





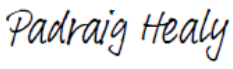
# BCA ENERGY

ENERGY MANAGEMENT CONSULTANTS



To: ADCO Contructions Pty Ltd  
Project: North Kellyville Public School  
Report: NCC SECTION 'J' JV3 ASSESSMENT REPORT  
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DOCUMENT CONTROL

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## Table of Contents

<b>1</b>	<b>BASIS OF ASSESSMENT .....</b>	<b>4</b>
1.1	Location and Description.....	4
1.2	Purpose .....	4
1.3	Building Code of Australia.....	4
1.4	Limitations .....	4
1.5	Design Documentation.....	4
<b>2</b>	<b>BUILDING DESCRIPTIONS.....</b>	<b>5</b>
2.1	Classification (Clause A3.2).....	5
2.2	Climate Zone (Clause A1.1).....	5
<b>3</b>	<b>PROVISIONS TO COMPLY WITH JV3 - SUMMARY OF CHANGES.....</b>	<b>6</b>
3.1	Part JV3 - Verification Method Using the Proposed Building.....	6
3.2	Building Fabric - Comparison between DTS & JV3 Provisions .....	6
3.3	Glazing - Comparison between DTS & JV3 Provisions .....	6
3.4	Part J3 - Building Sealing.....	7
3.5	Part J5 - Air Conditioning and Ventilation Systems .....	7
3.6	Part J6 - Artificial Lighting and Power .....	7
3.7	Part J7 - Hot Water Supply .....	8
3.8	Part J8 - Facilities for Energy Monitoring.....	8
<b>4</b>	<b>REFERENCE BUILDING REQUIREMENTS - DTS.....</b>	<b>9</b>
<b>5</b>	<b>DETAILED ASSESSMENT - DTS .....</b>	<b>11</b>
5.1	Part J1 - Building Fabric.....	11
5.2	Part J2 - Glazing .....	17
5.3	Part J3 - Building Sealing.....	18
5.4	Part J4 - Air Movement - Not Applicable .....	19
5.5	Part J5 - A/C & Ventilation Systems .....	20
5.6	Part J6 - Artificial Lighting and Power .....	22
5.7	Part J7 - Hot Water Supply, Swimming Pool, Spa Pool.....	25
5.8	Part J8 - Facilities for Energy Monitoring.....	26
<b>6</b>	<b>STATEMENT OF COMPLIANCE .....</b>	<b>27</b>
	<b>ANNEXURE A - DESIGN DOCUMENTATION .....</b>	<b>28</b>
	<b>APPENDIX 1 – BUILDING ENVELOPE.....</b>	<b>29</b>
	<b>APPENDIX 2 - GLAZING CALCULATIONS.....</b>	<b>30</b>
	<b>APPENDIX 3 - LIGHTING CALCULATIONS TABLE.....</b>	<b>31</b>
	<b>APPENDIX 4 - TABLE OF MAXIMUM ILLUMINATION POWER DENSITY .....</b>	<b>32</b>
	<b>APPENDIX 5 – DTS AND PROPOSED ENERGY CONSUMPTION RESULTS.....</b>	<b>34</b>
	<b>APPENDIX 6 – BUILDING MODEL .....</b>	<b>35</b>
	<b>APPENDIX 7 - EVIDENCE OF COMPLIANCE CHECK LIST .....</b>	<b>36</b>

## 1 BASIS OF ASSESSMENT

### 1.1 Location and Description

The building development, the subject of this report, is located at Hezlett Road, North Kellyville and consists of new development public school

### 1.2 Purpose

The purpose of this report is to assess the design proposal against the Section JV3, verification method of the NCC 2016, using approved energy modelling software. This Report addresses ONLY matters relevant to Section 'J' of Volume 1 of the NCC pertaining to the **Class** 9b building.

### 1.3 Building Code of Australia

This report is based on the Deemed-to-Satisfy Provisions of Section J of the National Construction Code Series Volume 1 - Building Code of Australia, 2016 Edition incorporating the State variations where applicable. Please note that the version of the NCC applicable is the version applicable at the time of the Construction Certificate Application is dated as received by the certifying authority.

### 1.4 Limitations

This report does not include nor imply any detailed assessment for design, compliance or upgrading for -

Sections B, C, D, E, F, G, H and I of the NCC;

The structural adequacy or design of the building;

The inherent derived fire-resistance ratings of any proposed structural elements of the building (unless specifically referred to); and

The design basis and/or operating capabilities of any proposed electrical, mechanical or hydraulic fire protection services.

This report does not include, or imply compliance with:

- a) The National Construction Code - Plumbing Code of Australia Volume 3
- b) The Disability Discrimination Act;
- c) The Premises Standard;
- d) Demolition Standards not referred to by the NCC;
- e) Occupational Health and Safety Act;
- f) Requirements of other Regulatory Authorities including, but not limited to, Telstra, Sydney Water, Electricity Supply Authority, WorkCover, RTA, Council and the like;  
and
- g) Conditions of Development Consent

The building has been modelled to the current JV3 Specifications set out in the NCC 2016. This includes JV3 reference building design criteria JV3 (a) to (g) along with Specification JV for occupancy, A/C, appliances and lighting profiles.

This JV3 does not give the actual annual energy consumption for the building; rather it gives an estimate of the expected annual energy consumption of the building with the chosen fabric and services provided in co-ordination with Specification JV.

### 1.5 Design Documentation

This report has been based on the Design plans and Specifications listed in Annexure A of this Report.

## 2 BUILDING DESCRIPTIONS

For the purposed of the NCC the development may be described as follows.

### 2.1 Classification (Clause A3.2)

The Building has been classified as follows:

Class	Level	Description
9b	Ground	Public School
9b	First	Public School

This Report addresses ONLY matters relevant to Section 'J' of Volume 1 of the NCC pertaining to the Class 9b portion of the building.

### 2.2 Climate Zone (Clause A1.1)

The building is located within Climate Zone 6. Any reference to 'this climate zone' throughout the report is referring to Climate Zone 6.

### 3 PROVISIONS TO COMPLY WITH JV3 - SUMMARY OF CHANGES

This part specifies how the proposed building is modelled differently to the reference (DTS) building and supersedes any specifications noted within Section 5 (DTS Provisions) of this Report.

#### 3.1 Part JV3 - Verification Method Using the Proposed Building

The annual energy consumption of the proposed Building, using the proposed building fabric and proposed services is 411.6366 **MWh** (please see Appendix 5). The annual energy consumption for the reference building, using DTS building fabric and DTS services is 418.1655 **MWh** (please see Appendix 5). The building as proposed is compliant with Section JV3 as the estimated annual energy consumption of the proposed building is less than that of the reference building. It is assumed that in the proposed building the services will achieve minimum DTS requirements.

**The proposed building uses the same services as the reference building. The proposed building fabric is different to the reference building in the following way:**

- R2.00 suspended floor insulation no longer required
- Glazing standardised to one specification throughout

#### 3.2 Building Fabric - Comparison between DTS & JV3 Provisions

Building Element	DTS	Proposed JV3 Provisions
External Wall Insulation	R2.80	R2.80
Internal Wall Insulation	R1.80	R1.80
Ceiling / Roof Insulation	R3.20	R3.20
Suspended Floor Insulation	R2.00	Nil
Slab on Ground Insulation	Nil	Nil

#### 3.3 Glazing - Comparison between DTS & JV3 Provisions

##### DTS Glazing Calculator Requirements (Maximum Full System Values)

##### Ground Floor

Orientation	U-value maximum	SHGC* maximum	Possible Glazing Solution
North	4.5	0.45	Low e, tint
East	4.0	0.30	Double, dark tint
South	4.0	0.60	Double, clear
West	4.5	0.60	Low e, clear

##### First Floor

Orientation	U-value maximum	SHGC* maximum	Possible Glazing Solution
North	4.5	0.45	Low e, tinted
East	4.0	0.30	Double, dark tint
South	3.0	0.60	Double, clear
West	4.0	0.30	Double, dark tint

**JV3 Alternative Solution Glazing Requirements (Maximum Full System Values)**

Orientation	U-value maximum	SHGC maximum	Glazing Solution
All Orientations	6.5	0.65	Single, clear

**3.4 Part J3 - Building Sealing**

Building Element	Comment
New Entry Doors	Must be self-closing provided with weather seals.
New Exhaust Fans	Must have self-closing dampers.
Bi-Fold Doors	Any bi-fold doors must be interlocked to ensure the air-conditioning system is inactive when these doors are open.
Roof, Walls & Floor	Minimise air leakage by enclosed or internal lining systems that are close fitting at ceiling, wall and floor junctions or sealed by caulking, skirting, architraves, cornices or the like.

**3.5 Part J5 - Air Conditioning and Ventilation Systems**

Building Element	Comment
New Air Conditioning Certification	Required if the size of the air-conditioner is greater than 35kW.
New A/C System	Must have the ability to be inactive when the area is not occupied.
New Ductwork	Must be insulated to a minimum R-value of R1.20 within a conditioned space, R3.0 in direct sunlight, and R2.0 in other locations.

**3.6 Part J6 - Artificial Lighting and Power**

Building Element	Comment
New Lighting	Must not exceed the "maximum lighting wattage" in the lighting calculations table in Appendix 3.
Artificial Lighting Switch	Must be located in a visible position in the room being switched or located in an adjacent room where the lighting being switched can be seen. Not operate lighting for an area more than 250m <sup>2</sup> for a space not more than 2000m <sup>2</sup> or 1000m <sup>2</sup> for a space of more than 2000m <sup>2</sup> in a class 3,6,7,8 (non laboratory) & 9 building except for single function spaces.
Artificial Lighting	A time switch or an occupant sensing device such as a security key card reader or a motion detector in accordance with Spec J6 must control 95% of artificial lighting in a building or storey of a building of more than 250m <sup>2</sup> (for exceptions see J6.3(f),(g) in the detailed assessment).
Interior Decorative & Display Lighting	Controlled separately from other artificial lighting by a manual switch for each area. Controlled by a time switch where display lighting exceeds 1kW.
Window Display Lighting	Must be controlled separately from other display lights.
Artificial Lighting Perimeter	Controlled by a daylight sensor or time switch. When the total perimeter lighting load exceeds 100W, have an average light

	source efficiency of not less than 100 lumens/W or to be controlled by a motion detector (for exceptions see J6.5 (b) in the detailed assessment).
Decorative External Lighting	Must have a separate time switch.
Boiling Water & Chilled Water Storage Units	Must be controlled by a time switch.

Specification	Comment
Specification J6	All time switches, motion detectors, occupant sensing devices & daylight sensors must meet Specification J6 standards.

### 3.7 Part J7 - Hot Water Supply

Building Element	Comment
New Hot Water Taps	Specifying all new hot water taps with a minimum rating of 3 stars and timeclocks to zip type instantaneous water heaters.

### 3.8 Part J8 - Facilities for Energy Monitoring

Monitoring	Comment
Energy Monitoring	A facility to record individually the energy consumption of - a) Air-conditioning plant, b) Artificial lighting, c) Appliance power, d) Central hot water supply, e) Internal transport devices and other ancillary plant.



#### 4 REFERENCE BUILDING REQUIREMENTS - DTS

##### **Part JV3 - Verification Method Using a Reference Building**

- a) For a 9b building, compliance is verified when it is determined that the annual energy consumption of the proposed building with its services is not more than the annual energy consumption of a reference building when:
  - The proposed building is modelled with the proposed services and
  - The proposed building is modelled with the same services as the reference building.
- b) The annual energy consumption has been calculated using methods that complies with the ABCB protocol for Building Energy Analysis Software.
- c) The annual energy consumption for the **reference building** has been calculated using:
  - The Deemed-To-Satisfy (DTS) Provisions as per Part J1 to J7.
  - Solar absorptance of 0.6 for the external walls and 0.7 for the roofs,
  - The maximum illumination power density without any increase for adjustment factors
  - Air-conditioning with the conditioned space temperature within the range of 18<sup>o</sup> CDB to 26<sup>o</sup> CDB for 98% of the plant operation time,
  - The profiles for occupancy, air-conditioning, lighting, internal heat gains from people, hot meals, appliances, equipment and hot water supply systems as per Specification JV
  - Infiltration value of 1.5 air changes per hour for the whole building, when pressurising plant is not operating
  - Infiltration value of 1.0 air change per hour for the perimeter zone of depth equal to the floor-to-ceiling height, when pressurising plant is operating
- d) The annual energy consumption for the **reference building** and the **proposed building** has been calculated using the same:
  - Annual energy consumption calculation method,
  - Location
  - Adjacent structures and features
  - Environmental conditions
  - Orientation
  - Building form (including roof geometry, floor plan, number of storeys, ground to lowest floor arrangements, and size and location of the glazing)
  - External doors
  - Testing standards (including insulation, glazing, and package air-conditioning equipment)
  - Thermal resistance of air films
  - Dimensions of all walls
  - Quality of insulation installation
  - Assumptions and temperature difference calculations relating to A/C zone boundaries
  - Floor coverings
  - Shading devices
  - Range and type of services, and energy sources other than energy generated on-site from sources that do not emit greenhouse gas such as solar and wind power
  - Internal artificial lighting levels
  - Internal heat gains (including people, lighting, appliances and electrical power loads)
  - A/C system configuration and zones
  - Daily and annual occupancy and service profiles
  - Internal temperatures and plant operating times
  - Infiltration values
  - Metabolic rate for people
- e) The annual energy consumption of the heater water supply, lifts and escalators are the same in the proposed building and referenced building. Therefore, these services are removed from the annual energy consumption calculations.
- f) The building design (referenced and proposed) must consists of the following:
  - i. The ability to achieve all the criteria used in the annual energy consumption calculation method, such as having an automatic operation controlling device

- capable of switching lighting and air conditioning plant on and off, in accordance with the occupancy and operation profiles used; and
- ii. Compliance with:
- J1.2 for general thermal construction
  - J1.3(c) for compensation for a loss of ceiling insulation
  - J1.6(a)(ii), J1.6(c), J1.6(d) and J1.6(e) for floor edge insulation
  - BS 7190 for testing a water heater
  - AS/NZS 3823.1.2 at test condition T1 for testing package air-conditioning equipment not less than 65kW<sub>r</sub>
  - AHRI 550/590 for testing a refrigeration chiller
  - Part J8 for facilities for energy monitoring

## 5 DETAILED ASSESSMENT - DTS

**This section specifies how the reference (DTS) building has been modelled using the DTS requirements of Section J. This section is only for reference, the construction specifications are superseded by Section 3.**

### 5.1 Part J1 - Building Fabric

J1.1 Application - All new parts of the new building envelope need to comply.

The deemed-to-satisfy provisions of this part apply to building elements forming the envelope of a Class 2 to 9 building.

#### **Building Envelope**

The building envelope for the purpose of this Section J is described as the external walls, floors and roof of any conditioned space within the proposed Class 9b premises, as well as any internal walls or floors of the premises exposed to an unconditioned space. Please see Appendix 1 for building envelope insulation mark-up.

J1.2 Thermal Construction General - Builder is to ensure compliance, during construction.

- Insulation must comply with AS/NZS 4859.1.
- Abuts or overlaps adjoining insulation other than at supporting members such as studs, noggins, joists, furring channels where the insulation must be against the member.
- Forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that contribute to the thermal barrier.
- Does not affect the safe or effective operation of a service or fitting.
- Reflective insulation must be installed with the necessary airspace between the reflective side of the insulation and the lining or cladding.
- Reflective insulation must be installed closely against any penetration, door or window opening.
- Each adjoining sheet of roll membrane being overlapped not less than 50mm or taped together.
- Bulk insulation must be installed so that it maintains its position and thickness.
- When selecting insulation caution should be taken to clearly identify the total R-value of the installed roofing and ceiling system or wall system.

J1.3 Roof & Ceiling Construction

- a) In this Climate Zone 6, Table J1.3 requires a minimum total R-value of R3.20 (downwards).
- b) Where the area of ceiling insulation is reduced by more than 0.5% because of exhaust fans, flues or downlights, the loss of insulation must be compensated for by increasing the R-value of the insulation.

*Compliance can be met by:*

- Ensuring the loss of insulation area because of exhaust fans, flues or down lights is less than 0.5% of the ceiling area.
- c) A metal roof with metal purlins or metal battens, to which the ceiling lining is fixed directly underneath must have a thermal break, consisting of a material with an R-value of not less than R0.20, installed between the metal sheet roofing and its supporting metal purlins, metal rafters or metal battens.

The reflective insulation blanket provides the required thermal break, in this instance.

R-Value: R3.20.

The roof & ceiling system that is a metal roof with plasterboard ceiling has an un-insulated R-value of R0.26 (>15-45°) (downwards). Additional insulation is required to achieve a minimum total R-value of R3.20.

Roof & Ceiling Element	R-Value Unventilated-Down
Outside air film	0.04
Metal roof	0.00
55mm Reflective Blanket R1.30	1.30
Reflective Airspace (E0.9-0.05)(<10)(>10)	1.06
Ceiling Batts	Additional minimum 0.58
Plasterboard	0.06
Internal air film	0.16
<b>Total R-value</b>	<b>3.20 minimum</b>

*Compliance can be met by:*

- Installing 55mm R1.30 reflective insulating blanket & R2.0 ceiling batts. This will achieve a total 'R-value' of R4.62 (downwards), which exceeds the required minimum of R3.20.
- Any insulation or sarking is required to be non-combustible material in accordance with BCA Specification C1.1.

J1.4 Roof lights - Not Applicable

J1.5 External Walls

- Each part of an external wall that is part of an envelope must meet the following NCC thermal performance requirements except for -
  - Opaque non-glazed openings in external walls such as garage doors, vents, penetrations, shutters and the like;
  - Glazing
- For external walls in this Climate Zone (4,5,6), Table J1.5a requires a minimum total R-value of R2.80, which can be reduced by R0.5 if the wall surface density is greater than 220kg/m<sup>2</sup>, and by another R0.5 if the wall is south facing or is shaded between 30 and 60 degrees.  
OR

The wall system that is light coloured (solar absorptance less than 0.60) concrete panels with internal plasterboard lining has an un-insulated R-Value of R0.32. Additional insulation is required in order to achieve a minimum total R-value of R2.80.

Wall Element	R-Value
Outside air film	0.04
Concrete panel	0.10
<i>Additional reflective insulation</i>	<i>2.0 minimum</i>
<i>50mm reflective airspace (E0.9-0.05)</i>	<i>0.48</i>
Plasterboard	0.06
Internal air film	0.12
<b>Total R-value</b>	<b>2.80 minimum</b>

*Compliance can be met by:*

- Adding 50mm of reflective rigid board insulation with a thermal conductivity of 0.023 or better to the concrete panel wall system which provides an added **R-value of R2.17**. This will achieve a total 'R-value' of **R2.97** which meets the required minimum of R2.80.
- Any insulation or sarking is required to be non-combustible material in accordance with BCA Specification C1.1.

The wall system that is 90mm Blockwork/Brickwork with internal plasterboard lining has an un-insulated R-Value of R0.31. Additional insulation is required in order to achieve a minimum total R-value of R2.30.

Wall Element	R-Value
Outside air film	0.04
Blockwork	0.09
<i>Additional reflective insulation</i>	<i>2.0 minimum</i>
<i>50mm reflective airspace (E0.9-0.05)</i>	<i>0.48</i>
Plasterboard	0.06
Internal air film	0.12
<b>Total R-value</b>	<b>2.80 minimum</b>

*Compliance can be met by:*

- Adding 50mm of reflective rigid board insulation with a thermal conductivity of 0.023 or better to the concrete panel wall system which provides an added **R-value of R2.17**. This will achieve a total 'R-value' of **R2.96** which meets the required minimum of R2.80.
- Any insulation or sarking is required to be non-combustible material in accordance with BCA Specification C1.1.

The wall system that is external Metal cladding with internal plasterboard has an un-insulated R-value of R0.39. Additional insulation is required in order to achieve a minimum total R-value of R2.80.

Wall Element	R-Value
Outside air film	0.04
Metal Cladding	0.00
Airspace (non-reflective and unventilated)	0.17
<i>Additional insulation</i>	<i>2.41 minimum</i>
Plasterboard	0.06
Internal air film	0.12
<b>Total R-value</b>	<b>2.80 minimum</b>

*Compliance can be met by:*

- Adding R2.50 wall batts to the cladding wall system. This will achieve a total '**R-value**' of **R2.89**, which exceeds the required minimum of R2.80.
- Any insulation or sarking is required to be non-combustible material in accordance with BCA Specification C1.1.

The wall system that is external FC cladding with internal plasterboard has an un-insulated R-value of R0.42. Additional insulation is required in order to achieve a minimum total R-value of R2.80.

Wall Element	R-Value
Outside air film	0.04
Metal Cladding	0.03
Airspace (non-reflective and unventilated)	0.17
<i>Additional insulation</i>	<i>2.38 minimum</i>
Plasterboard	0.06
Internal air film	0.12
<b>Total R-value</b>	<b>2.80 minimum</b>

*Compliance can be met by:*

- Adding R2.50 wall batts to the cladding wall system. This will achieve a total '**R-value**' of **R2.92** which exceeds the required minimum of R2.80.
- Any insulation or sarking is required to be non-combustible material in accordance with BCA Specification C1.1.

A light weight wall that is part of the envelope on a metal frame must have thermal break using a material with an R-value of not less than R0.20 installed between the metal frame and the external cladding.

*Compliance can be met by:*

- Installing wall sarking with **R-value of R0.20** where metal frames are used.

### J1.5 Internal Walls

- a) For internal walls that form part of the envelope in this Climate Zone (4,5,6), Table J1.5b requires a minimum total R-value of R1.80.

The internal wall system that is concrete panels with internal plasterboard lining has an un-insulated R-Value of R0.40. Additional insulation is required to achieve a total R-value of R1.80/R2.30.

Wall Element	R-Value
Internal air film	0.12
Concrete panel	0.10
<i>Additional insulation</i>	<i>1.40 minimum</i>
Plasterboard	0.06
Internal air film	0.12
<b>Total R-value</b>	<b>R1.80 minimum</b>

*Compliance can be met by:*

- Adding 35mm reflective rigid board with thermal conductivity of 0.023 or better to the concrete panel wall system. This will achieve a total **R-value of R1.90**, which meets the required minimum of R1.80

The internal wall system that is a stud wall lined with plasterboard has an un-insulated R-value of R0.36. Additional insulation is required to achieve a total R-value of R2.8

Wall Element	R-Value
Internal air film	0.12
Plasterboard	0.06
<i>Additional insulation</i>	<i>1.44 minimum</i>
Plasterboard	0.06
Internal air film	0.12
<b>Total R-value</b>	<b>1.80 minimum</b>

*Compliance can be met by:*

- Adding R1.50 wall batt to the stud wall system. This will achieve a total '**R-value**' of **R1.86** which exceeds the required R-value of R1.80.

### J1.6 Floors

- a) For a slab on ground in this Climate Zone (1,2,3,4,5,6), Table J1.6 does not require any additional insulation in the floor.
- b) For a suspended floor with an open subfloor in this Climate Zone (1,2,3,4,5,6), Table J1.6 requires a Total R-value of R2.0 to be achieved.
- c) In climate zones 1 to 6, by increasing the roof/ceiling insulation by R0.75 above the required value would allow the floor insulation to be reduced by R0.50.
- d) A floor that is part of the envelope of a building, including a floor above or below a carpark or a plant room -
- Must achieve the Total R-Value specified in Table J1.6 from NCC 2016 Building Code of Australia –Volume One, and
  - With an in-slab or in-screened heating or cooling system, must be insulated around the vertical edge of its perimeter with insulation having R-Value of not less than 1.0.

- e) A concrete slab-on-ground -  
i. With an in-slab heating or cooling system; or

Must have insulation installed around the vertical edge of its perimeter.

- f) Insulation required by a concrete slab-on-ground must -  
i. Have an R-value of not less than R1.0; and  
ii. Be water resistant; and be continuous from the adjacent finished ground level -  
(A) To a depth of not less than 300mm; or  
(B) For the full depth of the vertical edge of the concrete slab-on-ground.
- g) The requirements of (e) (ii) and (f) (i) do not apply to an in-screed heating or cooling system used solely in a bathroom, amenity area or the like.

The concrete suspended slab floor has an un-insulated R-value of R0.30. Additional insulation is required where it abuts out/overhangs from the building to achieve a total R-value of R2.00.

Floor Element	R-Value
Indoor air film	0.16
150mm Concrete Slab	0.10
<i>Additional insulation</i>	<i>1.70 minimum</i>
Outdoor air film	0.04
<b>Total R-value</b>	<b>2.00 minimum</b>

*Compliance can therefore be met by the following:*

- Adding 40mm rigid board with a thermal conductivity of 0.023 or better to the concrete slab, which provides an added R-value of /R1.73. This will achieve a total 'value' of **R2.03**, which exceeds the required R-value of R2.00.



## 5.2 Part J2 - Glazing

### J2.1 Application

The deemed-to-satisfy provisions apply to elements forming the envelope of a building other than:

- i. A sole-occupancy unit of a Class 2 building or Class 4 part of a building.
- ii. A Class 7, 8 or 9b building that does not have a conditioned space.
- iii. An atrium or solarium that is not a conditioned space & is separated from the remainder of the building by an envelope.

### J2.4 Glazing

The building must comply with glazing requirements, which satisfy Method 2 calculations of the NCC Vol. 1, 2016. In this instance the Glazing Calculator Spreadsheet developed by the ABCB has been employed and all results are attached in Appendix 2.

NOTE: The glazing characteristics referred to are the new NFRC-100 characteristics, any glazing system which has either a 'U value' or 'SHGC value' EQUAL TO OR LESS THAN that specified, is acceptable.

Appendix 2 contains these calculations.

*Compliance can be met by:*

#### Ground Floor

- Installing the new North facing windows with a characteristic equal to or less than a **U-value of 4.5** and a **SHGC-value of 0.45**, which can be achieved with **Low e, tinted glazing** in **standard aluminium** frames.
- Installing the new East facing windows with a characteristic equal to or less than a **U-value of 4.0** and a **SHGC-value of 0.30**, which can be achieved with **Double, dark tinted glazing** in **standard aluminium** frames.
- Installing the new South facing windows with a characteristic equal to or less than a **U-value of 4.0** and a **SHGC-value of 0.60**, which can be achieved with **Double, clear glazing** in **standard aluminium** frames.
- Installing the new West facing windows with a characteristic equal to or less than a **U-value of 4.5** and a **SHGC-value of 0.60**, which can be achieved with **Low e, clear glazing** in **standard aluminium** frames.

#### First Floor

- Installing the new North facing windows with a characteristic equal to or less than a **U-value of 4.5** and a **SHGC-value of 0.45**, which can be achieved with **Low e, tinted glazing** in **standard aluminium** frames.
- Installing the new East facing windows with a characteristic equal to or less than a **U-value of 4.0** and a **SHGC-value of 0.30**, which can be achieved with **Double, dark tinted glazing** in **standard aluminium** frames.
- Installing the new South facing windows with a characteristic equal to or less than a **U-value of 3.0** and a **SHGC-value of 0.60**, which can be achieved with **Double, clear glazing** in **standard aluminium** frames.
- Installing the new West facing windows with a characteristic equal to or less than a **U-value of 4.0** and a **SHGC-value of 0.30**, which can be achieved with **Double, dark tinted glazing** in **standard aluminium** frames.

**It is important to note that it is the system U-value and SHGC characteristics which are the determining factors for compliance NOT the glazing description.**

### J2.5 Shading

When shading is required, it must -

- a) Be provided by an external permanent projection, such as a verandah, balcony, fixed canopy, eaves or shading hood, which;
  - i. Extends horizontally on both sides of the glazing for the same projection distance.
  - ii. Provides the equivalent shading with a reveal or the like.
- b) Be provided by an external shading device, such as a shutter, blind, vertical or horizontal building screen with blades, battens or slats which -
  - i. Is capable of restricting at least 80% of summer solar radiation.
  - ii. If adjustable, is operated automatically in response to the level of solar radiation.

### 5.3 Part J3 - Building Sealing

#### J3.1 Application

Applies to elements forming the envelope of a Class 2 to 9 building other than -

- i. A building in climate zones 1, 2, 3 and 5 where the only means of air-conditioning is by using an evaporative cooler.
- ii. A permanent building opening, in a space where a gas appliance is located, that is necessary for the safe operation of a gas appliance.
- iii. A class 6, 7, 8 and 9b building that does not have a conditioned space.
- iv. A building or space where the mechanical ventilation required provides sufficient pressurisation to prevent infiltration.
- v. An atrium or solarium that is not a conditioned space and is separated from the remainder of the building by an envelope.

#### 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.

#### J3.4 Windows and doors

All external doors and windows must either have seals to restrict air infiltration or the windows must comply with AS 2047.

An entrance to a building must have an airlock, self-closing door, revolving door or the like...where the conditioned space has a floor area greater than 50m<sup>2</sup>.

*Compliance can be met by the following:*

- All new entry doors must be self-closing.
- All bi-fold doors must be interlocked to ensure the air-conditioning system is inactive when these doors are open.

#### J3.5 Exhaust Fans

All exhaust fans fitted in a conditioned space must have a sealing device such as a self-closing damper or the like.

*Compliance can be met by:*

- Any new exhaust fans to have self-closing dampers, including "miscellaneous exhaust fans".

#### J3.6 Constructions of roofs, walls and floors

Roofs, ceilings, walls and floors and any opening such as a window or door must be constructed to minimise air leakage by -

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

#### J3.7 Evaporative coolers

An evaporative cooler must be fitted with a self-closing damper when serving -

- i. A heated space; or
- ii. A habitable room or a public area of a building in Climate Zones 4, 5, 6, 7 & 8.

---

**5.4 Part J4 - Air Movement - Not Applicable**

## 5.5 Part J5 - A/C & Ventilation Systems

The air-conditioning system requires certification by a Mechanical Engineer, where the size of the air-conditioner is greater than **35kW<sub>r</sub>** in **Climate 4, 5, 6 or 7**. For smaller package or split systems the motor efficiency performance is controlled under the Australian Governments Minimum Energy performance Scheme (MEPS).

A mechanical ventilation system will require certification by a Mechanical Engineer.

General provisions include:

### 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 of 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)
      - (bb) in climate zones 4, 5, 6, 7 or 8, when the air-conditioning system capacity is more than 35 kW<sub>r</sub>; 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
- b) 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 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.
- c) Insulation -
  - i. The ductwork of an air-conditioning system must be insulated and sealed in accordance with 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 Specification J5.2c.
- d) Space Heating - A heater used for air-conditioning or as part of an air-conditioning system must comply with Specification J5.2d.
- e) Energy Efficiency Ratios -
  - i. refrigerant chillers used as part of an air-conditioning system; and
  - ii. packaged air-conditioning equipment, must comply with Specification J5.2e

- f) Time switches -
  - i. A time switch complying with Specification J6 must be provided to control -
    - (A) an air-conditioning system of more than 10 kW<sub>r</sub>; and
    - (B) a heater of more than 10 kW<sub>heating</sub> used for air-conditioning.

#### J5.3 Mechanical ventilation systems

- a) Control -
  - i. A mechanical ventilation system, including one that is part of an air-conditioning system, 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 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 Part E2; and
    - (B) ventilation required by Part E3 and Part F4
- b) Fans - Fans of a mechanical ventilation system covered by (a) must comply with 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.

#### 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. where additional exhaust ventilation is needed to balance the required outside air for ventilation.

## 5.6 Part J6 - Artificial Lighting and Power

### J6.1 Application

J6.2, J6.3 and J6.5 (a)(ii) do not apply to a Class 8 electricity network substation.

### J6.2 Interior artificial lighting

- a) All artificial lighting for the whole building must not exceed the aggregated maximum Illumination Power Density (IPD) specified in Table J6.2b. (refer Appendix 4).

NOTE: Illumination Power Density is not just the wattage of the lamps but of the entire installation. E.g. typically a 2 x 36W fluorescent fitting is not 72 watts BUT 80 watts, to allow for energy losses in the control equipment and particularly the ballast. For LV lights, the transformer and control gear must be considered. For example a 50W LV dichroic light is rated at 65W. When purchasing or specifying lighting equipment, the full energy use data for the equipment should be obtained from the supplier.

*Compliance can be met by:*

- Not exceeding the "Max. Lighting Wattage" for any new lighting in each of the areas in the lighting calculations table in **Appendix 3**.
- The maximum lighting wattage for the building must not exceed **63,933watts**.

In calculating the number of such lamps required -

A 2 x 36W triphosphor fluorescent fitting will generate 80 Lm/W, resulting in a lighting output of 5,760 Lm per fitting.

This fitting will use 80W of electricity, therefore to comply with 10 W/ m<sup>2</sup> IPD, for an area of 100 m<sup>2</sup>, the maximum number of these fittings permissible is:  $10 \times 100 \text{ W} = 1,000\text{W} / 80 = 12$  fittings, and this will produce 69,000 Lm or 690 Lux. (i.e. more than twice that required for an Office).

- b) The lighting limits do not apply to the following -

- Emergency Lighting
- Signage and display lighting
- A heater where it emits light
- Lighting for a specialised process nature
- Lighting for performances such as theatrical or sporting
- Lighting of permanent displays in museums or galleries

### J6.3 Interior artificial lighting and power control

- a) Artificial lighting of a room or space must be individually operated by a switch or other control device.
- b) An artificial lighting switch must -
- i. Be located in a visible position in the room being switched or in an adjacent room or space from where the lighting being switched is visible.
  - ii. Not operate lighting for an area more than 250m<sup>2</sup> for a space of not more than 2000m<sup>2</sup> or 1000m<sup>2</sup> for a space of more than 2000m<sup>2</sup> in a Class 3,6,7,8 (other than a laboratory) or 9 building, except for single function spaces.
- c) 95% of artificial lighting in a building or storey of a building of more than 250m<sup>2</sup> in floor area must be controlled by -
- i. A time switch in accordance with Specification J6; or
  - ii. An occupant sensing device such as a security key card reader or a motion detector in accordance with Specification J6.
- d) These lighting requirements do not apply to Emergency lighting requirements or where lighting is required for 24 hours occupancy situations.
- e) The requirements of (c) 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 in a Class 9a building or in a Class 9c aged care building.
  - ii. A heater where the heater also emits light, such as in bathrooms.

**J6.4 Interior decorative and 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 .....; and
  - iii. By a time switch in accordance with Specification J6 where display lighting exceeds 1 kW.
- b) Window display lighting must be controlled separately from other display lighting.

**J6.5 Artificial lighting around the perimeter of a building**

- a) Artificial lighting around the perimeter of a building, must -
  - i. Be controlled by either a daylight sensor or a time switch in accordance with Specification J6.
  - ii. When the total perimeter lighting load exceeds 100W, have an average light source efficacy of not less than 60 Lumens/W, or be controlled by a motion detector in accordance with Specification J6.
  - iii. When used for decorative purposes, such as façade lighting or signage lighting, have a separate time switch in accordance with Specification J6.
- b) The requirements of (a) (ii) do not apply to the following -
  - i. Emergency lighting in accordance with Part E4.
  - ii. Lighting around a detention centre.

**J6.6 Boiling water and 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 Specification J6.

**NOTE:**

- That for smaller rooms a greater Illumination Power Density can be achieved by using a Motion Detector.
- All areas have had the Room Aspect Ratio applied.
- Low Voltage Halogen lights only have efficacy of approx. 20 Lm/W and Compact Fluorescent lamps have an efficacy of approx. 70 Lm/W.
- That for stairwells and corridors the provisions of Part E4 overrides this Section.

**Specification J6**

This section contains the requirements for lighting control devices should they be used in the building.

**Spec J6.3 Time Watch**

- 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 lights on by a manual switch or an occupant sensing device that can override the time switch for a period of up to two hours after which there is no further presence detected, the time switch must resume control.  
OR
  - ii. A means of turning lights on by 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
  - iii. 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.

**Spec J6.4 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 a person before they have entered 1m into the space, and movement of 500mm within the useable part of the space; and
  - iii. Not control more than, in other than a carpark, an area of 500m<sup>2</sup> with a single sensor or group of parallel sensors and 75% of the lights in spaces using high intensity discharge; and
  - iv. Be capable of maintaining the artificial lighting when activated for a maximum of 30 minutes unless it is reset, and without interruption if the motion detector is reset by movement; and
  - v. Not be overridden by a manual switch to permanently leave the lights on.
- b) When outside a 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 a person within a distance of twice the mounting height or 80% of the ground area covered by the lights beam, and
  - iii. Not control more than 5 lights and
  - iv. Be operated in series with a photoelectric cell or astronomical time switch so that the lights will not operate in daylight hours, and
  - v. Be capable of maintaining the artificial lighting when the switch is turned on for a maximum of 10 minutes unless it is reset, and
  - vi. Have a manual override switch which is reset after a maximum period of 4 hours.

**Spec J6.4 Daylight sensor and dynamic lighting control device**

A daylight sensor and dynamic lighting control device for artificial lighting must -

- a) For switching on and off -
  - i. Be capable of having the switching level set point adjusted between 50 and 1000 lux; and
  - ii. Have a delay of more than 2 minutes or a differential of more than 50 lux, and

Have a manual override switch which enables the lighting in an area to be turned off but is not able to switch the lights permanently on or bypass the lighting controls.



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## 5.7 Part J7 - Hot Water Supply, Swimming Pool, Spa Pool

### J7.2 Hot Water Supply

Builder to generally ensure all provisions of NCC are complied with. However, specifically ALL hot water outlets must be fitted with a minimum 3 star water fittings, in this new section of the building. The water supply system needs to be stored and delivered the conditions which prevent the likelihood of the growth of Legionella bacteria.

Should 'Zip' type instantaneous water heaters be installed over sinks they must have time clocks installed.

*Compliance can be met by:*

- Specifying all new hot water taps with a minimum rating of **3 stars**.

### J7.3 Swimming Pool Heating and Pumping - Not Applicable

### J7.4 Spa Pool Heating and Pumping - Not Applicable

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## 5.8 Part J8 - Facilities for Energy Monitoring

### J8.1 Application

The provisions of this part do not apply to a sole-occupancy unit of a Class 2 building, a Class 4 part of a building or to a Class 8 electricity network substation.

### J8.2 \*\*\*\*\*

### J8.3 Facilities for Energy Monitoring - Not Applicable

- a) A building with a floor area greater than 2500m<sup>2</sup> must have the facility to record individually the energy consumption of air-conditioning plant, artificial lighting, appliance power, central hot water supply, internal transport devices, and other ancillary plant.

*Compliance can be met by:*

- A building with a floor area greater than 2500m<sup>2</sup> must have the facility to record individually the energy consumption of air-conditioning plant, artificial lighting, appliance power, central hot water supply, internal transport devices, and other ancillary plant.

---

## 6 STATEMENT OF COMPLIANCE

The design documentation as referred to in this report has been assessed against the applicable provisions of Section J of the National Construction Code (NCC) and it is considered that such documentation complies or is capable of complying (as outlined above) with that Code.

**ANNEXURE A - DESIGN DOCUMENTATION**

This report has been based on the following design documentation.

Architectural Plans Prepared by		
Drawing Number	Revision	Title
100	5	Level 1 Full Plan
105	4	Level 2 Full Plan
120	1	Roof Plan
300	1	North Elevation
200	1	South Elevation
301	1	East and West Elevation
306	1	North Courtyard Elevation
307	1	East and West Courtyard Elevation
308	1	South Courtyard Elevation
401	1	Sections

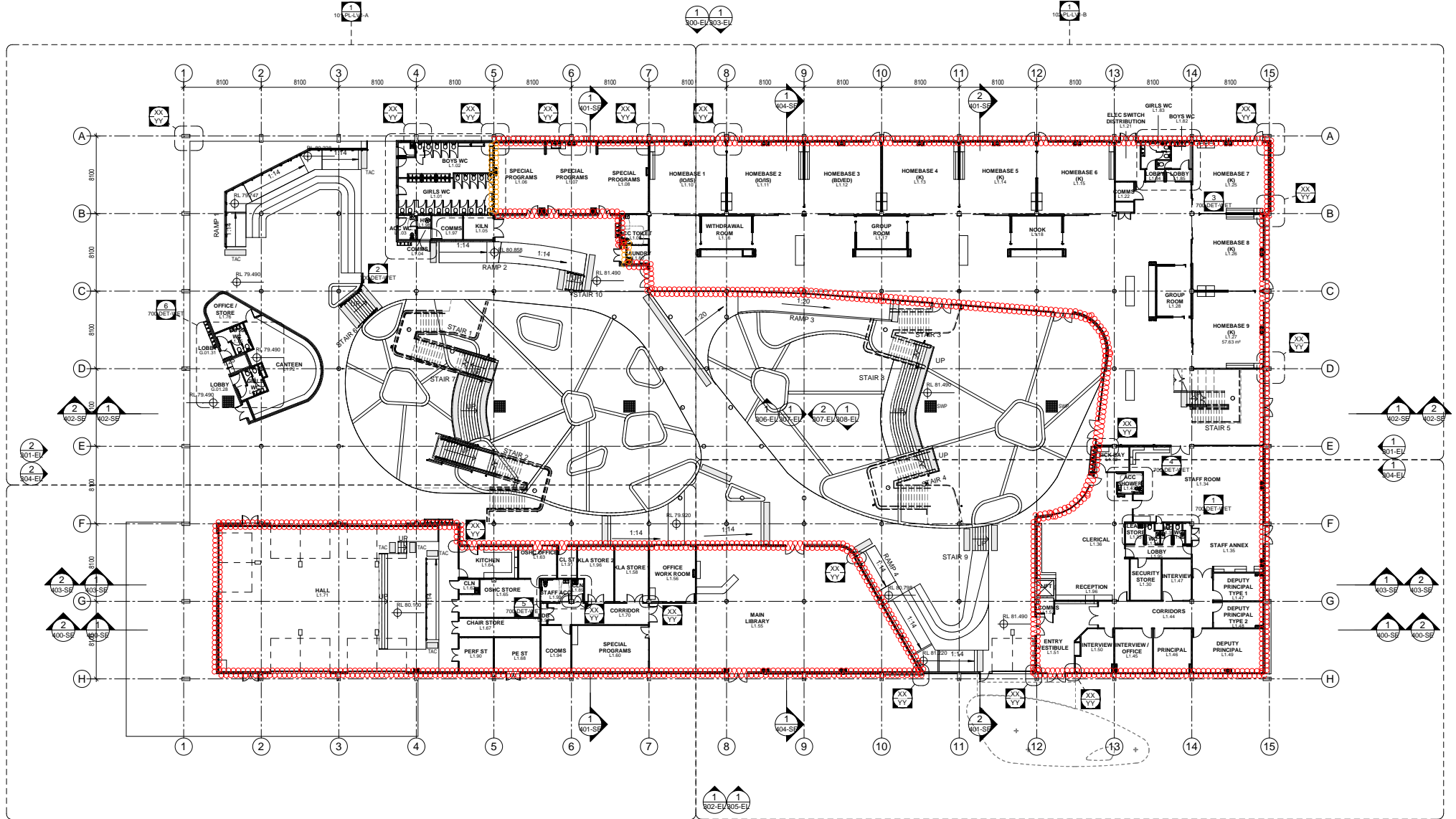
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**APPENDIX 1 – BUILDING ENVELOPE**

CODE	DESCRIPTION
SWP	STORE WATER RHY
TAC	TACTILE GROUND SURFACE INDICATOR

===== = R2.80 External Wall Insulation

===== = R1.80 Internal Wall Insulation



**1** LEVEL 1 - FULL PLAN  
1 : 200

NOTE:  
ORIGINAL DESIGN BY GHD WOODHEAD

ISSUE	No.	Date	Description	Chd
1	29/11/2017	FOR DISCUSSION ONLY		
2	11/12/2017	GENERAL REVISION		
3	08/01/2018	COORDINATION ISSUE		EM
4	15/01/2018	80% DOCUMENTATION ISSUE		EM

**PRELIMINARY**




Drawing Title  
LEVEL 1 - FULL PLAN

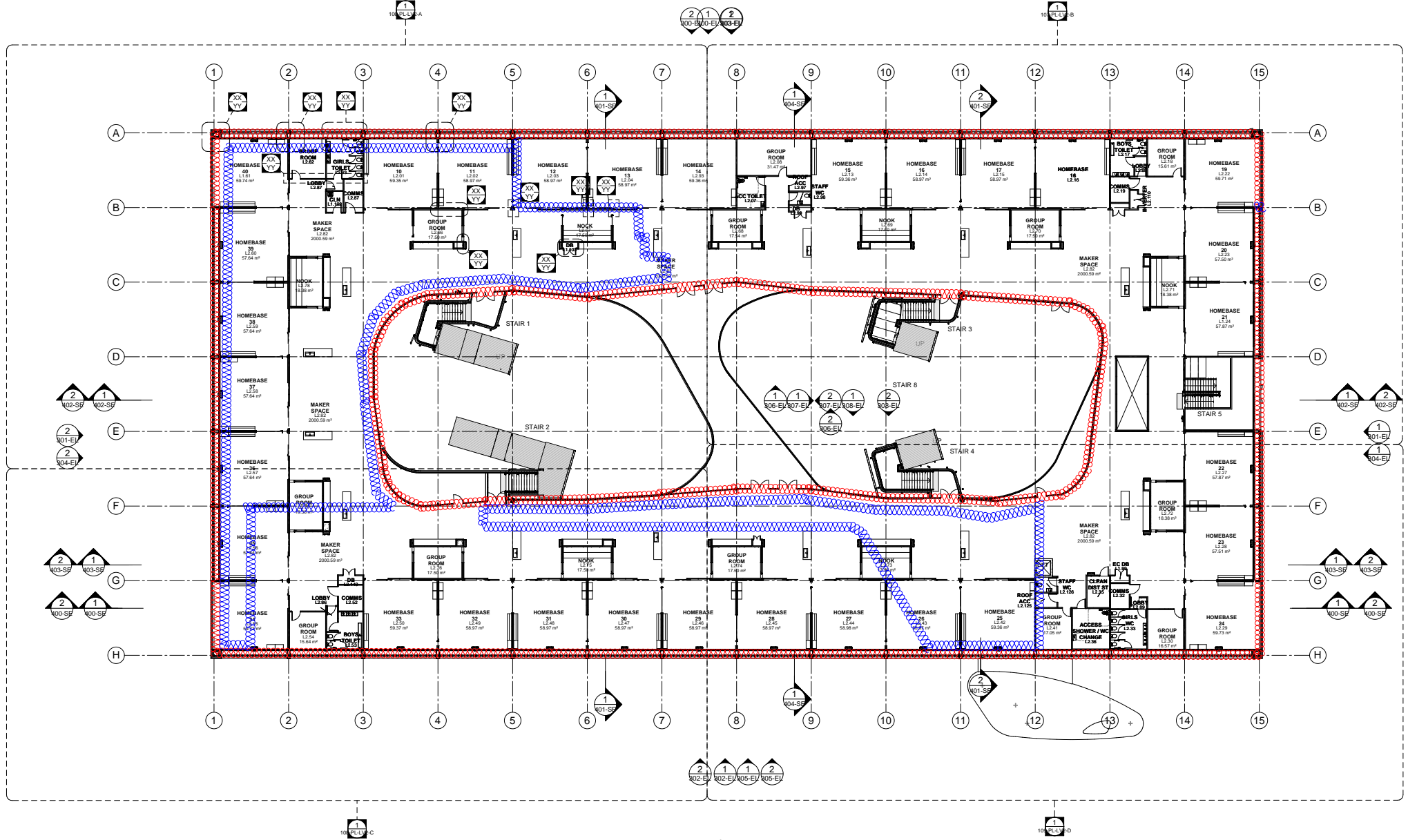
Project  
North Kellyville Public School

at  
Hezlett Road, Kellyville  
for  
NSW Department of Education

Architect  
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A/N/N 16 002 247 565

Date 15/01/2018  
Scale 200@A1 or 400@A3  
Drawing Reference 17447-AWD-100-PL-LV1  
Revision 4

-  = R2.80 External Wall Insulation  
 = DTS R2.00 Suspended Floor Insulation  
 = JV3 Nil Suspended Floor Insulation



PRELIMINARY

NOTE:  
ORIGINAL DESIGN BY GHD WOODHEAD

ISSUE	No.	Date	Description	Child
1	11/1/2017	GENERAL REVISION	EM	
2	09/01/2018	COORDINATION ISSUE	EM	
3	15/01/2018	80% DOCUMENTATION ISSUE	EM	

Drawing Title  
LEVEL 2 - FULL PLAN

Project  
North Kellyville Public School

at  
Hezlett Road, Kellyville  
for  
NSW Department of Education

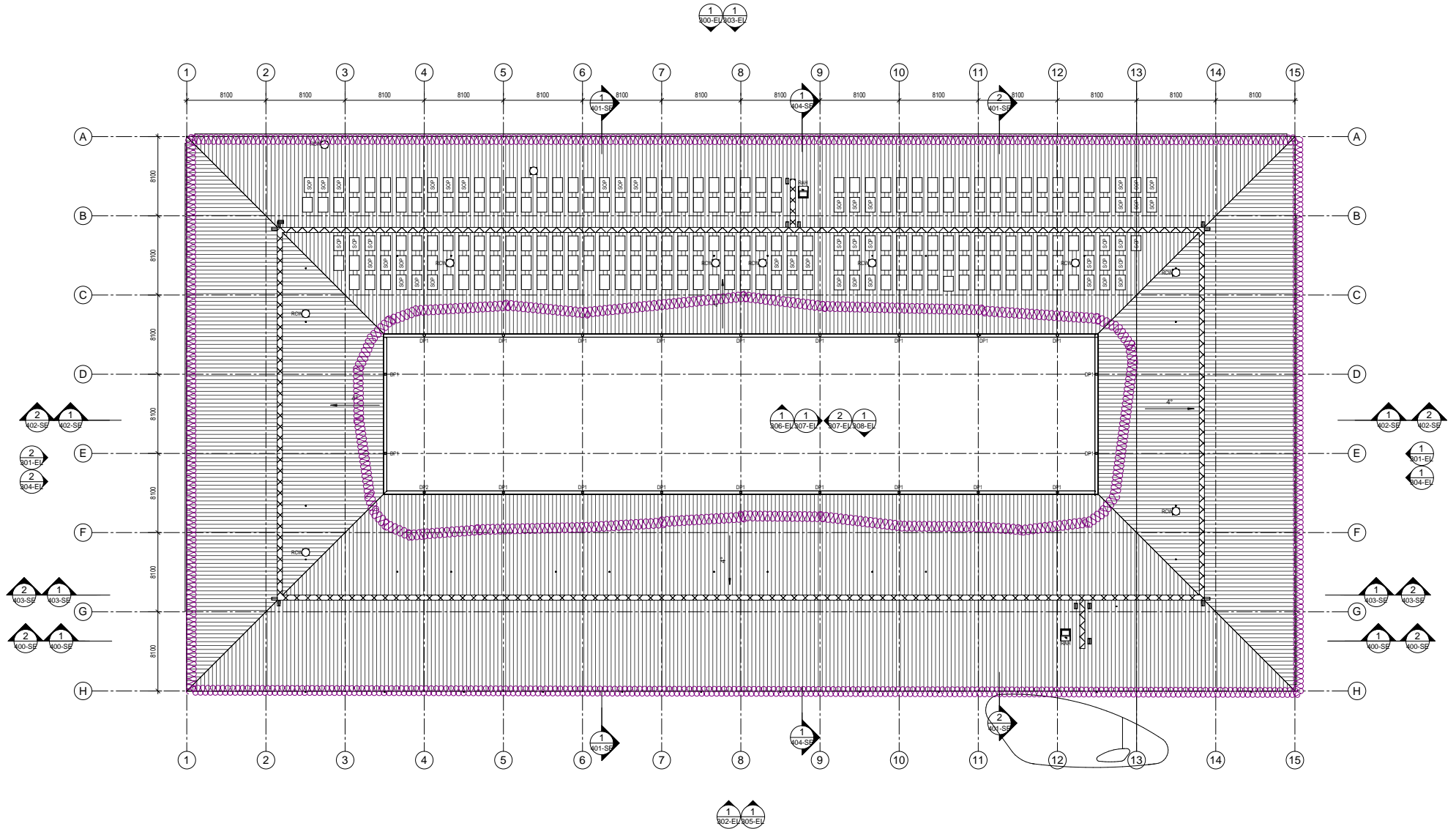
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ABN 16 002 247 565

Date 15/01/2018  
Scale 100@A1 or 200@A3  
Drawing Reference 17447-AWD-105-PL-LV2  
Revision 3



CODE	DESCRIPTION
DPI	COLORBOND DOWNPIPE
DP2	150mm ROUND NATURAL GALVANISED DOWNPIPE
RAH	ROOF ACCESS HATCH
RCW	ROOF COWL
SOP	SOLAR PANELS

===== = R3.20 Ceiling / Roof Insulation



NOTE:  
MECHANICAL PENETRATIONS NOT SHOWN ON THIS ISSUE.

ISSUE  
No. Date Description Chkd  
1 15/01/2018 80% DOCUMENTATION ISSUE EM

NOTE:  
ORIGINAL DESIGN BY GHD WOODHEAD

PRELIMINARY

Drawing Title  
ROOF PLAN

Project  
North Kellyville Public School

at  
Hezlett Road, Kellyville  
for  
NSW Department of Education

Architect  
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Date 15/01/2018  
Scale 100@A1 or 200@A3

Drawing Reference  
17447-AWD-120-PL-R  
Revision  
1



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**APPENDIX 2 - GLAZING CALCULATIONS**

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

Building name/description

2013 - North Kellyville Public School

Application

other

Climate zone

6

Storey

Ground

Facade areas

Option A

Option B

Glazing area (A) 183m<sup>2</sup> ..... 106m<sup>2</sup> ..... 193m<sup>2</sup> ..... 36.7m<sup>2</sup>

N	NE	E	SE	S	SW	W	NW	internal
570m <sup>2</sup>		278m <sup>2</sup>		609m <sup>2</sup>		230m <sup>2</sup>		
								n/a

Number of rows preferred in table below

78 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m <sup>2</sup> )	Element share of % of allowance used
1	WT05	N		2.45	3.60		4.5	0.45	0.900	2.450	0.37	0.00	0.84	0.66	8.82	5% of 75%
2	WT04	N		2.20	3.40		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	7.48	4% of 75%
3	WT01	N		1.50	0.95		4.5	0.45	0.900	2.100	0.43	0.60	0.99	0.90	1.43	1% of 75%
4	WT01	N		1.50	0.95		4.5	0.45	0.900	2.100	0.43	0.60	0.99	0.90	1.43	1% of 75%
5	WT07	N		2.20	3.70		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	8.14	4% of 75%
6	WT03	N		2.45	3.70		4.5	0.45	0.900	2.450	0.37	0.00	0.84	0.66	9.07	5% of 75%
7	WT03	N		2.45	3.70		4.5	0.45	0.900	2.450	0.37	0.00	0.84	0.66	9.07	5% of 75%
8	WT02	N		2.20	3.70		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	8.14	4% of 75%
9	WT02	N		2.20	3.70		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	8.14	4% of 75%
10	WT03	N		2.45	3.70		4.5	0.45	0.900	2.450	0.37	0.00	0.84	0.66	9.07	5% of 75%
11	WT03	N		2.45	3.70		4.5	0.45	0.900	2.450	0.37	0.00	0.84	0.66	9.07	5% of 75%
12	WT02	N		2.20	3.70		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	8.14	4% of 75%
13	WT02	N		2.20	3.70		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	8.14	4% of 75%
14	WT03	N		2.45	3.70		4.5	0.45	0.900	2.450	0.37	0.00	0.84	0.66	9.07	5% of 75%
15	WT03	N		2.45	3.70		4.5	0.45	0.900	2.450	0.37	0.00	0.84	0.66	9.07	5% of 75%
16	WT02	N		2.20	3.70		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	8.14	4% of 75%
17	WT02	N		2.20	3.70		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	8.14	4% of 75%
18	WT02	N		2.20	3.70		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	8.14	4% of 75%
19	WT02	N		2.20	3.70		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	8.14	4% of 75%
20	WT02	N		2.20	3.70		4.5	0.45	0.900	2.200	0.41	0.00	0.81	0.62	8.14	4% of 75%
21	Kitchen	N		1.05	2.10		4.5	0.45				0.00	1.00	1.00	2.21	2% of 75%

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 <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m²)	Element share of % of allowance used
22	OSHC Office	N		2.10	1.05		4.5	0.45				0.00	1.00	1.00	2.21	2% of 75%
23	Office Work Room	N		1.50	3.75		4.5	0.45				0.00	1.00	1.00	5.63	5% of 75%
24	Main Library 1	N		1.50	9.30		4.5	0.45	Device		2.00	0.00	0.00	0.30	13.95	5% of 75%
25	Main Library Door	N		2.40	1.85		4.5	0.45				0.00	1.00	1.00	4.44	4% of 75%
26											ROW SKIPPED (OK if intentional)					
27	Special Prog 1	S		2.20	3.70		4.0	0.60	0.900	3.200	0.28	1.00	0.98	0.96	8.14	4% of 88%
28	Special Prog 2	S		2.20	3.70		4.0	0.60	0.900	3.200	0.28	1.00	0.98	0.96	8.14	4% of 88%
29	Main Library 2	S		2.20	3.70		4.0	0.60	0.900	3.200	0.28	1.00	0.98	0.96	8.14	4% of 88%
30	Main Library 3	S		2.20	3.70		4.0	0.60	0.900	3.200	0.28	1.00	0.98	0.96	8.14	4% of 88%
31	Main Library 4	S		3.20	1.85		4.0	0.60	0.900	4.200	0.21	1.00	0.99	0.98	5.92	3% of 88%
32	Main Library 4	S		2.20	1.85		4.0	0.60	0.900	3.200	0.28	1.00	0.98	0.96	4.07	2% of 88%
33	Main Library 5	S		2.20	3.70		4.0	0.60	0.900	3.200	0.28	1.00	0.98	0.96	8.14	4% of 88%
34	Main Library 6	S		2.20	3.70		4.0	0.60	0.900	3.200	0.28	1.00	0.98	0.96	8.14	4% of 88%
35	Main Library 7	S		2.20	3.70		4.0	0.60	0.900	3.200	0.28	1.00	0.98	0.96	8.14	4% of 88%
36	Entry Vestibule	S		2.70	3.70		4.0	0.60	Device		2.00	0.00	0.55	0.55	9.99	7% of 88%
37	Interview	S		2.20	3.70		4.0	0.60	0.900	2.200	0.41	0.00	0.86	0.80	8.14	4% of 88%
38	Interview Office	S		2.20	3.70		4.0	0.60	0.900	2.200	0.41	0.00	0.86	0.80	8.14	4% of 88%
39	Principal	S		2.20	3.70		4.0	0.60	0.900	2.200	0.41	0.00	0.86	0.80	8.14	4% of 88%
40	Deputy Principal 1	S		2.20	3.40		4.0	0.60	0.900	2.200	0.41	0.00	0.86	0.80	7.48	4% of 88%
41	Deputy Principal 2	S		2.20	3.40		4.0	0.60	0.900	2.200	0.41	0.00	0.86	0.80	7.48	4% of 88%
42	Special Programs 1	S		1.00	0.50		4.0	0.60	Device		2.00	0.00	0.55	0.55	0.50	0.4% of 88%
43	Special Programs 2	S		1.00	0.50		4.0	0.60	Device		2.00	0.00	0.55	0.55	0.50	0.4% of 88%
44	Special Programs 3	S		1.00	0.50		4.0	0.60	Device		2.00	0.00	0.55	0.55	0.50	0.4% of 88%
45	WT26	S		1.70	7.70		4.0	0.60				0.00	1.00	1.00	13.09	6% of 88%
46	WT26	S		1.70	7.70		4.0	0.60				0.00	1.00	1.00	13.09	6% of 88%
47	WT26	S		1.70	7.70		4.0	0.60				0.00	1.00	1.00	13.09	6% of 88%
48	South	S		1.70	5.60		4.0	0.60				0.00	1.00	1.00	9.52	5% of 88%
49	South Door	S		2.70	1.90		4.0	0.60				0.00	1.00	1.00	5.13	3% of 88%
50	WT26	S		1.70	9.60		4.0	0.60				0.00	1.00	1.00	16.32	8% of 88%
51	South Door	S		2.70	1.90		4.0	0.60				0.00	1.00	1.00	5.13	3% of 88%
52											ROW SKIPPED (OK if intentional)					
53	WT24	W		1.70	5.65		4.5	0.60	1.100	2.700	0.41	1.00	0.96	0.94	9.61	26% of 66%
54	West Door	W		2.70	1.90		4.5	0.60	1.700	3.700	0.46	1.00	0.95	0.92	5.13	14% of 66%
55	WT24	W		1.70	5.00		4.5	0.60	3.200	2.700	1.19	1.00	0.75	0.67	8.50	20% of 66%
56	West Door	W		2.70	1.00		4.5	0.60	3.200	2.700	1.19	0.00	0.31	0.41	2.70	7% of 66%

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m <sup>2</sup> )	Element share of % of allowance used
57	West Door	W		2.70	2.00		4.5	0.60	Device		2.00	0.00	0.05	0.31	5.40	17% of 66%
58	West Door	W		2.70	2.00		4.5	0.60	Device		2.00	0.00	0.05	0.31	5.40	17% of 66%
59											ROW SKIPPED (OK if intentional)					
60	WT09	E		2.20	2.60		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	5.72	5% of 92%
61	WT08	E		2.20	1.85		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	4.07	4% of 92%
62	WT08	E		0.70	1.85		4.0	0.30	0.900	0.700	1.29	0.00	0.19	0.38	1.30	1% of 92%
63	WT07	E		2.20	1.85		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	4.07	4% of 92%
64	WT07	E		3.20	1.85		4.0	0.30	0.900	3.200	0.28	0.00	0.86	0.81	5.92	6% of 92%
65	WT02	E		2.20	3.70		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	8.14	8% of 92%
66	WT02	E		2.20	3.70		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	8.14	8% of 92%
67	WT06	E		2.20	2.80		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	6.16	6% of 92%
68	WT06	E		3.20	2.00		4.0	0.30	0.900	3.200	0.28	0.00	0.86	0.81	6.40	7% of 92%
69	WT06	E		2.20	2.80		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	6.16	6% of 92%
70	WT02	E		2.20	3.70		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	8.14	8% of 92%
71	WT03	E		2.20	2.70		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	5.94	6% of 92%
72	WT03	E		3.20	1.00		4.0	0.30	0.900	3.200	0.28	0.00	0.86	0.81	3.20	3% of 92%
73	WT03	E		2.20	2.70		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	5.94	6% of 92%
74	WT03	E		3.20	1.00		4.0	0.30	0.900	3.200	0.28	0.00	0.86	0.81	3.20	3% of 92%
75	WT02	E		2.20	3.70		4.0	0.30	0.900	2.200	0.41	0.00	0.77	0.71	8.14	8% of 92%
76	Main Library 8	E		1.50	2.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	4.05	3% of 92%
77	Main Library 9	E		1.50	3.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	5.55	4% of 92%
78	Main Library 10	E		1.50	3.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	5.55	4% of 92%

**IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR**

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters.

While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all.

Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.

*if inputs are valid*



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

Building name/description

2013 - North Kellyville Public School

Application

other

Climate zone

6

Storey

First

Facade areas

Option A

Option B

Glazing area (A) 334m<sup>2</sup> ..... 96.1m<sup>2</sup> ..... 333m<sup>2</sup> ..... 81.4m<sup>2</sup>

N	NE	E	SE	S	SW	W	NW	internal
726m <sup>2</sup>		271m <sup>2</sup>		734m <sup>2</sup>		290m <sup>2</sup>		
								n/a

Number of rows preferred in table below

77 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m <sup>2</sup> )	Element share of % of allowance used
1	WT36	N		2.20	3.50		4.5	0.45	Device		2.00	0.00	0.00	0.30	7.70	2% of 73%
2	WT36	N		2.20	3.50		4.5	0.45	Device		2.00	0.00	0.00	0.30	7.70	2% of 73%
3	WT37	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
4	WT38	N		2.20	1.85		4.5	0.45	Device		2.00	0.00	0.00	0.30	4.07	1% of 73%
5	WT38	N		0.80	1.85		4.5	0.45	Device		2.00	0.00	0.00	0.30	1.48	0.4% of 73%
6	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
7	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
8	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
9	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
10	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
11	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
12	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
13	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
14	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
15	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
16	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
17	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
18	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
19	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
20	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
21	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%

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 <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m²)	Element share of % of allowance used
22	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
23	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
24	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
25	WT39	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
26	WT37	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
27	WT36	N		2.20	3.50		4.5	0.45	Device		2.00	0.00	0.00	0.30	7.70	2% of 73%
28	WT37	N		2.20	3.70		4.5	0.45	Device		2.00	0.00	0.00	0.30	8.14	2% of 73%
29	Internal	N		1.70	53.42		4.5	0.45	2.700	2.400	1.13	0.70	0.82	0.56	90.82	31% of 73%
30	Internal Doors	N		2.70	10.00		4.5	0.45	2.700	3.400	0.79	0.70	0.94	0.72	27.00	13% of 73%
31											ROW SKIPPED (OK if intentional)					
32	WT South	S		2.20	3.40		3.0	0.60	Device		2.00	0.00	0.55	0.55	7.48	3% of 98%
33	WT South	S		2.20	3.40		3.0	0.60	Device		2.00	0.00	0.55	0.55	7.48	3% of 98%
34	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
35	WT South	S		0.80	1.85		3.0	0.60	Device		2.00	0.00	0.55	0.55	1.48	1% of 98%
36	WT South	S		2.20	1.85		3.0	0.60	Device		2.00	0.00	0.55	0.55	4.07	1% of 98%
37	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
38	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
39	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
40	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
41	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
42	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
43	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
44	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
45	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
46	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
47	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
48	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
49	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
50	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
51	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
52	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
53	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
54	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
55	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
56	WT South	S		0.80	1.85		3.0	0.60	Device		2.00	0.00	0.55	0.55	1.48	1% of 98%



GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m <sup>2</sup> )	Element share of % of allowance used
57	WT South	S		2.20	1.85		3.0	0.60	Device		2.00	0.00	0.55	0.55	4.07	1% of 98%
58	WT South	S		0.80	1.85		3.0	0.60	Device		2.00	0.00	0.55	0.55	1.48	1% of 98%
59	WT South	S		2.20	1.85		3.0	0.60	Device		2.00	0.00	0.55	0.55	4.07	1% of 98%
60	WT South	S		2.20	3.70		3.0	0.60	Device		2.00	0.00	0.55	0.55	8.14	3% of 98%
61	WT South	S		2.20	3.40		3.0	0.60	Device		2.00	0.00	0.55	0.55	7.48	3% of 98%
62	WT South	S		2.20	3.40		3.0	0.60	Device		2.00	0.00	0.55	0.55	7.48	3% of 98%
63	South Internal	S		1.70	52.27		3.0	0.60	2.700	2.400	1.13	0.70	0.86	0.79	88.85	19% of 98%
64	South Door	S		2.70	10.00		3.0	0.60	2.700	3.400	0.79	0.70	0.91	0.85	27.00	5% of 98%
65											ROW SKIPPED (OK if intentional)					
66	WT39	E		2.20	3.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	8.14	7% of 84%
67	WT39	E		2.20	3.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	8.14	7% of 84%
68	WT39	E		2.20	3.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	8.14	7% of 84%
69	WT39	E		2.20	3.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	8.14	7% of 84%
70	Stairs	E		2.40	7.50		4.0	0.30	0.900	3.100	0.29	0.70	0.98	0.96	18.00	24% of 84%
71	WT39	E		2.20	3.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	8.14	7% of 84%
72	WT39	E		2.20	3.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	8.14	7% of 84%
73	WT39	E		2.20	3.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	8.14	7% of 84%
74	WT39	E		2.20	3.70		4.0	0.30	Device		2.00	0.00	0.01	0.29	8.14	7% of 84%
75	East Internal	E		1.70	7.65		4.0	0.30	1.150	2.400	0.48	0.70	0.95	0.92	13.01	17% of 84%
76											ROW SKIPPED (OK if intentional)					
77	WT39 x10	W		2.20	37.00		4.0	0.30	Device		2.00	0.00	0.05	0.31	81.40	100% of 99%

**IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR**

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

**if inputs are valid**

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**APPENDIX 3 - LIGHTING CALCULATIONS TABLE**

AREA DESCRIPTION	FLOOR DIMENSIONS		PERIMETER	AREA	LIGHT ALLOW	MAX. LIGHTING WATTAGE
	L	B	P (m)	(m <sup>2</sup> )	(W/m <sup>2</sup> )	(W)
Toilet Block	10.12	10.02	40.28	101.40	6	780
Special Programs	7.54	16.06	47.20	121.09	8	1,234
Homebase 1-6	7.50	48.64	112.28	364.75	8	3,389
G/B WC	4.14	5.30	18.88	21.94	6	209
Comms/Elec Switch	7.40	2.74	20.28	20.28	5	166
Homebase 7-9	23.03	7.50	61.06	172.73	8	1,697
Staff Offices	20.50	22.27	85.54	456.54	8	3,652
Main Library	13.10	19.40	65.00	254.14	8	2,176
Office Work Room	5.81	5.00	21.62	29.05	8	358
KLA Store	5.81	7.59	26.80	44.10	5	323
CL Store	3.31	1.94	10.50	6.42	5	57
OSHC Office	3.31	3.86	14.34	12.78	8	171
Kitchen	3.31	5.94	18.50	19.66	8	254
Store Rooms	9.62	8.12	35.48	78.11	5	525
Cooms	4.71	3.19	15.80	15.02	5	124
Special Programs	4.71	7.87	25.16	37.07	8	447
Corridor	2.62	11.31	27.86	29.63	8	383
Staff Acc	2.13	4.52	13.30	9.63	6	100
Hall	15.17	25.08	80.50	380.46	8	3,044
Acc Laundry	5.15	3.05	16.40	15.71	6	155
General Area	26.94	26.94	181.05	725.89	8	6,142
Boys WC	3.58	2.85	12.86	10.20	6	104
Girls WC	2.94	2.60	11.08	7.64	6	80
Canteen	8.28	8.28	45.60	68.65	8	823
<b>Total Sum</b>						<b>25,386</b>
AREA DESCRIPTION	FLOOR DIMENSIONS		PERIMETER	AREA	LIGHT ALLOW	MAX. LIGHTING WATTAGE
	L	B	P (m)	(m <sup>2</sup> )	(W/m <sup>2</sup> )	(W)
Homebase 10-14	7.48	40.48	95.92	302.79	8	2,847
Homebase 15-18	7.70	32.40	80.20	249.48	8	2,360
Homebase 19-21	23.68	8.44	64.24	199.86	8	1,891
Homebase 22-24	23.80	7.54	62.68	179.45	8	1,755
Homebase 25-33	7.22	72.48	159.40	523.31	8	4,841
Homebase 24-40	55.39	7.60	125.98	420.95	8	3,865
Girls Toilet	4.03	4.35	16.76	17.53	6	171
Service	3.65	3.91	15.12	14.27	5	118
Acc Toilet	3.28	3.02	12.60	9.91	6	101
Roof Acc	3.28	2.49	11.54	8.17	6	85
Boys Toilet	3.97	3.64	15.22	14.45	6	143
Service	3.64	3.10	13.48	11.28	5	95
Toilet Block	4.18	8.15	24.66	34.07	6	313
Service	3.61	4.48	16.18	16.17	5	132
Staff WC	3.23	2.28	11.02	7.36	6	77
Boys Toilet	3.76	3.97	15.46	14.93	6	147
Service	3.78	2.20	11.96	8.32	5	72
General Area	49.40	49.40	394.24	2441.70	8	19,534
<b>Total Sum</b>						<b>38,547</b>



**APPENDIX 4 - TABLE OF MAXIMUM ILLUMINATION POWER DENSITY**

<b>Space</b>	<b>Maximum illumination power density (W/m<sup>2</sup>)</b>
Auditorium, church and public hall	10
Board room and conference room	10
Car park - general	6
Car park - entry zone (first 20 m of travel)	25
Common rooms spaces and corridors	8
Control room, switch room, and the like	9
Corridors	8
Courtroom	12
Entry lobby	15
Health-care - Children's ward	10
Health-care - examination room	10
Health-care - patient ward	7
Health-care - all patient care	13
Kitchen and food preparation area	8
Laboratory	12
Library - stack and shelving	12
Library - reading room	10
Museum and gallery - circulation, cleaning and service lighting	8
Office - artificially lit to an ambient level of 200 lux or more	9
Office - artificially lit to an ambient level of less than 200 lux	7
Plant room	5
Restaurant, café, bar, hotel lounge and a space for the serving and consumption of food or drinks	18
Retail space including a museum and gallery whose purpose is the sale of objects	22
School - general purpose learning area	8
Storage with shelving no higher than 75% of the height of the aisle lighting	8
Storage with shelving higher than 75% of the height of the aisle lighting	10
Service area, locker room, staff room, cleaner's room, rest room and the like	5
Toilet, locker room, staff room, rest room and the like	6
Wholesale storage and display area	10

**Notes:**

1. In areas not listed above, the maximum illumination power density is:

For an illuminance of less than 80 Lux, 7.5 W/m<sup>2</sup>

For an illuminance of less than 80 to 160 Lux, 9 W/m<sup>2</sup>

For an illuminance of less than 160 to 240 Lux, 10 W/m<sup>2</sup>

For an illuminance of less than 240 to 320 Lux, 11 W/m<sup>2</sup>

For an illuminance of less than 320 to 400 Lux, 12 W/m<sup>2</sup>

For an illuminance of less than 400 to 480 Lux, 13 W/m<sup>2</sup>

For an illuminance of less than 480 to 540 Lux, 14 W/m<sup>2</sup>

For an illuminance of less than 540 to 620 Lux, 15 W/m<sup>2</sup>

For an illuminance of more than 620 Lux, the light source efficacy must not be less than 80 Lumens/W

**APPENDIX 5 – DTS AND PROPOSED ENERGY CONSUMPTION RESULTS****DTS Results**

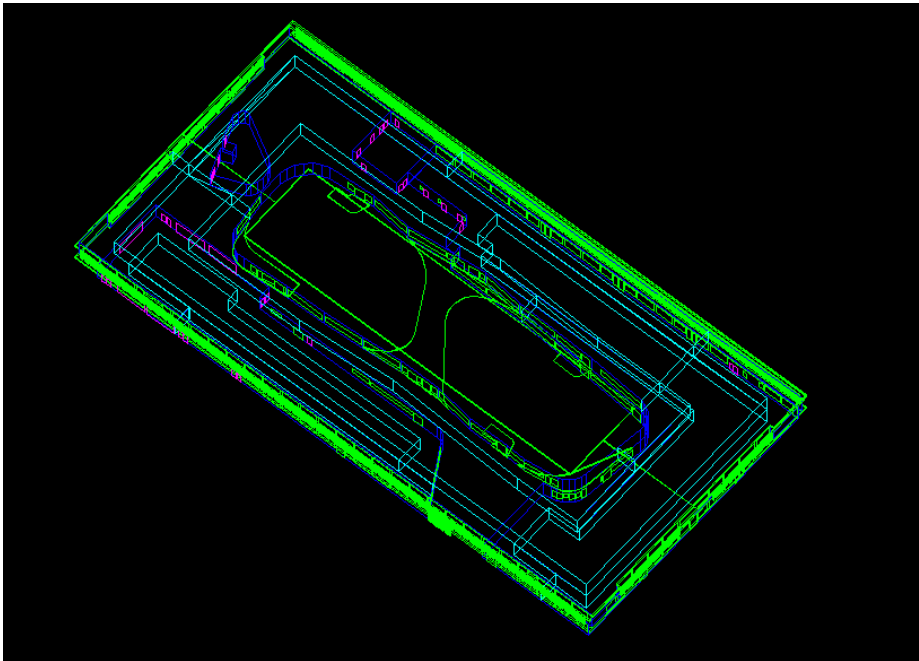
	Chillers energy (MWh)	Ap Sys heat rej fans/pumps energy (MWh)	Boilers energy (MWh)	Lights electricity (MWh)	Equip electricity (MWh)	Total energy (MWh)
Date	2013 - DTS	2013 - DTS	2013 - DTS	2013 - DTS	2013 - DTS	2013 - DTS
Jan 01-31	21.6762	6.5028	0.0000	12.6168	7.6446	48.4403
Feb 01-28	22.1531	6.6459	0.0000	11.9041	7.2107	47.9138
Mar 01-31	19.0931	5.7279	0.0000	13.6016	8.2373	46.6600
Apr 01-30	10.2084	3.0625	0.0816	13.0358	7.8951	34.2835
May 01-31	2.3993	0.7198	0.9603	12.6168	7.6446	24.3410
Jun 01-30	0.2100	0.0630	2.7190	13.0358	7.8951	23.9230
Jul 01-31	0.1204	0.0361	5.1034	13.1092	7.9409	26.3103
Aug 01-31	1.7563	0.5269	3.2432	13.1092	7.9409	26.5767
Sep 01-30	2.1902	0.6571	1.0156	13.0358	7.8951	24.7939
Oct 01-31	8.5590	2.5677	0.3433	12.6168	7.6446	31.7316
Nov 01-30	11.9688	3.5906	0.0193	13.0358	7.8951	36.5097
Dec 01-31	19.1099	5.7330	0.0000	13.6016	8.2373	46.6818
Summed total	119.4447	35.8334	13.4858	155.3191	94.0813	418.1655

**JV3 Results**

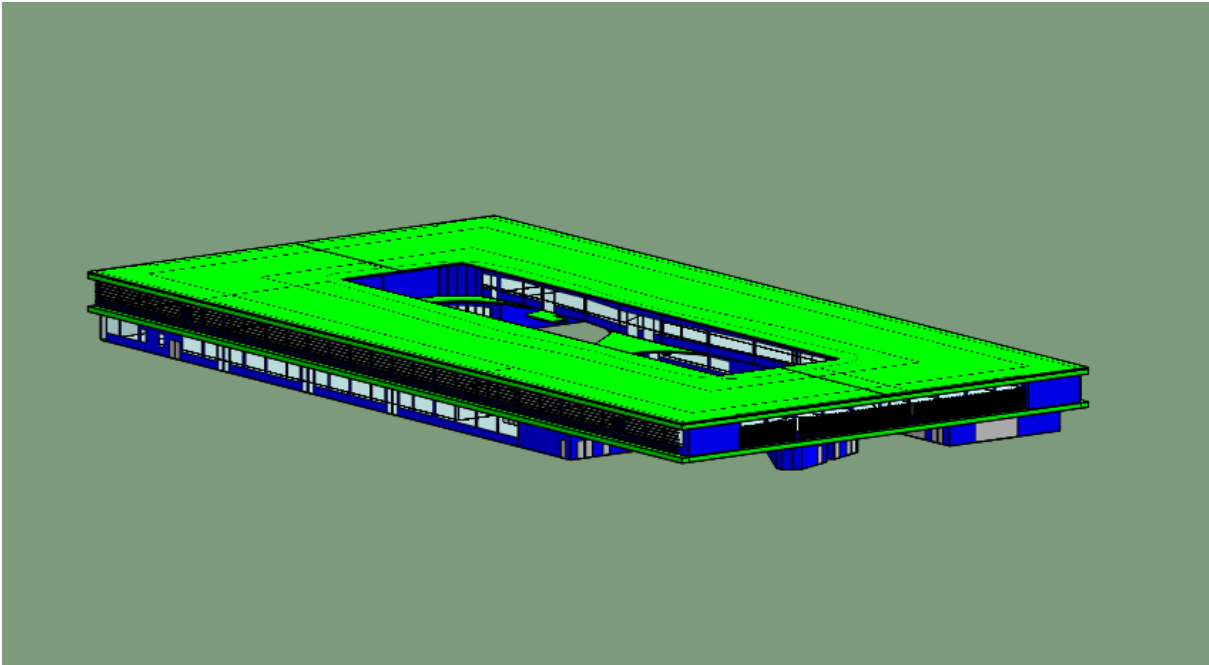
	Chillers energy (MWh)	Ap Sys heat rej fans/pumps energy (MWh)	Boilers energy (MWh)	Lights electricity (MWh)	Equip electricity (MWh)	Total energy (MWh)
Date	2013 - JV3	2013 - JV3	2013 - JV3	2013 - JV3	2013 - JV3	2013 - JV3
Jan 01-31	20.8865	6.2660	0.0051	12.6168	7.6446	47.4189
Feb 01-28	21.2444	6.3733	0.0000	11.9041	7.2107	46.7325
Mar 01-31	17.4386	5.2316	0.0133	13.6016	8.2373	44.5225
Apr 01-30	8.6018	2.5805	0.2965	13.0358	7.8951	32.4099
May 01-31	1.6132	0.4840	1.7277	12.6168	7.6446	24.0865
Jun 01-30	0.0204	0.0061	4.2371	13.0358	7.8951	25.1947
Jul 01-31	0.0203	0.0061	7.5833	13.1092	7.9409	28.6600
Aug 01-31	1.3675	0.4103	4.7137	13.1092	7.9409	27.5418
Sep 01-30	1.7226	0.5168	1.9350	13.0358	7.8951	25.1054
Oct 01-31	7.4214	2.2264	0.8578	12.6168	7.6446	30.7673
Nov 01-30	10.1664	3.0499	0.1528	13.0358	7.8951	34.3002
Dec 01-31	17.7313	5.3194	0.0074	13.6016	8.2373	44.8970
Summed total	108.2346	32.4704	21.5298	155.3191	94.0813	411.6366

APPENDIX 6 – BUILDING MODEL

Model IT



Model Viewer II



## APPENDIX 7 - EVIDENCE OF COMPLIANCE CHECK LIST

The purpose of this checklist is to itemise the evidence that should be collected during the construction phase of the project that will demonstrate how the final building complies with the Energy Efficiency requirements of Section J of the NCC that were identified during the design phase.

Generally evidence should take the form of delivery receipts, photographs, or signed and dated statements from installers.

This following check list is a generic list and some elements may not be applicable to a particular project.

### Part J1 - Building Fabric

Element	Applicable (Y or N)	Evidence
Roof & ceiling insulation		Delivery receipts for roof/ceiling insulation type and rating and/or pictures of insulation installation and the R rating of the insulation.
Roof Colour		Delivery receipts for roof material and colour or pictures of the roof colour naming the roof colour.
Wall insulation		Delivery receipts for wall insulation type and rating and/or pictures of insulation installation and the R rating of the insulation.
Floor		Delivery receipts for floor insulation type and rating and/or pictures of insulation installation and the R rating of the insulation.

Or a signed and dated statement from the builder/contractor that the Building Fabric insulation was installed as per the authorised plans and the Energy Efficiency Report

### Part J2 - Glazing

Element	Applicable (Y or N)	Evidence
Glazing		Delivery receipts for the glazing installed on site including the thermal characteristics of the glazing (U-value and SHGC-value).

Or a signed and dated statement from the builder/contractor that the Glazing was installed with the thermal characteristics as per the authorised plans and the Energy Efficiency Report.

## Part J3 - Building Sealing

Element	Applicable (Y or N)	Evidence
Infiltration prevention		Delivery receipts for the number of self-closing doors installed.
Exhaust fans		Delivery receipts for the self-closing dampers on exhaust fans or pictures showing their installation.

Or a signed and dated statement from the builder/contractor that the self-closing doors and/or A/C outlet next to the open shop front was installed as per the authorised plans, specifications and the Energy Efficiency Report.

## Part J4 - A/C &amp; Ventilation Systems

A signed and dated statement from the A/C installer will be required. This statement must indicate that the A/C system complies with MEPS and complies with all the requirements of Section J of the BCA 2016.

## Part J5 - Artificial Lighting and Power

Element	Applicable (Y or N)	Evidence
Internal Lighting		Delivery receipts for the number and wattage of all the internal lights installed.
External lighting		Delivery receipts for the number and wattage of all the external lights installed.

Or a signed and dated statement from the lighting installer indicating that the lighting was installed as per the authorised plans, specifications and the Energy Efficiency Report will comply.

## Part J6 - Hot Water Supply, Swimming Pool, Spa Pool

Element	Applicable (Y or N)	Evidence
Hot water taps		Delivery receipts for the number and star rating of the hot water taps installed.
Hot Water systems		Delivery receipts for the number and type of hot water systems installed.
Time clocks		Delivery receipts for the number and type of time clocks installed to control the hot water systems.

Or a signed and dated statement from the hot water installer that the hot water system fitting and time clocks were installed as per the authorised plans, specifications and the Energy Efficiency Report.