

SECTION J ENERGY EFFICIENCY REPORT

PROJECT NAME: The Star – Former Part 3A
Approval MP08_0098
Section 4.55(2) Modification
Application 18

ADDRESS: 80 Pymont Street, Pymont
NSW 2009

CLIENT: Foundation Theatres

DOCUMENT CONTROL

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ISSUE: FINAL

REVISION: 1

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DTS ENERGY EFFICIENCY DECLARATION

Pursuant to NCC A2.2 (vi) this report relies on supplied documentation for assessment with regards to adopting measures contributing to deemed-to-satisfy of designed and built deliverables. This report documents the energy efficiency assessment undertaken on the proposed building work described herein to confirm compliance with the Section J – Energy Efficiency Provisions of the National Construction Code Volume One – Class 2 to Class 9 Buildings. It is our opinion that this project can be constructed to satisfy the requirements of the National Construction Code.



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1 - Introduction

The term Proposed Development in this report refers to Star Casino- Project Francis located at 80 Pymont Street, Pymont NSW 2009.

This report presents the findings from the design assessment of the Proposed Development against the Deemed-to-Satisfy (DTS) requirements of Section J of the Building Code of Australia 2019 – Amendment 1, Volume 1, ENERGY EFFICIENCY.

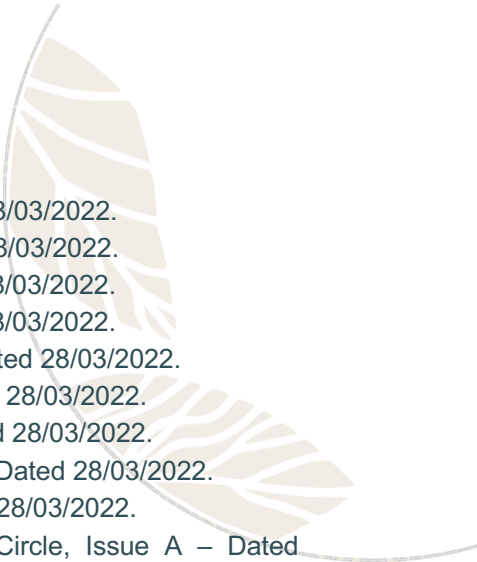
The purpose of this report is to provide an assessment of the design plans and documentation for the Proposed Development and to satisfy the requirements of the Department of Planning and Environment.

The scope of this report is limited to the design documentation referenced in Section 2 of this report and only covers Section J of BCA 2019 – Amendment 1, Volume 1 provisions.

2 - Referenced Documents

The following documents and design plans have been referenced in compilation of this report:

1. National Construction Code Series, Volume 1, Building Code of Australia 2019 – Amendment 1, Class 2 to Class 9 Buildings.
2. Architectural Plans listed below provided by “Foundation Theatres” and received by Certified Energy at 29/03/2022.
 - MOD18-A0000 – Cover Page, Issue A – Dated 28/03/2022.
 - MOD18-A0001 – Site Analysis, Issue A – Dated 28/03/2022.
 - MOD18-A0002 – Shadow Diagram 21 June, Issue A – Dated 28/03/2022.
 - MOD18-A0003 – Shadow Diagram 21 December, Issue A – Dated 28/03/2022.
 - MOD18-A0004 – Height Plane Plan, Issue A – Dated 28/03/2022.
 - MOD18-A0005 – Height Plane 3D View, Issue A – Dated 28/03/2022.
 - MOD18-A0006 – Height Plane Section, Issue A – Dated 28/03/2022.
 - MOD18-A0007 – Photomontage, Issue A – Dated 28/03/2022.
 - MOD14-A0702 – Demolition Plan-L02, Issue G – Dated 28/03/2022.
 - MOD14-A0703 – Demolition Plan-L03, Issue H – Dated 28/03/2022.
 - MOD14-A0704 – Demolition Plan-L04, Issue G – Dated 28/03/2022.
 - MOD14-A0705 – Demolition Plan-L05, Issue K – Dated 28/03/2022.
 - MOD18-A0706 – Demolition Plan-L06, Issue A – Dated 28/03/2022.
 - MOD18-A0707 – Demolition Plan-L07, Issue A – Dated 28/03/2022.
 - MOD14-A10B2 – Proposed Site Plan-B2, Issue I – Dated 28/03/2022.
 - MOD14-A10B1 – Proposed Site Plan-B1, Issue F – Dated 28/03/2022.
 - MOD14-A1000 – Proposed Site Plan-L00, Issue J – Dated 28/03/2022.
 - MOD14-A1001 – Proposed Site Plan-L01, Issue I – Dated 28/03/2022.
 - MOD14-A1002 – Proposed Site Plan-L02, Issue G – Dated 28/03/2022.

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- MOD14-A1003 – Proposed Site Plan-L03, Issue H – Dated 28/03/2022.
 - MOD14-A1004 – Proposed Site Plan-L04, Issue G – Dated 28/03/2022.
 - MOD14-A1005 – Proposed Site Plan-L05, Issue K – Dated 28/03/2022.
 - MOD18-A1006 – Proposed Site Plan-L06, Issue A – Dated 28/03/2022.
 - MOD18-A1007 – Proposed Plan- Gallery Level, Issue A – Dated 28/03/2022.
 - MOD18-A1008 – Proposed Plan- Grid Level, Issue A – Dated 28/03/2022.
 - MOD18-A1009 – Proposed Plan- Roof Level, Issue A – Dated 28/03/2022.
 - MOD18-A1101 – Proposed Plan-L02-Orchestra Pit, Issue A – Dated 28/03/2022.
 - MOD18-A1102 – Proposed Plan-L03-Stalls, Issue A – Dated 28/03/2022.
 - MOD18-A1103 – Proposed Plan-L04-Circle Lobby-Lower Circle, Issue A – Dated 28/03/2022.
 - MOD18-A1104 – Proposed Plan-L05-Live Room Lobby-Main Auditorium Circle, Issue A – Dated 28/03/2022.
 - MOD18-A1105 – Proposed Plan-L06-Live Room Upper-Forestage Grid, Issue A – Dated 28/03/2022.
 - MOD18-A1106 – Proposed Plan-Lower Loading Gallery, Issue A – Dated 28/03/2022.
 - MOD18-A1107 – Proposed Plan-Upper Loading Gallery, Issue A – Dated 28/03/2022.
 - MOD18-A1108 – Proposed Plan-Roof, Issue A – Dated 28/03/2022.
 - MOD14-A4010 – Proposed Elevations – Whole Site, Issue J – Dated 28/03/2022.
 - MOD18-A2110 – Proposed Elevations, Issue A – Dated 28/03/2022.
 - MOD18-A2111 – Proposed Elevations, Issue A – Dated 28/03/2022.
 - MOD18-A3000 – Proposed Sections, Issue A – Dated 28/03/2022.

3 – Proposed Development

The Proposed Development in this report are modifications to the existing Multi-Use Entertaining Facility located at 80 Pymont Street, Pymont NSW 2006.

The development is a class 9b building in BCA Climate Zone 5 according to BCA Climate Map for NSW.

The following construction elements are being proposed in the building design according to architectural plans and design documents referenced in this report:

Roof and Ceiling: Existing & New Metal Roof.

External Walls: Existing walls, Sandstone cladding, & Speed panels.

Internal Walls: Plasterboard on studs, Masonry wall with plasterboard, and F.C clad walls.

Floors: Existing & New Suspended concrete slab.

Windows: Standard Aluminium framed windows and Existing Glass Cladding.

Skylights: No skylights.

Air Conditioning System: No design plans provided.

Lighting System: No design plans provided.

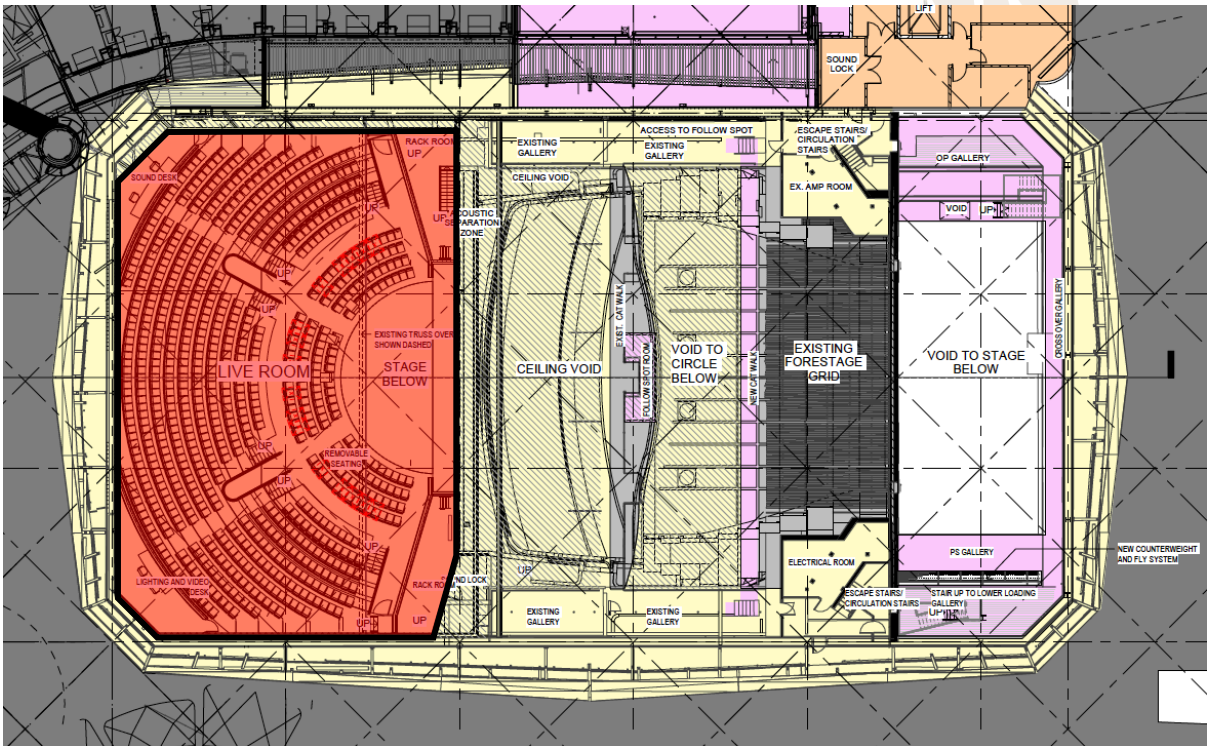
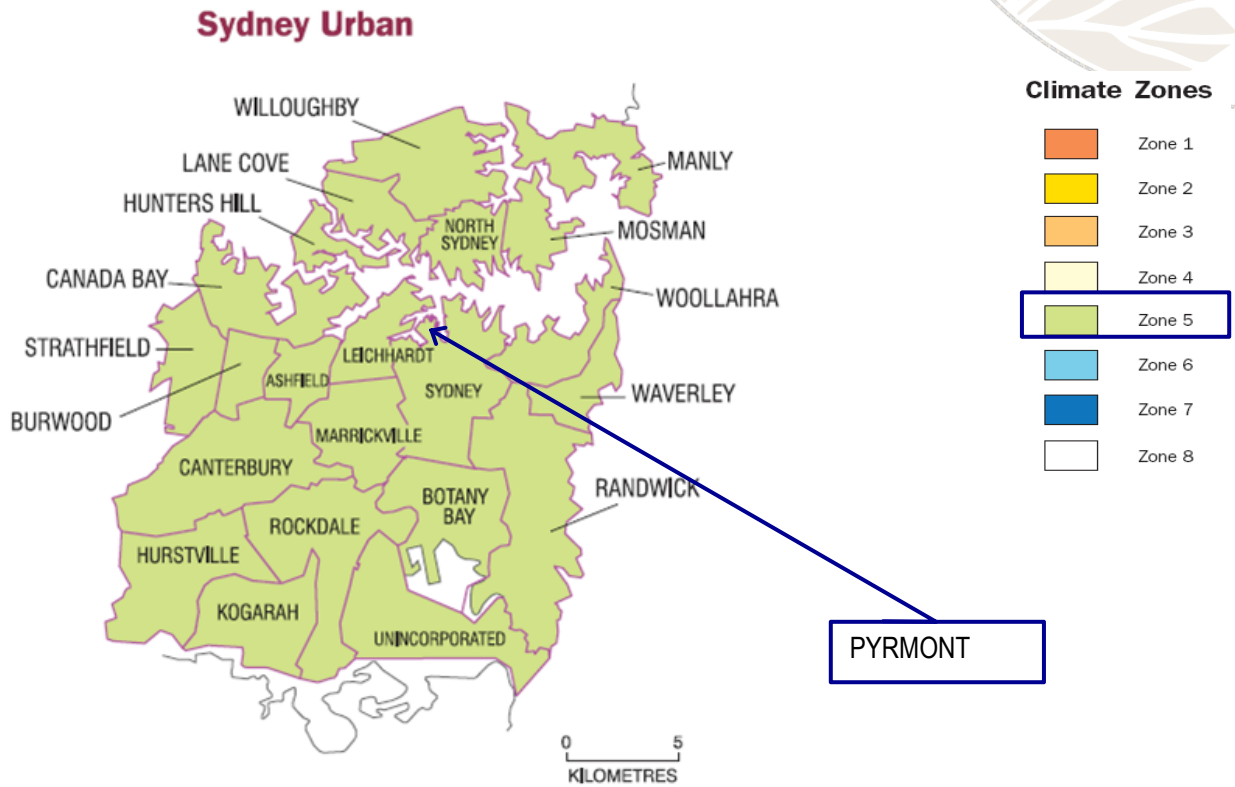


Figure 4 – New Construction – Building Envelope - Level 6-Live Room Front On

5 - Project Classification and Climate Zone

BUILDING CLASS 9B



CLIMATE	COLOUR	SUBURB
ZONE 5	GREEN	PYRMONT

Climate Characteristics of Zone 5

Warm Temperate

- Moderate diurnal (day-night) temperature range near coast to high diurnal range inland
- Four distinct seasons: summer and winter can exceed human comfort range, spring and autumn are ideal for human comfort
- Mild winters with low humidity
- Hot to very hot summers with low to moderate humidity
- Widely variable solar access and cooling breeze directions and patterns

Key design objectives

Minimising heating and cooling energy use should be a primary design objective.

6 - NCC Section J Compliance Provisions

This section analyses the current elements of the of Proposed Development design against provisions of Section J of the Building Code of Australia 2019 – Amendment 1, Volume 1 Energy Efficiency. In case of a non-complying element, advisory notes are provided to bring the building in compliance with Section J requirements.

A summary note of these provisions is provided in **Section 7-Conclusions** of this report that can be incorporated into specification blocks of architectural plans and, as a result, be deployed during construction. It is however the responsibility of the entity responsible for the submission of the design plans and documents to the council to ascertain each and every element of this report is clearly referenced and reflected on the submitted plans and documents.

6.1 – Part J1 Building Fabric

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part
J1.3 Roof and ceiling construction			
1	Metal roof (Ortech Roof) of the Proposed Development	Install minimum R1.36 m ² .K/W insulation OR Provide a roof and ceiling system with total performance of R3.7 m ² .K/W	Part J1.3(a) and Material Properties from Specification - J1.2
2		The solar absorptance of the upper surface of the roof should not exceed 0.45	Part J1.3(b)
3	Concrete Roof	Install minimum R2.96 m ² .K/W insulation OR Provide a roof and ceiling system with total performance of R3.7 m ² .K/W	Part J1.3(a) and Material Properties from Specification - J1.2
J1.5 Walls and Glazing			
4	External speed panel walls of the Proposed Development	Install minimum R0.96 m ² .K/W insulation or provide an external wall system with total performance of R1.88 m ² .K/W.	Table 1.5(a), Façade Calculator and Material Properties from Specification - J1.2
5	External sandstone cladding walls of the Proposed Development	Install minimum R1.46 m ² .K/W insulation or provide an external wall system with total performance of R1.87 m ² .K/W.	Table 1.5(a), Façade Calculator and Material Properties from Specification - J1.2
6	External walls between dressing room and plant room of the Proposed Development	Install minimum R1.41 m ² .K/W insulation or provide an external wall system with total performance of R1.85 m ² .K/W.	Table 1.5(a), Façade Calculator and Material Properties from Specification - J1.2
5	Plasterboard on stud internal walls adjacent to unconditioned spaces	Install minimum R1.19 m ² .K/W insulation or provide an internal wall system with total performance of R1.76 m ² .K/W.	Table 1.5(a), Façade Calculator and Material Properties from Specification - J1.2
5	F.C on stud internal walls adjacent to unconditioned spaces	Install minimum R1.31 m ² .K/W insulation or provide an internal wall system with total performance of R1.80 m ² .K/W.	Table 1.5(a), Façade Calculator and Material Properties from Specification - J1.2
5	Orchestra pit internal walls adjacent to unconditioned spaces	Install minimum R0.28 m ² .K/W insulation or provide an internal wall system with total performance of R1.51 m ² .K/W.	Table 1.5(a), Façade Calculator and Material Properties from Specification - J1.2

6	New external dressing room building elevation windows	Install windows with Total System U-value no more than 5.8 W/m ² .K and SHGC no more than 0.41	Part 1.5(a) and Façade Calculator
J1.5 Floors			
7	Suspended concrete slab	Install minimum R1.66 m ² .K/W insulation or provide a suspended slab system with total performance of R2.0 m ² .K/W.	Part J1.6(a)(i) and Table J1.6 considering the material properties from specification - J1.2 & J1.6 Figure 2(c)
7	Suspended auditorium seating floor	Install minimum R1.56 m ² .K/W insulation or provide a suspended slab system with total performance of R2.0 m ² .K/W.	Part J1.6(a)(i) and Table J1.6 considering the material properties from specification - J1.2 & J1.6 Figure 2(c)

6.1.1 – Building Fabric Breakdown

	Metal Roof (Ortech Roof)	R value [m ² K/W]
1	Outdoor air film	0.04
2	Metal cladding	0.00
3	Foil Faced Insulation Blanket	-
4	Unventilated reflective airspace	1.52
5	Bulk insulation	-
6	Durra Panel	0.62
7	Indoor air film	0.16
	Default System R value	R2.34
	Total system R value required	R3.7
	Additional insulation required for compliance	R1.36
We recommend to install R1.8 Foil faced blanket for this type of roof system as the reflective airspace R-value has been considered in the calculation.		

	Concrete Roof (New Dressing building)	R value [m ² K/W]
1	Indoor air film	0.12
2	Concrete Slab (150mm)	0.10
3	Airspace	0.28
4	Bulk insulation	-
5	Plasterboard gypsum (13mm, 880kg/m ³)	0.08
6	Indoor air film	0.16
	Default System R value	R0.74
	Total system R value required	R3.7
	Additional insulation required for compliance	R2.96

	Speed Panel Walls	R value [m ² K/W]
1	Outdoor air film	0.03
2	Metal Cladding	0.00
3	Speed Panel (78mm)	0.30
4	Airspace	0.17
5	Bulk insulation	-
6	Speed Panel	0.30
7	Indoor air film	0.12
	Default System R value	R0.92
	Total system R value required (with factored thermal bridging)	R1.88
	Additional insulation required for compliance (with factored thermal bridging) *	R0.96

	Sandstone Cladding Walls	R value [m ² K/W]
1	Outdoor air film	0.03
2	Sandstone Cladding	0.01
3	Airspace	0.17
4	Bulk insulation	-
5	Plasterboard gypsum (13mm, 880kg/m ³)	0.08
6	Indoor air film	0.12
	Default System R value	R0.41
	Total system R value required (with factored thermal bridging)	R1.87
	Additional insulation required for compliance (with factored thermal bridging) *	R1.46

	Wall between Dressing rooms & Plant room	R value [m ² K/W]
1	Outdoor air film	0.03
2	Fibre-cement	0.04
3	Airspace	0.17
4	Bulk insulation	-
5	Plasterboard gypsum (13mm, 880kg/m ³)	0.08
6	Indoor air film	0.12
	Default System R value	R0.44
	Total system R value required (with factored thermal bridging)	R1.85

	Additional insulation required for compliance (with factored thermal bridging) *	R1.41
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	Plasterboard on stud walls	R value [m²K/W]
1	Indoor air film	0.12
2	Plasterboard gypsum (13mm, 880kg/m ³)	0.08
3	Airspace	0.17
4	Bulk insulation	-
5	Plasterboard gypsum (13mm, 880kg/m ³)	0.08
6	Indoor air film	0.12
	Default System R value	R0.57
	Total system R value required (with factored thermal bridging)	R1.76
	Additional insulation required for compliance (with factored thermal bridging) *	R1.19

	FC Clad on both side walls	R value [m²K/W]
1	Indoor air film	0.12
2	Fibre-cement	0.04
3	Airspace	0.17
4	Bulk insulation	-
5	Fibre-cement	0.04
6	Indoor air film	0.12
	Default System R value	R0.49
	Total system R value required (with factored thermal bridging)	R1.80
	Additional insulation required for compliance (with factored thermal bridging) *	R1.31

	Orchestra Pit Walls	R value [m²K/W]
1	Indoor air film	0.12
2	Concrete Masonry (190mm thick)	0.17
3	Airspace	0.17
4	Bulk insulation	-
5	3 x Plasterboard gypsum (13mm, 880kg/m ³)	0.24
6	Airspace (20 to 40mm)	0.17
7	3 x Plasterboard gypsum (13mm, 880kg/m ³)	0.24
8	Indoor air film	0.12

	Default System R value	R1.23
	Total system R value required (with factored thermal bridging)	R1.51
	Additional insulation required for compliance (with factored thermal bridging) *	R0.28

	Auditorium Suspended Seating Floor	R value [m²K/W]
1	Indoor air film	0.16
2	Structural Flooring (Assumed to be Wooden floorboards)	0.12
3	Bulk Insulation	-
4	Indoor air film	0.16
	Default System R value	R0.44
	Total system R value required	R2.0
	Additional insulation required for compliance	R1.56

	Suspended concrete floor	R value [m²K/W]
1	Indoor air film	0.16
2	Concrete floor slab (150mm)	0.10
3	Bulk Insulation	-
4	Subfloor air film	0.08
	Default System R value	R0.34
	Total system R value required	R2.0
	Additional insulation required for compliance	R1.66

6.3 – Part J3 Building Sealing

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part
1	Each edge of a door, all openable windows, or the like forming part of the envelope of a conditioned space	Provide air seals on all edges or provide windows complying with AS2047 for the Proposed Development except for fire doors, smoke doors, roller shutter doors roller shutter grille or other security door or device installed only for out-of-hours security	Part J3.4 (a)(b)

2	Entry doors to the building which leads to conditioned spaces greater than 50m ²	Provide self-closing mechanism, revolving door or similar system.	Part J3.4(d)
3	Exhaust fans of the conditioned areas of the Proposed Development if any	Must be equipped with a self-closing damper or similar	Part J3.5
4	Roofs, ceilings, walls, floors, windows frame, door frame and roof light frame of the conditioned areas of the Proposed Development	Must be enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions OR be sealed by caulking, skirting, architraves, cornices or similar elements unless required for smoke hazard management	Part J3.6
5	Evaporative coolers	All evaporative coolers serving heated space or, habitable room/public area in climate zones 4 to 8, must be fitted with a self-closing damper or the like	Part J3.7

6.4 – Part J5 Air-Conditioning and Ventilation Systems

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part
Air Conditioning Systems			
1	Control	All air conditioning systems must be capable of being deactivated when the air-conditioned space is not occupied.	Part J5.2a
2	Zoning	All air conditioning units serve multiple zones, then each zone temperature should be thermostatically controlled. Zone temperature cannot be controlled by mixing actively heated and cooled air. If the zone needs reheating, for a fixed supply air rate, limit the reheating to not more than 7.5K rise in temperature and for a variable supply air rate, limit rise in temperature to not more than 7.5K at the nominal supply air rate but increased or decreased at the same rate that the supply air rate is respectively decreased or increased.	Part J5.2a
3	Economy Cycle	All air conditioning systems with capacity over 35kW _r will be required to have economy cycle fitted.	Part J5.2a
4	Variable Fan Loads	When the supply air quantity is capable of being varied, must provide a variable speed fan.	Part J5.2a

5	Fans	Fans of an air-conditioning system must comply with Specification J5.2a.	Part J5.4
6	Outdoor Air	Minimum outdoor air quantity requirements as per BCA part F4 and are not to be exceed by more than 20% except where additional unconditioned outside air is supplied for free cooling or to balance process exhaust. When the number of square metres per person is not more than 1 and the air flow rate is more than 1000 L/s, need to provide an energy reclaiming system that preconditions outside air OR automatically modulate the mechanical ventilation quantity in proportion to the number of occupants.	Part J5.3a
7	Outside & Return Air Dampers	Motorised outside air and return air dampers should be closed when the air conditioning system is deactivated.	Part J5.2a
8	Pumps Power	All pumps in the air conditioning system that circulate the water more than 2 L/s and cooling/heating load of the conditioned space 100 W/m ² , maximum pumping powers are, chilled water pump = 1.3 W/m ² , condenser water pumps = 0.9 W/m ² , heating water pump = 1.0 W/m ² . Spray water pump used in an <i>air-conditioning</i> system's closed circuit cooler or evaporative condenser must not use more than 150 W of <i>pump power</i> for each L/s of spray water circulated.	Part J5.7
9	Pump Control	All pumps in an air conditioning system that rated than 3kW pump power and circulate the water more than 2 L/s, must be capable of varying the speed according to the varying loads.	Part J5.7
10	Insulations	Duct work insulation specification to be in accordance with BCA specification J5.2b. Piping, vessels, heat exchangers & tanks that contain cool or heat fluid must meet MEPS rating or insulate in accordance with BCA specification J5.2c.	Part J5.5
11	Time Switches	An air-conditioning system of more than 10 kW _r must provide a time switch complying with BCA specification J6.	Part J5.2c
12	Space Heaters	Heater of an air-conditioning system must comply with Specification J5.2d.	Part J5.9
13	Energy Efficiency Ratios	Water cooled refrigerant chiller with a capacity less than 350 kW _r must have a minimum COP of 4.2 & IPLV of 5.2, when determined in accordance with AHRI 550/590. Package <i>air-conditioning</i> equipment with a capacity of 65 – 95 kW _r , (including split units and heat pumps), must have a minimum Cooling COP of 2.7, when tested in accordance with AS/NZS 3823.1.2 at test condition T1.	Part J5.10 & J5.11
Mechanical Ventilation Systems			
14	Controls	The Ventilation Systems are to be capable of being deactivated when the building is not occupied.	Part J5.3a

15	Fans	Must comply with Specification J5.2a.	Part J5.4
16	Time switches	Time switch complying with BCA Specification J6 must be provided to control a mechanical ventilation system with an air flow rate of more than 1000 L/s.	Part J5.3d
Miscellaneous Exhaust Systems			
17	Controls	When the air flow rate is more than 1000 L/s, and variable demand, must capable of stopping the motor when the system is not needed and fan to be variable speed.	Part J5.3b

6.5 – Part J6 Artificial Lighting and Power

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part
1	Lighting electrical power of the Proposed Development	Maximum design power allowed is 49,242 Watts	Part J6.2
2	Artificial light switch or other lighting control devices of Proposed Development	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. Light switch or control device must control lighting of no more than 250 m ² of area. *	Part J6.3c
3	Artificial lighting control for space greater than 250m ²	95% of the light fittings must be controlled by a time switch in accordance with Specification J6 or an occupant sensing device such as a security key card reader that registers a person entering and leaving the building or a motion detector in accordance with Specification J6.	Part J6.3d
4	Windows display lighting if installed	Must be controlled separately from other display lighting.	Part J6.4b
5	External lighting of the Proposed Development if installed	Must be controlled by either a daylight sensor or a time switch which is capable of being pre-programmed for different times of the day on variable days. *	Part J6.5a(i)
6	If the total perimeter lighting load of the Proposed Development exceeds 100 Watts	Provide average light source efficacy not less than 60 Lumens/Watt or control with a motion detector device in accordance with Specification J6 except when providing emergency lighting in accordance with Part E4 of the BCA 2011. *	Part J6.5a(ii)

7	Façade lighting or signage lighting of the Proposed Development if installed	Must be provided with a separate time switch in accordance with Specification J6. *	Part J6.5a(ii)(C)
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6.6 – Part J7 Hot Water Supply and Swimming Pool and Spa Pool Plant

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part
1	Hot water supply of the Proposed Development	Must be designed and installed in accordance with section 8 of AS/NZS 3500.4	Part J7.2

6.7 – Part J8 Access for Maintenance and Facilities for Monitoring

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part
1	For the Proposed Development with a floor area of more than 2500 m ²	Provide facilities to record individually the energy consumption of air conditioning plant, heating plant, cooling plant, air handling fans, artificial lighting, appliance power, central hot water supply and internal transport devices including lifts escalators, and travelators where there is more than one serving the building and other ancillary plant.	Part J8.3(b)

7 - Conclusions

Considering the modification design elements nominated on the Proposed Development provided by Integrated Project Services Pty the following can be concluded for the Proposed modification to meet the Deemed to Satisfy requirements of Section J of the Building Code of Australia 2019 – Amendment 1, Volume 1 Energy Efficiency;

Part J1 – Building Fabric:

Roof & Ceiling:

- » Install minimum R1.36 m².K/W insulation or provide metal roof (Ortech system) with total performance of R3.7 m².k/w for the roof of Proposed Development on top of conditioned areas.
- » All the upper surfaces of the roof should not exceed the solar absorptance of 0.45.
- » Install minimum R2.96 m².K/W insulation or provide concrete roof with total performance of R3.7 m².k/w for the roof of Proposed Development on top of conditioned areas.

Walls:

- » Install minimum R0.96 m².K/W insulation OR Provide an external speed panel wall system with total performance of R1.88 m².K/W
- » Install minimum R1.46 m².K/W insulation OR Provide an external sandstone cladding wall system with total performance of R1.87 m².K/W
- » Install minimum R1.41 m².K/W insulation OR Provide an external walls system between dressing room and plant room with total performance of R1.85 m².K/W
- » Install minimum R1.19 m².K/W insulation OR Provide an internal plasterboard on studs wall system with total performance of R1.76 m².K/W
- » Install minimum R1.31 m².K/W insulation OR Provide an internal FC clad wall system with total performance of R1.80 m².K/W
- » Install minimum R0.28 m².K/W insulation OR Provide an internal Orchestra pit wall system with total performance of R1.51 m².K/W

Glazing:

- » Provide the following minimum performance requirements for doors & windows of conditioned areas, adjacent to unconditioned spaces.
 - All new external dressing rooms elevation windows; Install windows with Total System U-value no more than 5.8 W/m².K and SHGC no more than 0.41

Flooring:

- » Install minimum R1.66 m².K/W insulation OR provide a suspended concrete slab flooring system with total performance of R2.0 m².K/W.
- » tall minimum R1.56 m².K/W insulation OR provide a suspended auditorium seating flooring system with total performance of R2.0 m².K/W.

Insulations:

- » Installed insulation must comply with AS/NZS 4859.1 and be installed in such a way to meet the following requirements:
 - The insulation must abut or overlap adjoining insulation other than at supporting members such as studs, noggins, joists, furring channels and the like where the insulation must be against the member.
 - The installed insulation must form a continuous barrier with ceiling, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier while does not affect the safe and effective operation of a service or fitting.
 - The bulk insulation must maintain its position and thickness other than when it is compressed between cladding and supporting members, water pipes, electrical cabling or the like.
 - Reflective insulation must be installed with the necessary airspace to achieve the required R Value and be adequately supported by framing members. Each adjoining sheet of reflective membrane must be overlapped by not less than 50mm or taped together. It must be closely fitted against any penetration, door or window opening.

Part J3 – Building Sealing:

- » Provide air seals on all edges or provide windows complying with AS 2047 for all external doors and openable windows of the Proposed Development servicing conditioned areas except fire doors, smoke doors, roller shutter doors roller shutter grille or other security door or device installed only for out-of-hours security.
- » Provide self-closing mechanism, revolving door or similar system to conditioned spaces greater than 50m².
- » Exhaust fans of the Proposed Development serving conditioned areas must be equipped with a self-closing damper or similar.
- » Roofs, ceilings, walls, floors, windows frame, door frame and roof light frame of conditioned areas of the Proposed Development must be enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions OR be sealed by caulking, skirting, architraves, cornices or similar elements unless required for smoke hazard management.
- » Air infiltration seal for bottom edge of external swing doors of the Proposed Development must be a draft protection device and for other edges of an external door or the edges of an openable window or other such openings may be a foam or rubber compression strip, fibrous seal or the like.
- » All evaporative coolers serving heated space or, habitable room/public area in climate zones 4 to 8, must be fitted with a self-closing damper or the like.

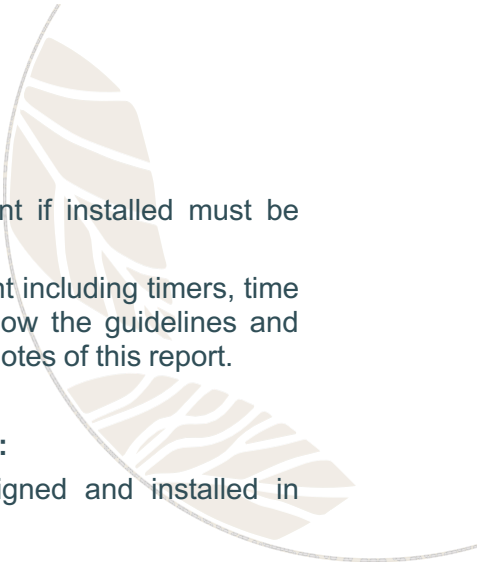
Part J5 – Air Conditioning & Ventilation:

- » All Air Conditioning units and Ventilation Systems are to be capable of being deactivated when the space is not occupied.
- » All air conditioning units serves multiple zones, then each zone temperature should be thermostatically controlled. If the zone needs reheating, then limit the reheating to not more than 7.5K to the air conditioning supply air. Zone temperature cannot be controlled by mixing actively heated and cooled air.
- » All air conditioning systems with capacity over 35kW_r will be required to have economy cycle fitted (Climate Zone 4 - 8).
- » When the supply air quantity is capable of being varied, must provide a variable speed fan (except packaged air conditioning).

- » Fans of an air-conditioning system must comply with Specification J5.2a.
- » Mechanical Ventilation quantities need to meet the requirements in BCA part F4 and do not exceed 20% of the air condition air flow rates.
- » Motorised outside air and return air dampers should be closed when the air conditioning system is deactivated.
- » All pumps in the air conditioning system that circulate the water more than 2 L/s and cooling/heating load of the conditioned space 100 W/m², maximum pumping power of, chilled water pump = 1.3 W/m², condenser water pumps = 0.9 W/m², heating water pump = 1.0 W/m².
- » Spray water pump used in 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.
- » All pumps in an air conditioning system that rated than 3kW pump power and circulate the water more than 2 L/s, must be capable of varying the speed according to the varying loads.
- » Duct work insulation specification to be in accordance with BCA specification J5.2.
- » Piping, vessels, heat exchangers & tanks that contain cool or heat fluid must meet MEPS rating or insulate in accordance with BCA specification J5.2c.
- » An air-conditioning system of more than 10 kW_r must provide a time switch complying with BCA specification J6.
- » Heater of an air-conditioning system must comply with Specification J5.2d.
- » Water cooled refrigerant chiller with a capacity less than 350 kW_r must have a minimum COP of 4.2 & IPLV of 5.2, when determined in accordance with AHRI 550/590.
- » Package air-conditioning equipment with a capacity of 65 – 95 kW_r, (including split units and heat pumps), must have a minimum Cooling COP of 2.7, when tested in accordance with AS/NZS 3823.1.2 at test condition T1.
- » Mechanical ventilation systems that are to be capable of being deactivated when the building is not occupied.
- » Time switch complying with BCA Specification J6 must be provided to control a mechanical ventilation system with an air flow rate of more than 1000 L/s.
- » Miscellaneous Exhaust Systems with air flow rate is more than 1000 L/s, and variable demand, must capable of stopping the motor when the system is not needed and fan to be variable speed.

Part J6 – Artificial Lighting & Power:

- » Maximum design lighting power allowed for the Proposed Development is 49,242 Watts.
- » 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. Artificial light switch or other lighting control devices of the Proposed Development must control lighting of no more than 250 m² of area.
- » For space greater than 250m², 95% of the light fittings must be controlled by a time switch in accordance with Specification J6 or an occupant sensing device such as a security key card reader that registers a person entering and leaving the building or a motion detector in accordance with Specification J6.
- » Windows display lighting if installed must be controlled separately from other display lighting.
- » External lighting of the Proposed Development if installed must be controlled by either a daylight sensor or a time switch which is capable of being pre-programmed for different times of the day on variable days.

- 
- » Façade lighting or signage lighting of the Proposed Development if installed must be provided with a separate time switch.
 - » All lighting and power control devices of the Proposed Development including timers, time switches, motion detectors and daylight control devices must follow the guidelines and specifications outlined in Appendix D Artificial Lighting and Power Notes of this report.

Part J7 – Heater Water Supply & Swimming Pool & Spa Pool Plant:

- » Hot water supply of the Proposed Development must be designed and installed in accordance with section 8 of AS/NZS 3500.4

Part J8 – Facilities for Energy Monitoring:

- » For the Proposed Development provide facilities to record individually the energy consumption of air conditioning plant, heating plant, cooling plant, air handling fans, artificial lighting, appliance power, central hot water supply, and internal transport devices including lifts, escalators and travelators where there is more than one serving the building and other ancillary plant.

8 - Appendix

This section of the report demonstrates the results of employing BCA Calculators for Glazing, Lighting Power, and other referenced calculations and plans in this report.



8.1 – Appendix A – Façade Calculator



Project Summary

Date
16/02/2022

Name
Shubham Kadam

Company
Certified Energy

Position
ESD Consultant

Building Name / Address
Project Francis
Foundation Theatres

Building State
NSW

Climate Zone
Climate Zone 5 - Warm temperate

Building Classification
Class 9b - theatres and cinemas with multiple auditoria, art

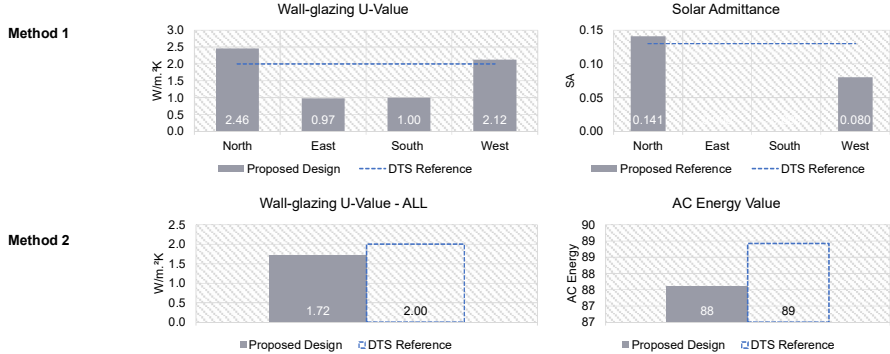
Stores Above Ground
6

Tool Version
1.1 (April 2020)

The summary below provides an overview of where compliance has been achieved for Specification J1.5a - Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Aspects).

Compliant Solution =
 Non-Compliant Solution =

	Method 1				Method 2
	North	East	South	West	All
Wall-glazing U-Value (W/m ² .K)	2.46	0.97	1.00	2.12	1.72
Solar Admittance	0.14			0.08	
AC Energy					88



Project Details

	North	East	South	West
Glazing Area (m²)	81.3	0	0	22.95
Glazing to Façade Ratio	34%	0%	0%	28%
Glazing References	L3 Win N L4 Win N L5 Win N			L3 Win W L4 Win W L5 Win W
Glazing System Types	Fixed	Fixed		Fixed
Glass Types	Single Glazing - low-E coating			Single Glazing - low-E coating
Frame Types	Aluminium	Aluminium		
Average Glazing U-Value (W/m².K)	5.80			5.80
Average Glazing SHGC	0.41	0.00	0.00	0.29
Shading Systems				
Wall Area (m²)	155.2077	185.64125	100.744	59.78985
Wall Types	Wall	Wall	Wall	Wall
Methodology	Wall			
Wall Construction	Ext Sandstone Cladding	Ext Sandstone Cladding Int Masonry Wall with Plasterboard	Int Masonry Wall with Plasterboard	Int Masonry Wall with Plasterboard
Wall Thickness	200	200	200	200
Average Wall R-value (m².K/W)	1.40	1.03	1.00	1.40
Solar Absorptance	0.6	0.6	0.6	0.6

8.2 – Appendix B – Lighting Calculator





Non-residential Lighting

Class 3 and 5-9 buildings



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Multiple Lighting Systems Calculator

Calculator

Building name/description

Project Francis

Classification

Class 9b

Number of rows preferred in table below

78

(as currently displayed)

ID	Description	Floor area of the space	Perimeter of the space	Floor to ceiling height	Design Illumination Power Load	Space	Illuminance		Adjustment Factor One		Adjustment Factor Two		Light Colour Adjustment Factors		SATISFIES PART J6.2	
							Designed Lux Level	Recommended Lux Level	Adjustment Factor One	Dimming % Area	Illuminance Turndown	Adjustment Factor Two	Dimming % Area	Illuminance Turndown	Light Colour Adjustment Factor One	Light Colour Adjustment Factor Two
1	L2 Orchestra Pit	53.8 m ²	34 m	1.4 m	1 W	Auditorium, church and public hall									489 W	1% of 0%
2	L3 Storage 1	62.6 m ²	36 m	2.7 m	1 W	Storage									132 W	1% of 0%
3	L3 Green Room	83.3 m ²	37 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like									321 W	1% of 0%
4	L3 Offices 1	48.7 m ²	36 m	2.7 m	1 W	Office - artificially lit to an ambient level of 200 lx or more									327 W	1% of 0%
5	L3 Storage 2	22.7 m ²	22 m	2.7 m	1 W	Storage									54 W	1% of 0%
6	L3 Offices 2	57.8 m ²	37 m	2.7 m	1 W	Office - artificially lit to an ambient level of 200 lx or more									377 W	1% of 0%
7	L3 Offices 3	43.4 m ²	28 m	2.7 m	1 W	Office - artificially lit to an ambient level of 200 lx or more									283 W	1% of 0%
8	L3 FOH Change Rm	29.3 m ²	22 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like									131 W	1% of 0%
9	L3 Stairs 1	15.6 m ²	16 m	2.7 m	1 W	Stairways, including fire-isolated stairways									50 W	1% of 0%
10	L3 Corridor 1	245.9 m ²	220 m	2.7 m	1 W	Corridors									1920 W	1% of 0%
11	L3 Music Rm	18.4 m ²	16 m	2.7 m	1 W	An illuminance more than 240 lx to 320 lx									130 W	1% of 0%
12	L3 Music Change Rm	18.0 m ²	16 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like									86 W	1% of 0%
13	L3 Service Closet	9.0 m ²	12 m	2.7 m	1 W	Service area, cleaner's room and the like									24 W	1% of 0%
14	L3 Bathroom 2	35.0 m ²	28 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like									162 W	1% of 0%
15	L3 Cleaner's Rm	34.8 m ²	24 m	2.7 m	1 W	Storage									76 W	1% of 0%
16	L3 Storage 3	54.2 m ²	29 m	2.7 m	1 W	Storage									111 W	1% of 0%
17	L3 Lifts 1	50.3 m ²	35 m	2.7 m	1 W	Lift cars									222 W	1% of 0%
18	L3 WC 1	3.9 m ²	8 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like									21 W	1% of 0%
19	L3 Stairs 2	17.9 m ²	20 m	2.7 m	1 W	Stairways, including fire-isolated stairways									59 W	1% of 0%
20	L3 Wig Rm	24.8 m ²	22 m	2.7 m	1 W	An illuminance more than 240 lx to 320 lx									175 W	1% of 0%
21	L3 Laundry	48.9 m ²	32 m	2.7 m	1 W	Service area, cleaner's room and the like									106 W	1% of 0%
22	L3 Prep rooms 1	137.6 m ²	64 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like									536 W	1% of 0%
23	L3 Corridor 2	198.9 m ²	137 m	2.7 m	1 W	Corridors									1462 W	1% of 0%
24	L3 Lift 2	5.0 m ²	9 m	2.7 m	1 W	Lift cars									26 W	1% of 0%
25	L3 Lift 3	13.0 m ²	14 m	2.7 m	1 W	Lift cars									64 W	1% of 0%
26	L3 Offices 4	109.1 m ²	62 m	2.7 m	1 W	Office - artificially lit to an ambient level of 200 lx or more									682 W	1% of 0%
27	L3 Dress Rm	40.8 m ²	29 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like									182 W	1% of 0%
28	L3 Control Rm 1	39.0 m ²	26 m	2.7 m	1 W	Control room, switch room, and the like - intermittent monitoring									172 W	1% of 0%
29	L3 Corridor 3	132.3 m ²	85 m	3.6 m	1 W	Corridors									1033 W	1% of 0%
30	L3 Corridor 4	203.2 m ²	143 m	3.6 m	1 W	Corridors									1613 W	1% of 0%
31	L3 Lift 4	5.9 m ²	10 m	2.7 m	1 W	Lift cars									31 W	1% of 0%
32	L3 Function Room 1	19.3 m ²	19 m	2.7 m	1 W	Board room and conference room									154 W	1% of 0%
33	L3 Function Room 2	18.6 m ²	18 m	2.7 m	1 W	Board room and conference room									150 W	1% of 0%
34	L3 Control Rm 2	10.3 m ²	15 m	2.7 m	1 W	Control room, switch room, and the like - intermittent monitoring									53 W	1% of 0%



Non-residential Lighting

Class 3 and 5-9 buildings



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Calculator

Building name/description

Project Francis

Classification

Class 9b

Number of rows preferred in table below

78

(as currently displayed)

ID	Description	Floor area of the space	Perimeter of the space	Floor to ceiling height	Design Illumination Power Load	Space	Illuminance		Adjustment Factor One			Adjustment Factor Two			Light Colour Adjustment Factors		SATISFIES PART J6.2	
							Designed Lux Level	Recommended Lux Level	Adjustment Factor One	Dimming % Area	Illuminance Turndown	Adjustment Factor Two	Dimming % Area	Illuminance Turndown	Light Colour Adjustment Factor One	Light Colour Adjustment Factor Two	System Illumination Power Load Allowance	Lighting System Share of % of Aggregate Allowance Used
35	L3 Seating Back Half	413.7 m ²	93 m	4.0 m	1 W	Auditorium, church and public hall											3805 W	1% of 0%
36	L3 Seating Front Half	294.5 m ²	67 m	8.0 m	1 W	Auditorium, church and public hall											3465 W	1% of 0%
37	L3 Candy Bar 1	15.9 m ²	17 m	2.7 m	1 W	Restaurant, café, bar, hotel lounge and a space for the serving and consumption of food or drinks											358 W	1% of 0%
38	L3 Candy Bar 2	19.4 m ²	18 m	2.7 m	1 W	Restaurant, café, bar, hotel lounge and a space for the serving and consumption of food or drinks											430 W	1% of 0%
39	L3 Stairs 2	27.7 m ²	28 m	2.7 m	1 W	Stairways, including fire-isolated stairways											89 W	1% of 0%
40	L3 Stairs 3	24.0 m ²	22 m	2.7 m	1 W	Stairways, including fire-isolated stairways											76 W	1% of 0%
41	L3 Comms	4.9 m ²	8 m	2.7 m	1 W	Control room, switch room, and the like-intermittent monitoring											26 W	1% of 0%
42	L3 Stage	399.6 m ²	91 m	10.6 m	1 W	Auditorium, church and public hall											4995 W	1% of 0%
43	L4 Female Bathroom	51.0 m ²	31 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like											215 W	1% of 0%
44	L4 Storage 1	2.7 m ²	7 m	2.7 m	1 W	Storage											7 W	1% of 0%
45	L4 Function Room 1	51.1 m ²	33 m	2.7 m	1 W	Board room and conference room											370 W	1% of 0%
46	L4 Male & Dis. Bathrooms	41.8 m ²	32 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like											189 W	1% of 0%
47	L4 Function Room 2	55.1 m ²	36 m	2.7 m	1 W	Board room and conference room											400 W	1% of 0%
48	L4 Storage 2	2.7 m ²	7 m	2.7 m	1 W	Storage											7 W	1% of 0%
49	L4 Dis. Toilet	5.8 m ²	10 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like											30 W	1% of 0%
50	L4 Corridor 1	31.4 m ²	30 m	2.7 m	1 W	Corridors											249 W	1% of 0%
51	L4 Corridor 2	19.3 m ²	20 m	2.7 m	1 W	Corridors											155 W	1% of 0%
52	L4 Corridor 3	105.8 m ²	97 m	2.7 m	1 W	Corridors											838 W	1% of 0%
53	L4 Corridor 4	59.0 m ²	46 m	2.7 m	1 W	Corridors											447 W	1% of 0%
54	L4 Dress Circle Seating	140.9 m ²	66 m	4.5 m	1 W	Auditorium, church and public hall											1708 W	1% of 0%
55	L4 Boxes 1	26.0 m ²	24 m	6.5 m	1 W	Auditorium, church and public hall											371 W	1% of 0%
56	L4 Boxes 2	25.6 m ²	24 m	6.5 m	1 W	Auditorium, church and public hall											366 W	1% of 0%
57	L4 Dressing Rooms	186.5 m ²	87 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like											736 W	1% of 0%
58	L4 Lighting 1	11.0 m ²	13 m	2.7 m	1 W	Service area, cleaner's room and the like											28 W	1% of 0%
59	L4 Lighting 2	12.3 m ²	14 m	2.7 m	1 W	Service area, cleaner's room and the like											30 W	1% of 0%
60	L5 Corridor 1	193.5 m ²	127 m	2.7 m	1 W	Corridors											1401 W	1% of 0%
61	L5 Live Rm Seating	434.2 m ²	93 m	5.6 m	1 W	Auditorium, church and public hall											4454 W	1% of 0%
62	L5 Live Rm Stage	82.2 m ²	36 m	6.0 m	1 W	Auditorium, church and public hall											1044 W	1% of 0%
63	L5 Corridor 2	132.1 m ²	86 m	2.7 m	1 W	Corridors											957 W	1% of 0%
64	L5 Corridor 3	193.1 m ²	148 m	2.7 m	1 W	Corridors											1462 W	1% of 0%
65	L5 Dressing Rooms	190.1 m ²	91 m	2.7 m	1 W	Toilet, locker room, staff room, rest room and the like											750 W	1% of 0%
66	L5 Box Room 1	27.3 m ²	27 m	2.7 m	1 W	Auditorium, church and public hall											348 W	1% of 0%
67	L5 Box Rooms 2	26.4 m ²	27 m	2.7 m	1 W	Auditorium, church and public hall											340 W	1% of 0%
68	L5 Seating	307.5 m ²	80 m	3.3 m	1 W	Auditorium, church and public hall											2764 W	1% of 0%



Non-residential Lighting

Class 3 and 5-9 buildings



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Calculator

Building name/description

Project Francis

Classification

Class 9b

Number of rows preferred in table below

78

(as currently displayed)

ID	Description	Floor area of the space	Perimeter of the space	Floor to ceiling height	Design Illumination Power Load	Space	Illuminance		Adjustment Factor One			Adjustment Factor Two			Light Colour Adjustment Factors		SATISFIES PART J6.2	
							Designed Lux Level	Recommended Lux Level	Adjustment Factor One	Dimming % Area	Illuminance Turndown	Adjustment Factor Two	Dimming % Area	Illuminance Turndown	Light Colour Adjustment Factor One	Light Colour Adjustment Factor Two	System Illumination Power Load Allowance	Lighting System Share of % of Aggregate Allowance Used
69	L6 Live Rm Seating	328.5 m ²	114 m	3.6 m	1 W	Auditorium, church and public hall											3413 W	1% of 0%
70	L6 Rack Rm 1	28.4 m ²	27 m	2.7 m	1 W	Storage											68 W	1% of 0%
71	L6 Rack Rm 2	32.1 m ²	28 m	2.7 m	1 W	Storage											75 W	1% of 0%
72	L6 Amp Room	53.6 m ²	30 m	2.7 m	1 W	Control room, switch room, and the like - constant monitoring											335 W	1% of 0%
73	L6 Corridor	26.0 m ²	30 m	2.7 m	1 W	Corridors											213 W	1% of 0%
74	L6 Laundry	15.0 m ²	20 m	2.7 m	1 W	Service area, cleaner's room and the like											39 W	1% of 0%
75	L6 Utility	17.0 m ²	18 m	2.7 m	1 W	Control room, switch room, and the like - intermittent monitoring											82 W	1% of 0%
76	L6 Storage	168.0 m ²	66 m	2.7 m	1 W	Storage											307 W	1% of 0%
77	L6 Electrical Rm	50.0 m ²	29 m	2.7 m	1 W	Control room, switch room, and the like - constant monitoring											317 W	1% of 0%
78	L6 Stairs	21.8 m ²	19 m	2.7 m	1 W	Stairways, including fire-isolated stairways											69 W	1% of 0%

Total 78 W

Total 49242 W

if inputs are valid



IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THIS LIGHTING CALCULATOR

By accessing or using this calculator, you agree to the following: While care has been taken in the preparation of this calculator, it may not be complete or up-to-date. You can ensure that you are using a complete and up-to-date version by checking the Australian Building Codes Board website (www.abcb.gov.au). The Australian Building Codes Board, the Commonwealth of Australia and States and Territories of Australia do not accept any liability, including liability for negligence, for any loss (howsoever caused), damage, injury, expense or cost incurred by any person as a result of accessing, using or relying upon this publication, to the maximum extent permitted by law. No representation or warranty is made or given as to the currency, accuracy, reliability, merchantability, fitness for any purpose or completeness of this publication or any information which may appear on any linked websites, or in other linked information sources, and all such representations and warranties are excluded to the extent permitted by law. This calculator is not legal or professional advice. Persons rely upon this calculator entirely at their own risk and must take responsibility for assessing the relevance and accuracy of the information in relation to their particular circumstances.



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8.3 – Appendix C – Insulation Mark-Up

LEGEND

- █ R1.87 EXTERNAL STANDSTONE CLADDING WALLS
- █ R1.80 INTERNAL VILLABOARD (F.C) CLADDING WALLS
- █ R1.76 INTERNAL SOUNDCHECK PLASTERBOARD ON STUD WALLS
- █ R1.51 INTERNAL ORCHESTRA PIT WALLS
- █ R1.88 EXTERNAL SPEED PANEL WALLS
- █ R1.85 EXTERNAL WALLS BETWEEN DRESSING & PLANT ROOM
- █ R3.7 METAL ROOF (ORTECH ROOF)
- █ R3.7 CONCRETE ROOF
- █ R2.0 SUSPENDED CONCRETE SLAB
- █ R2.0 SUSPENDED AUDITORIUM SEATING FLOOR

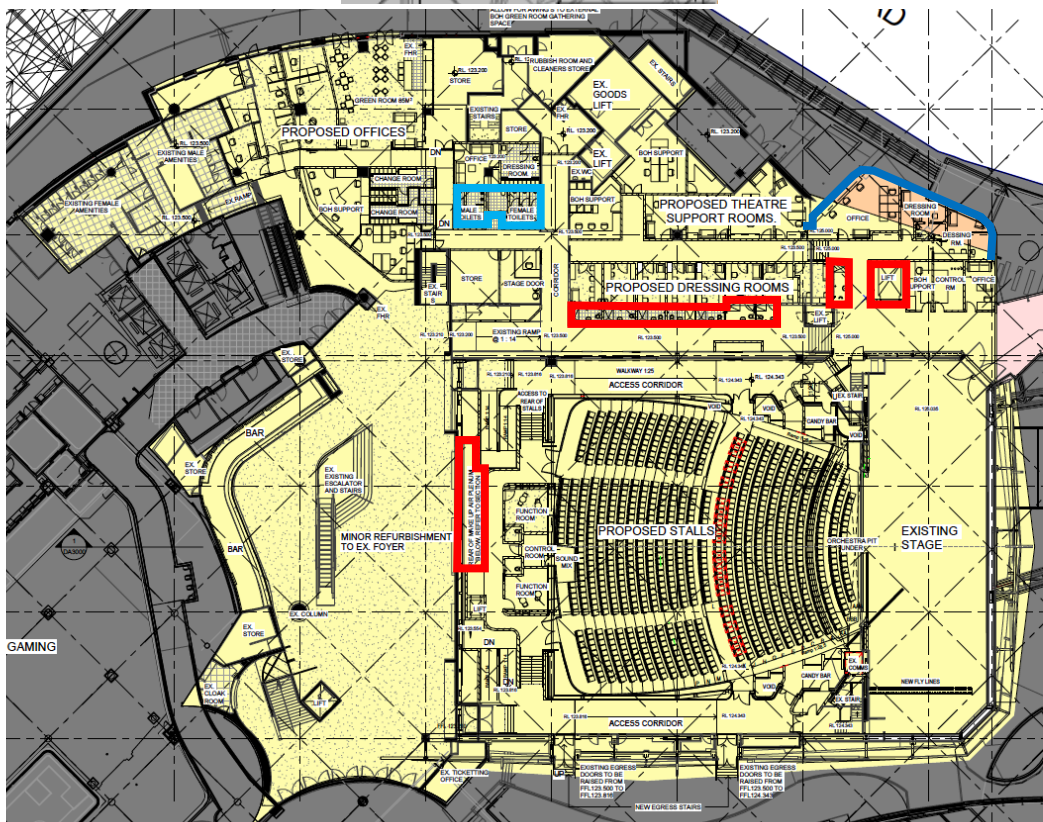
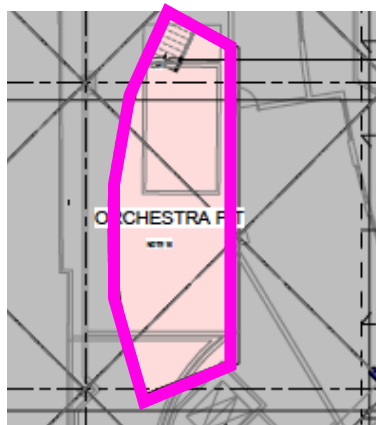


Figure 6 – New & Existing Construction – Building Envelope – Insulation Mark Up – Level 3

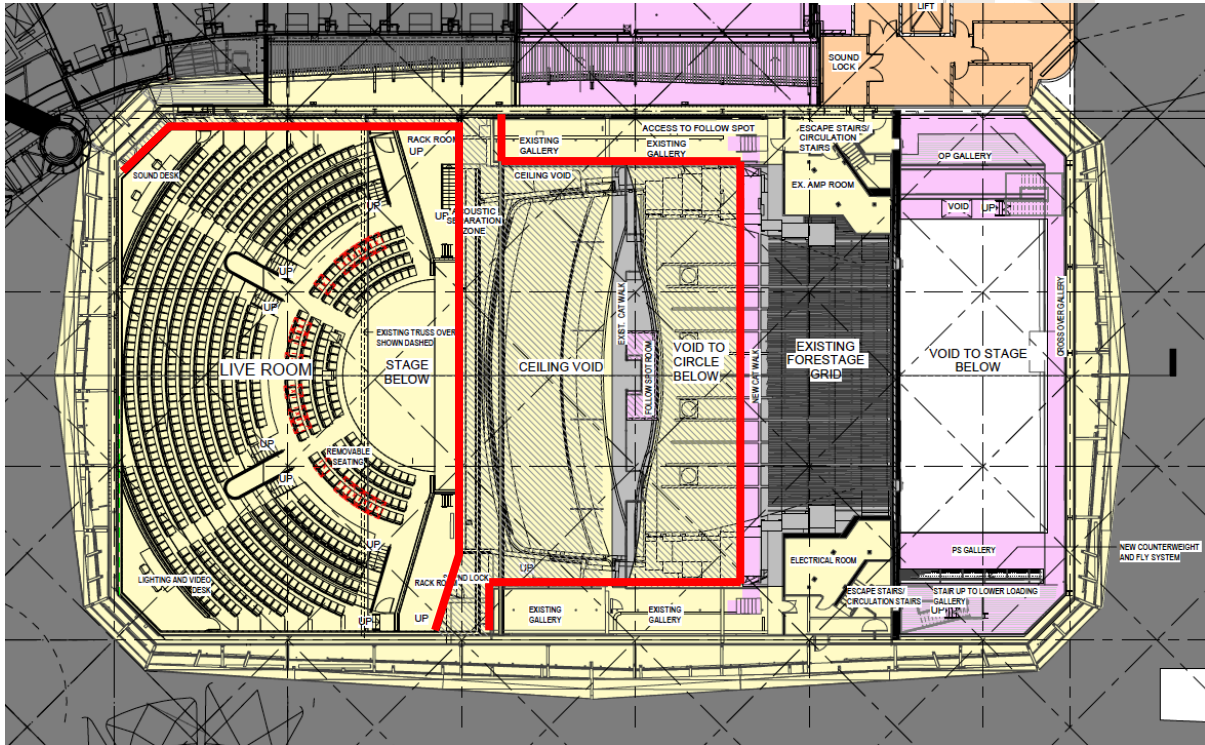


Figure 9 – New & Existing Construction – Building Envelope – Insulation Mark Up – Level 6

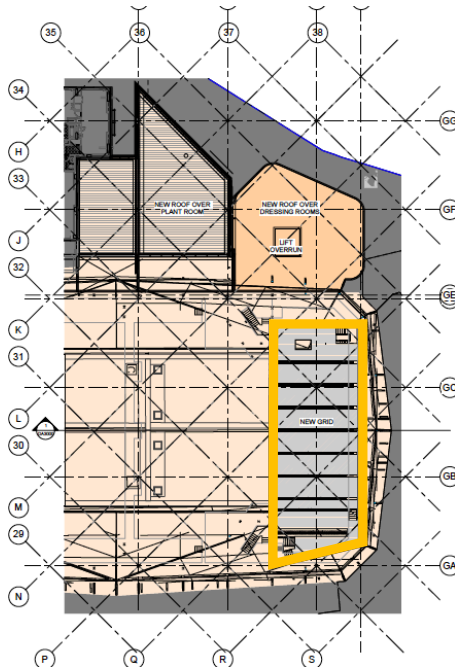


Figure 11 – New Construction – Building Envelope – Insulation Mark Up – FLYTOWER (Grid Level)

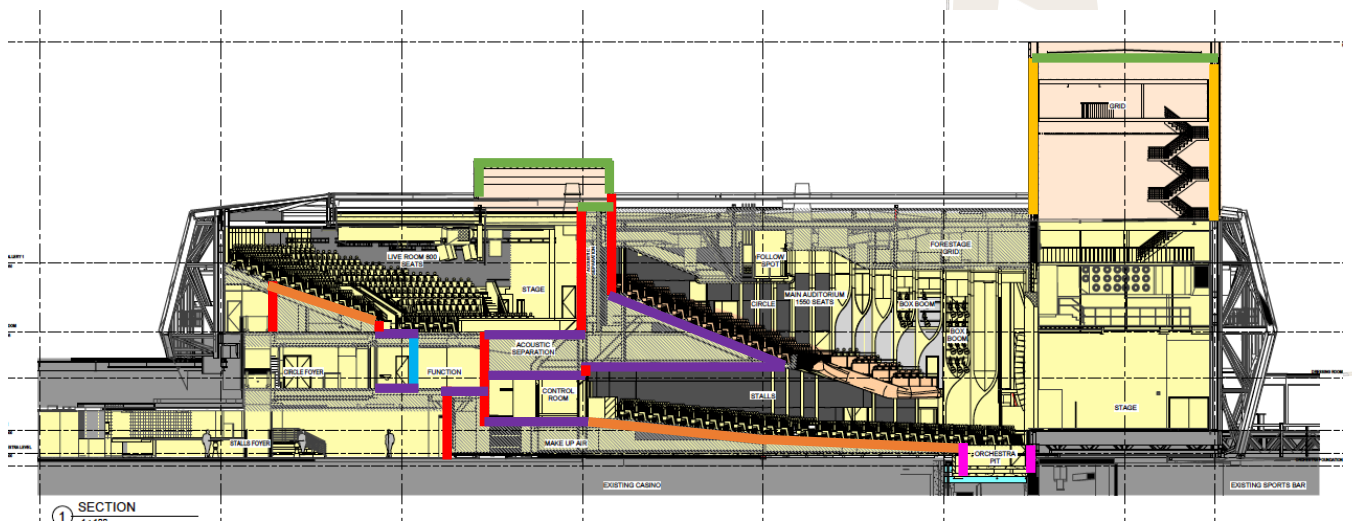


Figure 12 – New & Existing Construction – Building Envelope – Insulation Mark Up – Section

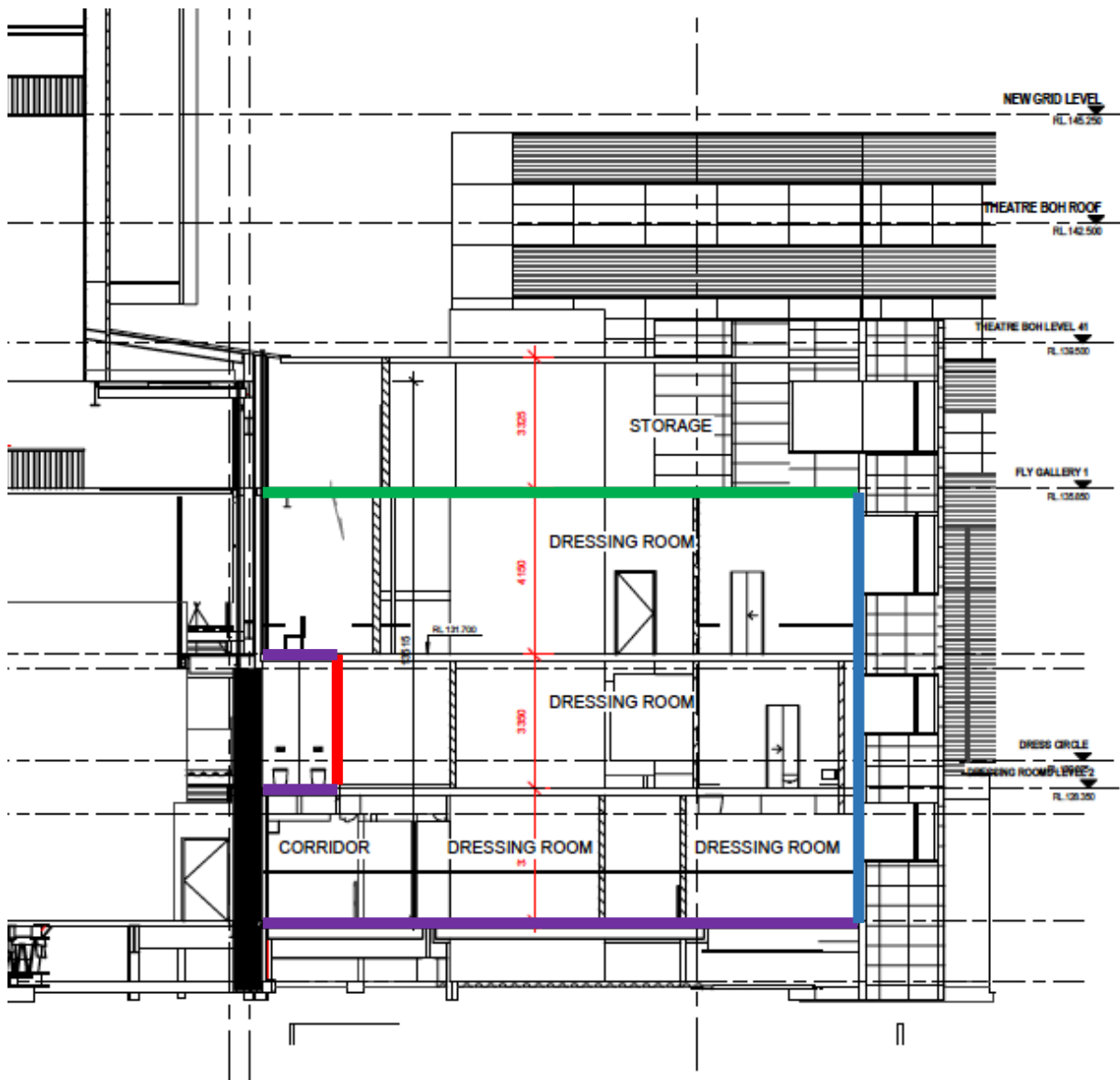
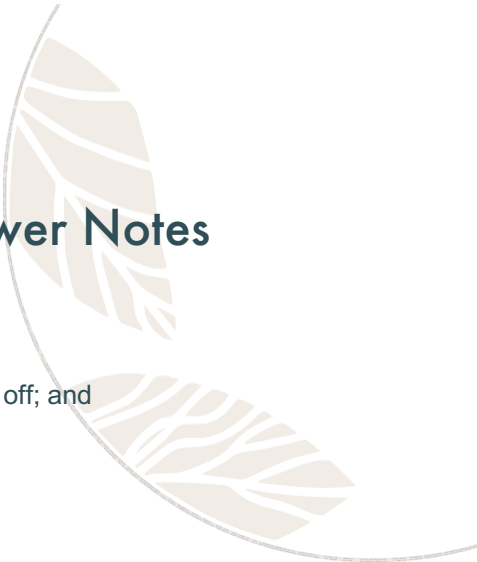


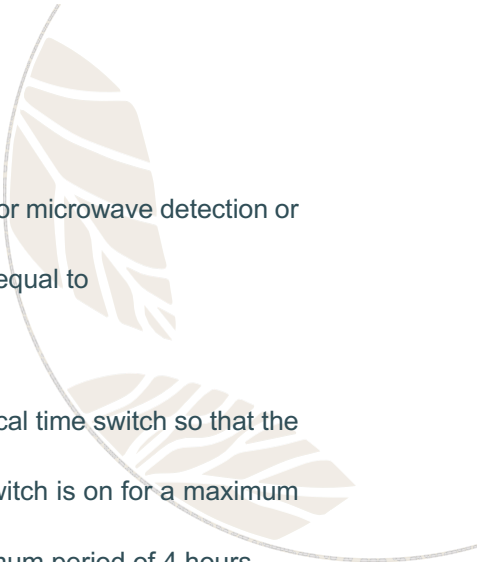
Figure 13 – New & Existing Construction – Building Envelope (Dressing Room) – Insulation Mark Up – Section

8.4 – Appendix D – Artificial Lighting & Power Notes

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- 1- A lighting timer must;
 - a. be located within 2 m of every entry door to the space; and
 - b. have an indicator light that is illuminated when the artificial lighting is off; and
 - c. not control more than
 - i. an area of 100 m² with a single push button timer; and
 - ii. 95% of the lights in spaces of area more than 25 m²; and
 - d. be capable of maintaining the artificial lighting
 - i. for not less than 5 minutes and not more than 15 minutes unless it is reset; and
 - ii. without interruption if the timer is reset.

 - 2- Time switch;
 - a. A time switch must be capable of switching on and off electric power at variable pre-programmed times and on variable pre-programmed days.
 - b. A time switch for internal lighting must be capable of being overridden by
 - i. a means of turning the lights on, either by
 1. a manual switch or an occupant sensing device that on sensing a person's presence, overrides the time switch for a period of up to 2 hours, after which there is no further presence detected, the time switch must resume control; or
 2. an occupant sensing device that overrides the time switch upon a person's entry and returns control to the time switch upon the person's exiting, such as a security card reader; and
 - ii. a manual "off" switch
 - c. A time switch for external lighting must be capable of
 - i. limiting the period the system is switched on to between 30 minutes before sunset and 30 minutes after sunrise is determined or detected including any pre-programmed period between these times; and
 - ii. being overridden by a manual switch or a security access system for a period of up to 30 minutes, after which the time switch must resume control.
 - d. A time switch for boiling water and chilled water storage units must be capable of being overridden by a manual switch or a security access system that senses a person's presence, overrides for a period of up to 2 hours, after which if there is no further presence detected, the time switch must resume control.

 - 3- Motion detectors;
 - a. In a Class 5, 6, 7, 8, 9a or 9b building, a motion detector must
 - i. be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and
 - ii. be capable of detecting
 1. a person before they have entered 1 m into the space; and
 2. movement of 500 mm within the useable part of the space; and
 - iii. not control more than
 1. in other than a carpark an area of 500 m² with a single sensor or group of parallel sensors; and
 2. 75% of the lights in spaces using high intensity discharge; and
 - iii. be capable of maintaining the artificial lighting when activated
 1. for a maximum of 30 minutes unless it is reset; and
 2. without interruption if the motion detector is reset by movement; and
 - iv. not be overridden by a manual switch to permanently leave the lights on.
 - b. When outside a building, a motion detector must

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- i. be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and
 - ii. be capable of detecting a person within a distance from the light equal to
 - 1. twice the mounting height; or
 - 2. 80% of the ground area covered by the light's beam; and
 - ii. not control more than five lights; and
 - iii. be operated in series with a photoelectric cell or astronomical time switch so that the light will not operate in daylight hours; and
 - iv. be capable of maintaining the artificial lighting when the switch is on for a maximum of 10 minutes unless it is reset; and
 - v. have a manual override switch which is reset after a maximum period of 4 hours.
- 4- Daylight sensor and dynamic lighting control device;
- a. A daylight sensor and dynamic control device for artificial lighting must
 - i. for switching on and off
 - 1. be capable of having the switching level set point adjusted between 50 and 1000 Lux; and
 - 2. have a delay of more than 2 minutes; and a differential of more than 100 Lux for a sensor controlling high pressure discharge lighting, and 50 Lux for a sensor controlling other than high pressure discharge lighting; and
 - 3. for dimmed or stepped switching, be capable of reducing the power consumed by the controlled lighting in proportion to the incident daylight on the working plane either
 - 5- continuously down to a power consumption that is less than 50% of full power; or
 - 6- in no less than 4 steps down to a power consumption that is less than 50% of full power.
 - a. Where a daylight sensor and dynamic control device has a manual override switch, the manual override switch must not be able to switch the lights permanently on or bypass the lighting controls.

9 - Disclaimer

Recommendations:

Based on the information available on the supplied drawings and data, I am of the opinion that there is nothing that should prevent this project from compliance with the requirements of the Building Code of Australia. However, if the Construction Certificate is lodged/intend to be lodged after 30 April 2020, this project will need to be assessed under NCC 2019. Please contact Certified Energy if a reassessment under NCC 2019 is required.

This report is based on details available at the time of writing. Selected contractors and other parties contributing to the scope of the works should confirm that their supplied work will be in compliance with the BCA/NCC. It is advisable that this confirmation be requested prior to the commencement of construction. Final certification of BCA/NCC compliance at completion of works should be obtained to aid final certifier's approval.

Dimensions:

The dimensions used in this report are scaled from the supplied project documents. There may be some minor variation between the scaled dimensions, the dimensions on the window schedule and the actual dimensions on site.

Checked by:



Shubham Kadam

B.Arch MArchSci (Sustainable Design)(High-Performance buildings)



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