ratio ($W_r/W_{input\ power}$)	
	65 kWr to 95 kWr capacity	More than 95 kWr capacity
Air-conditioner — cooling	2.70	2.80
Heat pump — cooling	2.60	2.70

(g) Time switches;

(i) A time switch complying with Specification J6 must be provided to control;

(A) an air-conditioning system of more than 10 kWr; and

(B) a heater of more than 10 $kW_{heating}$ used for air-conditioning.

(ii) The requirements of (i) do not apply to;

(A) an air-conditioning system that serves;

(aa) only one sole-occupancy unit in a Class 2 or 3 building; or

(B) a building where air-conditioning is needed for 24 hour occupancy.

5.5.2 J5.3 Mechanical Ventilation Systems

(a) Control —

(i) A mechanical ventilation system, including one that is part of an air-conditioning system, except where the mechanical system serves only one sole-occupancy unit in a Class 2 building or serves only a Class 4 part of a building, must;

(A) be capable of being deactivated when the building or part of the building served by that system is not occupied; and

(B) when serving a conditioned space;

(aa) not exceed the minimum outdoor air quantity required by BCA Part F4, where relevant, by more than 20%; and

(bb) in other than climate zone 2, where the number of square metres per person is not more than 1 as specified in D1.13 and the air flow rate is more than 1000 L/s, have;

(AA) an energy reclaiming system that preconditions outside air; or

(BB) the ability to automatically modulate the mechanical ventilation required by Part F4 in proportion to the number of occupants.

(ii) The requirements of (a)(i)(B)(aa) do not apply where;

(A) additional unconditioned outside air is supplied for free cooling or to balance process exhaust; or

(B) additional exhaust ventilation is needed to balance the required mechanical ventilation; or

(C) an energy reclaiming system preconditions all the outside air.

(iii) Compliance with (a)(i) must not adversely affect;

(A) smoke hazard management measures required by BCA Part E2; and

(B) ventilation required by BCA Part E3 and Part F4.

(b) Fans - Fans of a mechanical ventilation system covered by (a) must comply with BCA Specification J5.2a.

(c) Time switches;

(i) A time switch complying with Specification J6 must be provided to control a mechanical ventilation system with an air flow rate of more than 1000 L/s.

(ii) The requirements of (i) do not apply to;

(A) a mechanical ventilation system that serves;

(aa) only one sole-occupancy unit in a Class 2 or 3 building; or

(bb) a Class 4 part of a building; or

(cc) only one sole-occupancy unit in a Class 9c building; or

(B) a building where mechanical ventilation is needed for 24 hour occupancy.

5.5.3 J5.4 Miscellaneous Exhaust Systems

(a) A miscellaneous exhaust system with an air flow rate of more than 1000 L/s, that is associated with equipment having a variable demand, must;

(i) be capable of stopping the motor when the system is not needed; and

(ii) have a variable speed fan or the like.

(b) The requirements of (a) do not apply;

(i) to a miscellaneous exhaust system in;

(A) a sole-occupancy unit in a Class 2, 3 or 9c building; or

(B) a Class 4 part of a building; or

(ii) where additional exhaust ventilation is needed to balance the required outside air for ventilation.

5.6 J6 – Artificial Lighting & Power

Refer to appendix 5.10.

5.6.1 J6.2 Artificial Lighting

(a) In a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, please refer to the accompanying Basix reports.

(b) In a building other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a building;

(i) 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 maximum illumination power density in Table J6.2a; and

(ii) the aggregate design illumination power load in (i) is the sum of the design illumination power loads in each of the spaces served; and

(iii) in determining the design illumination power load for (ii) the following must be used:

(A) Where there are multiple lighting systems serving the same space;

(aa) the total illumination power load of all systems; or

(bb) for a control system that permits only one system to operate at a time, the design illumination power load is;

(AA) based on the highest illumination power load; or (BB) determined by the formula;

[H x T/2 + P x (100 -T/2)] / 100

Where:

H = the highest illumination power load; and

T = the time for which the maximum illumination power load will occur, expressed as a percentage; and

P = the predominant illumination power load.

(B) Where there is adjustable position lighting such as trapeze lighting or track lighting other than trunking systems that accept fluorescent lamps;

(aa) the rating of the circuit breaker protecting the track; or

(bb) of extra low voltage, 80% of the power rating of the transformer; or

(cc) of mains voltage, 100 W per metre of track.

(c) The requirements of (a) and (b) do not apply to the following:

(i) Emergency lighting in accordance with BCA Part E4.

(ii) Signage and display lighting within cabinets and display cases that are fixed in place.

(iv) A heater where the heater also emits light, such as in bathrooms.

5.6.2 J6.3 Interior Artificial Lighting & Power Control

(a) Artificial lighting of a room or space must be individually operated by a switch or other control device.

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

(c) An artificial lighting switch or other control device in (a) must;

(i) if an artificial lighting switch, be located in a visible position;

(A) in the room or space being switched; or

(B) in an adjacent room or space from where the lighting being switched is visible; and

(ii) for other than a single functional space such as an auditorium, theatre, swimming pool, sporting stadium or warehouse;

(B) not operate lighting for an area of more than;

(aa) 250 m^2 for a space of not more than 2000 m^2; or

(bb) 1000 m^2 for a space of more than 2000 m^2, if in a Class 3, 6, 7, 8 (other than a laboratory) or 9 building.

(d) 95% of the light fittings in a building or storey of a building, other than a Class 2 or 3 building or a Class 4 part of a building, of more than 250 m^2 must be controlled by;

(i) a time switch in accordance with BCA Specification J6; or

(ii) an occupant sensing device such as;

(A) a security key card reader that registers a person entering and leaving the building; or

(B) a motion detector in accordance with BCA Specification J6.

(f) The requirements of (a), (b), (c), (d) and (e) do not apply to the following:

(i) Emergency lighting in accordance with BCA Part E4.

(ii) Where artificial lighting is needed for 24 hour occupancy such as for a manufacturing process, parts of a hospital, an airport control tower or within a detention centre.

(g) The requirements of (d) do not apply to the following:

(i) Artificial lighting in a space where the sudden loss of artificial lighting would cause an unsafe situation such as in a patient care area in a Class 9a building or in a Class 9c building.

(ii) A heater where the heater also emits light, such as in bathrooms.

5.6.3 J6.4 Interior Decorative & Display Lighting

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

(i) separately from other artificial lighting; and

(ii) by a manual switch for each area other than when the operating times of the displays are the same in a number of areas such as in a museum, art gallery or the like, in which case they may be combined; and

(iii) by a time switch in accordance with BCA Specification J6 where the display lighting exceeds 1 kW.

(b) Window display lighting must be controlled separately from other display lighting.

5.6.4 J6.5 Artificial Lighting Around the Perimeter of a Building

(a) Artificial lighting around 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 load exceeds 100 W;

(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 BCA Specification J6; and

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

(b) The requirements of (a)(ii) do not apply to the following:

(i) Emergency lighting in accordance with BCA Part E4.

5.6.5 J6.6 Boiling Water & Chilled Water Storage Units

Power supply to a boiling water or chilled water storage unit must be controlled by a time switch in accordance with BCA Specification J6.

5.7 J7 – Heated Water Supply & Swimming Pool & Spa Plant

5.7.1 J7.2 Heated Water Supply

A heated water supply system for food preparation and sanitary purposes must be designed and installed in accordance with Part B2 of NCC Volume Three - Plumbing Code of Australia.

- Insulation/lagging to pipes
- Flow rate of showerheads to not exceed 9L/min

5.7.2 J7.3 Swimming Pool Heating & Pumping

(a) Heating for a swimming pool must be by;

(i) a solar heater not boosted by electric resistance heating; or

(ii) a heater using reclaimed energy; or

(iii) a gas heater; or

(iv) a heat pump; or

(v) a combination of (i) to (iv).

(b) Where some or all of the heating required by (a) is by a gas heater or a heat pump, the swimming pool must have;

(i) a cover unless located in a conditioned space; and

(ii) a time switch in accordance with Specification J6 to control the operation of the heater.

(c) A time switch must be provided in accordance with Specification J6 to control the operation of a circulation pump for a swimming pool.

(d) For the purpose of J7.3,a swimming pool does not include a spa pool.

5.7.3 J7.4 Spa Pool Heating & Pumping

(a) Heating for a spa pool that shares a water recirculation system with a swimming pool must be by—

(i) a solar heater; or

(ii) a heater using reclaimed energy; or

(iii) a gas heater; or

(iv) a heat pump; or

(v) a combination of (i) to (iv).

(b) Where some or all of the heating required by (a) is by a gas heater or a heat pump, the spa pool must have—

(i) a cover; and

(ii) a push button and a time switch in accordance with Specification J6 to control the operation of the heater.

(c) A time switch must be provided in accordance with Specification J6 to control the operation of a circulation pump for a spa pool having a capacity of 680 L or more.

5.8 J8 – Facilities for Energy Monitoring

5.8.1 J8.3 Facilities for Energy Monitoring

(a) 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.

(b) A building with a floor area of more than 2,500 m must have the facility to record individually the energy consumption of—

(i) air-conditioning plant including, where appropriate, heating plant, cooling plant and air handling fans; and

(ii) artificial lighting; and

(iii) appliance power; and

(iv) central hot water supply; and

(v) internal transport devices including lifts, escalators and travelators where there is more than one serving the building; and

(vi) other ancillary plant.

Appendixes

5.9 BCA volume 1 glazing calculator

Report from CalculatorGlazingVolOne2014 Ground *printed 16/11/2018*

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

Building name/description: 392 Glaston Road GLASTON NSW 2159

Application: Class 9c aged care

Climate zone: 6

Storey: Ground

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	55m²	23m²	95m²		55m²	60m²	60m²	50m²	
Option B									n/a
Glazing area (A)	*36.6m²*	*12.2m²*	*39.1m²*	.....	*35.7m²*	*39.4m²*	*32.5m²*	*28.4m²*	

Number of rows preferred in table below: 18 *(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	Meeting	SW		2.90	6.60		2.0	0.60				0.00	1.00	1.00	19.14	34% of 100%
2	Meeting	NW		2.90	9.80		2.0	0.21	0.900	3.000	0.30	0.10	0.87	0.76	28.42	100% of 86%
3	Entry	W		2.40	1.70		2.0	0.21	1.900	3.000	0.63	0.60	0.91	0.86	4.08	13% of 95%
4	Entry	W		2.40	1.70		2.0	0.21	1.900	3.000	0.63	0.60	0.91	0.86	4.08	13% of 95%
5	Entry	W		2.40	1.70		2.0	0.21	1.900	3.000	0.63	0.60	0.91	0.86	4.08	13% of 95%
6	Dining	SW		2.90	7.00		2.0	0.21	0.900	3.000	0.30	0.10	0.86	0.81	20.30	66% of 100%
7	Dining	W		2.90	7.00		2.0	0.21	0.900	3.000	0.30	0.10	0.85	0.80	20.30	62% of 95%
8	Dining	N		2.90	7.00		2.0	0.21	0.900	3.000	0.30	0.10	0.89	0.73	20.30	56% of 89%
9	Dining	N		2.40	1.70		2.0	0.21	2.500	3.000	0.83	0.60	0.93	0.70	4.08	10% of 89%
10	Bar	N		2.90	4.20		2.0	0.21	0.900	3.000	0.30	0.10	0.89	0.73	12.18	34% of 89%
11	Bar	NE		2.90	4.20		2.0	0.21	0.900	3.000	0.30	0.10	0.88	0.78	12.18	100% of 89%
12	Bar	E		2.90	5.50		2.0	0.21				0.00	1.00	1.00	15.95	41% of 87%
13	Kitchen	E		1.50	2.40		2.0	0.21				0.00	1.00	1.00	3.60	9% of 87%
14	Toilet	E		1.20	0.90		2.0	0.21				0.00	1.00	1.00	1.08	3% of 87%
15	Toilet	E		1.20	0.90		2.0	0.21				0.00	1.00	1.00	1.08	3% of 87%
16	Games	E		2.90	6.00		2.0	0.21				0.00	1.00	1.00	17.40	44% of 87%
17	Games	S		2.90	7.60		3.3	0.68				0.00	1.00	1.00	22.04	62% of 98%
18	Office	S		2.90	4.70		3.3	0.68				0.00	1.00	1.00	13.63	38% of 98%

if inputs are valid

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.

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

Building name/description: 392 Glaston Road GLASTON NSW 2159

Application: Class 9c aged care

Climate zone: 6

Storey: First

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	55m²	23m²	95m²		55m²	60m²	60m²	50m²	
Option B									n/a
Glazing area (A)	*32.5m²*	*12.2m²*	*39.1m²*	.....	*35.7m²*	*39.4m²*	*24.4m²*	*28.4m²*	

Number of rows preferred in table below: 18 *(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	Library	SW		2.90	6.60		2.0	0.60				0.00	1.00	1.00	19.14	34% of 100%
2	Library	NW		2.90	9.80		2.0	0.21	0.900	3.000	0.30	0.10	0.87	0.76	28.42	100% of 86%
3	Void	W		2.40	1.70		2.0	0.21	1.900	3.000	0.63	0.60	0.91	0.86	4.08	17% of 71%
4											ROW SKIPPED (OK if intentional)					
5											ROW SKIPPED (OK if intentional)					
6	Dining	SW		2.90	7.00		2.0	0.21	0.900	3.000	0.30	0.10	0.86	0.81	20.30	66% of 100%
7	Dining	W		2.90	7.00		2.0	0.21	0.900	3.000	0.30	0.10	0.85	0.80	20.30	83% of 71%
8	Dining	N		2.90	7.00		2.0	0.21	0.900	3.000	0.30	0.10	0.89	0.73	20.30	52% of 96%
9											ROW SKIPPED (OK if intentional)					
10	Bar	N		2.90	4.20		2.0	0.21				0.00	1.00	1.00	12.18	48% of 96%
11	Bar	NE		2.90	4.20		2.0	0.21	0.900	3.000	0.30	0.10	0.88	0.78	12.18	100% of 89%
12	Bar	E		2.90	5.50		2.0	0.21				0.00	1.00	1.00	15.95	41% of 87%
13	Kitchen	E		1.50	2.40		2.0	0.21				0.00	1.00	1.00	3.60	9% of 87%
14	Toilet	E		1.20	0.90		2.0	0.21				0.00	1.00	1.00	1.08	3% of 87%
15	Toilet	E		1.20	0.90		2.0	0.21				0.00	1.00	1.00	1.08	3% of 87%
16	Gym	E		2.90	6.00		2.0	0.21				0.00	1.00	1.00	17.40	44% of 87%
17	Gym	S		2.90	7.60		3.3	0.68				0.00	1.00	1.00	22.04	62% of 98%
18	Craft	S		2.90	4.70		3.3	0.68				0.00	1.00	1.00	13.63	38% of 98%

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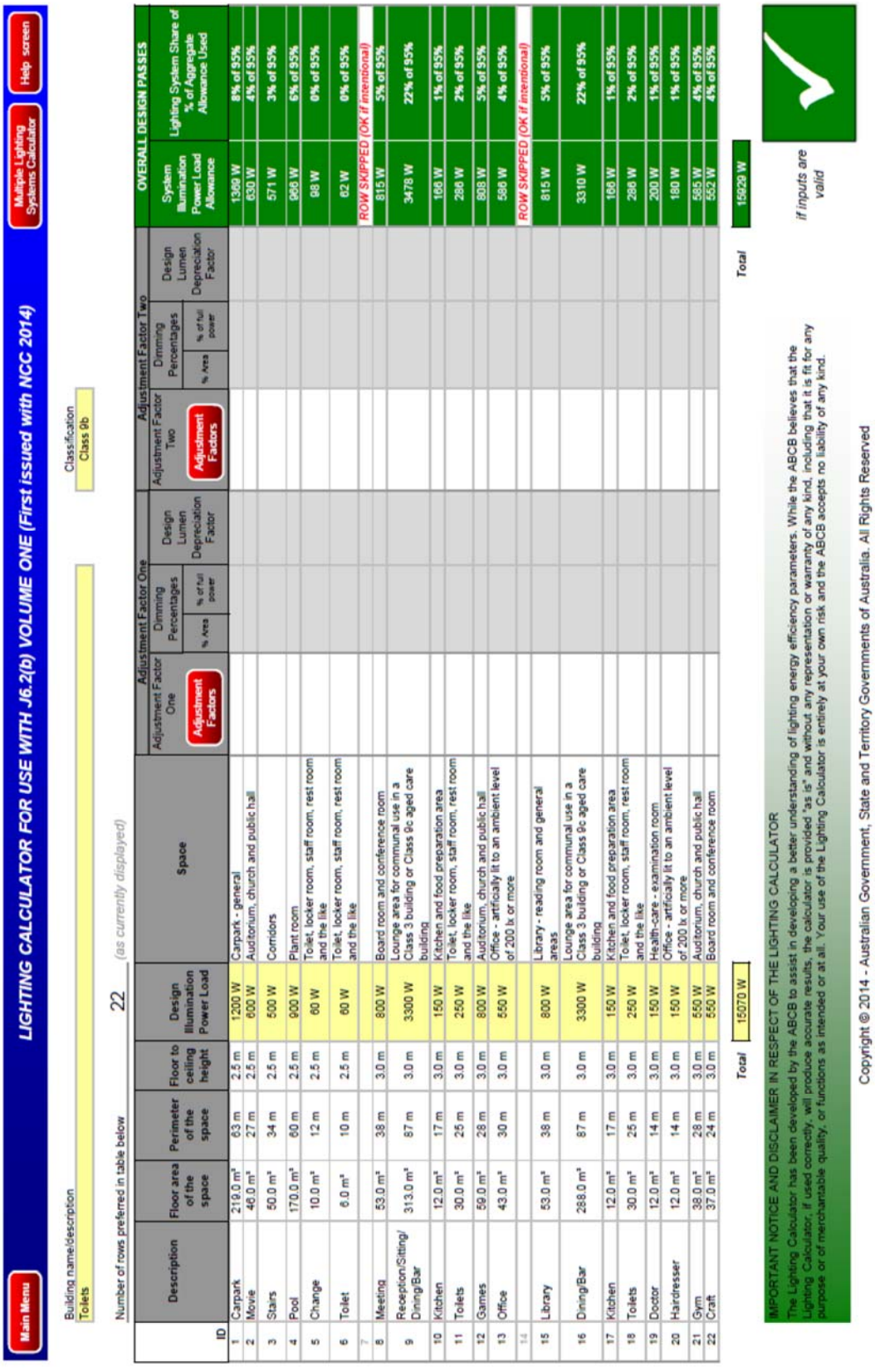
if inputs are valid ✓

5.10 BCA volume 1 lighting calculator



LIGHTING CALCULATOR FOR USE WITH J6.2(b) VOLUME ONE (First issued with NCC 2014)

Main Menu | Multiple Lighting Systems Calculator | Help screen

Building name/description: Toilets

Classification: Class 9b

Number of rows preferred in table below: 22 (as currently displayed)

ID	Description	Floor area of the space	Perimeter of the space	Floor to ceiling height	Design Illumination Power Load	Space	Adjustment Factor One	Adjustment Factors	Dimming Percentages: % Area	Dimming Percentages: % of full power	Design Lumen Depreciation Factor	Adjustment Factor Two	Adjustment Factors	Dimming Percentages: % Area	Dimming Percentages: % of full power	Design Lumen Depreciation Factor	OVERALL DESIGN PASSES: System Illumination Power Load Allowance	OVERALL DESIGN PASSES: Lighting System Share of % of Aggregate Allowance Used
1	Carpark	219.0 m²	63 m	2.5 m	1200 W	Carpark - general											1369 W	8% of 95%
2	Movie	46.0 m²	27 m	2.5 m	600 W	Auditorium, church and public hall											630 W	4% of 95%
3	Stairs	50.0 m²	34 m	2.5 m	500 W	Corridors											571 W	3% of 95%
4	Pool	170.0 m²	60 m	2.5 m	900 W	Plant room											968 W	6% of 95%
5	Change	10.0 m²	12 m	2.5 m	80 W	Toilet, locker room, staff room, rest room and the like											98 W	0% of 95%
6	Toilet	6.0 m²	10 m	2.5 m	60 W	Toilet, locker room, staff room, rest room and the like											62 W	0% of 95%
7																	ROW SKIPPED (OK if intentional)	
8	Meeting	53.0 m²	38 m	3.0 m	800 W	Board room and conference room											815 W	5% of 95%
9	Reception/Sitting/ Dining/Bar	313.0 m²	87 m	3.0 m	3300 W	Lounge area for communal use in a Class 3 building or Class 9c aged care building											3478 W	22% of 95%
10	Kitchen	12.0 m²	17 m	3.0 m	150 W	Kitchen and food preparation area											166 W	1% of 95%
11	Toilets	30.0 m²	25 m	3.0 m	250 W	Toilet, locker room, staff room, rest room and the like											286 W	2% of 95%
12	Games	59.0 m²	28 m	3.0 m	800 W	Auditorium, church and public hall											808 W	5% of 95%
13	Office	43.0 m²	30 m	3.0 m	550 W	Office - artificially lit to an ambient level of 200 lx or more											588 W	4% of 95%
14																	ROW SKIPPED (OK if intentional)	
15	Library	53.0 m²	38 m	3.0 m	800 W	Library - reading room and general areas											815 W	5% of 95%
16	Dining/Bar	288.0 m²	87 m	3.0 m	3300 W	Lounge area for communal use in a Class 3 building or Class 9c aged care building											3310 W	22% of 95%
17	Kitchen	12.0 m²	17 m	3.0 m	150 W	Kitchen and food preparation area											166 W	1% of 95%
18	Toilets	30.0 m²	25 m	3.0 m	250 W	Toilet, locker room, staff room, rest room and the like											286 W	2% of 95%
19	Doctor	12.0 m²	14 m	3.0 m	150 W	Health-care - examination room											200 W	1% of 95%
20	Hairdresser	12.0 m²	14 m	3.0 m	150 W	Office - artificially lit to an ambient level of 200 lx or more											180 W	1% of 95%
21	Gym	38.0 m²	28 m	3.0 m	550 W	Auditorium, church and public hall											585 W	4% of 95%
22	Craft	37.0 m²	24 m	3.0 m	550 W	Board room and conference room											552 W	4% of 95%
				Total	15070 W											Total	15829 W	

if inputs are valid

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