Version P3

Section J Report(JV3)

11-13 Albert Road & 2-6 Pilgrim avenue
Stratified 2135

PREPARED FOR

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REVISION STATUS

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P1	Draft Issue 1	10/11/2020	Mahbub Hassan
P3	DA Issue	21/6/2021	Mahbub Hassan BSc(Eng) , MEng, MIEAust ,CpEng,NER NABERS Assessor

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1 EXECUTIVE SUMMARY

The proposed Shops-Café/Restaurant in the mixed used development at 11-13 Albert Road& 2-6 Pilgrim avenue, Stratified 2135. has been assessed utilizing computer simulation modelling against the requirements of Verification Method JV3 to determine the performance requirements for building fabric and external glazing to comply with Section J. The findings of the assessment are summarised below.

Total Annual Green House gas Emission ((kgCO2-e/GJ))	
Run-1(Case 1) Reference Building	**Run-2(Case 2/3) Proposed Building with Reference Building**
111,234	106,214

The above table shows that the total annual Green House Gas Emission for the proposed building (Case 2/3) is less than the reference building (Case 1) .Therefore the proposed building fabric (J1)is compliant with the performance requirement JP1 using JV3.

The DTS requirements for all services as noted in Section J Parts J3 – J7 must be complied with to satisfy performance requirement JP1.

1.1 Building Fabric

As per JV3 Verification Method Provisions of BCA 2019 Volume 1, compliance with Part J1 can be met subject to the following specifications:

Case 2/3 – Proposed Building Model			
Reference construction	**Added Insulation**	**Total R (m2K/W)**	**Insulation description**
Roof / Ceiling			
RF-1	3.0	3.77	
External Walls			
WT-1	1.0	1.55	70 mm Bulk insulation or equivalent PIR
Internal Walls			
WT-2	1.0	1.48	70 mm Bulk insulation or equivalent PIR
Floor			
F-1	Nil	0.32	Nil Requirement- Concrete Slab above carpark

It has been noted that all constructions including installed insulation must meet the general thermal construction requirements of Clause J1.2 that are outlined in Section 4.1.1.

1.2 Glazing

Compliant glazing system selections have been suggested based on actual certified products from the WERS website that comply with the requirements of Section J.

Glass Configuration	U-Value	SHGC
Dbl Glazed High Solar Gain low-E Clear	2.9	0.51

Should a different product be selected for the development, the U-Value and SHGC to be equal or lower than that is outlined.

2 INTRODUCTION

Dural Group have been commissioned to assess the compliance with Section J of the National Construction code (NCC)-2019-Amendment-1 of the proposed commercial component (Shop) of the mixed use development at 11-13 Albert Road& 2-6 Pilgrim avenue, Stratified 2135.

2.1 Purpose

The purpose of the report is to provide the minimum requirements of the building fabric and the glazing required for compliance with JP1 when applying the JV3 verification method. It is to note that the compliance requirements of Parts J5 – J8 are still need to achieve due to the scope of the assessment

2.2 Methodology

The methodology used in this report includes the following steps:

- Review Section J Deemed-to-Satisfy requirements and the Verification Method JV3 applicable to the development.
- Prepare computer simulation models as required for JV3 to calculate the energy consumption.
- Compare the energy consumption of the models to assess compliance with Section J.
- Provide recommendations to discover the most appropriate solution for adoption.

2.3 Limitations

The DTS requirements for all services in Section J Parts J3 – J7 of NCC 2019 must be complied with to satisfy performance requirement JP1.

2.4 Building Description

The 11-13 Albert Road& 2-6 Pilgrim Avenue development is a 14 storey mixed use development consisting of apartment unit (Residential) and 2 shops (Commercial).

2.5 Climate Zone & Building Classification

The proposed development falls within Climate Zone 5 according to Part A1 of the NCC.

The Building has been classified as Class 6 (Shop-Cafe) according to NCC.

2.6 Documentation

The following documentation was used in the preparation of this report

- Latest Architectural Drawings:-Kenedy Associates Architects
- BCA 2019 – Volume One-Amendment-1
- ASHRAE Fundamentals Handbook
- Viridian Glass Specifiers Guide

2.7 Conditioned Space Envelope of the Development

The following diagrams identify the conditioned space envelopes of the levels to determine the requirements under Section J.

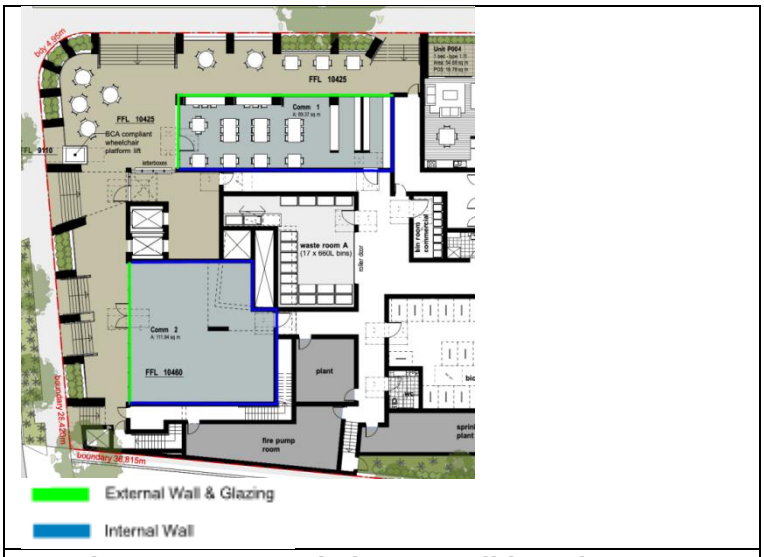


Figure 2 – Ground Floor Conditioned Space Envelope

3 ENERGY ANALYSIS: ALTERNATIVE METHOD (COMPUTER SIMULATION):

The following section describes the computer simulation modelling process to demonstrate compliance with Verification Method JV3.

3.1 Simulation Software

The Design Builder and Energy Plus whole building energy simulation software packages have been utilized for the purpose of predicting energy performance of the development. Energy Plus is a simulation program designed for modeling buildings with all their associated heating, cooling, lighting, ventilating, and other energy flows. Energy Plus is a stand-alone simulation engine without a 'user friendly' graphical interface. Energy Plus simulation software is certified in accordance with ANSI/ASHRAE Standard 140-2001: "Standard Method of Test for Evaluation of Building Energy Analysis Computer Programs",

3.2 Weather Data

NatHERS Hourly data file for Sydney climate data has been used for the analysis . This data file was selected as it was the nearest available data set location to the development that is within the same BCA climate zone 6.

3.3 Analysis

To demonstrate compliance with Verification Method JV3, a thermal calculation method must be used to calculate the annual energy consumption of the proposed building not being more than the annual energy consumption of a reference building where the buildings have been modelled in accordance with the clauses of NCC Section J, JV3.

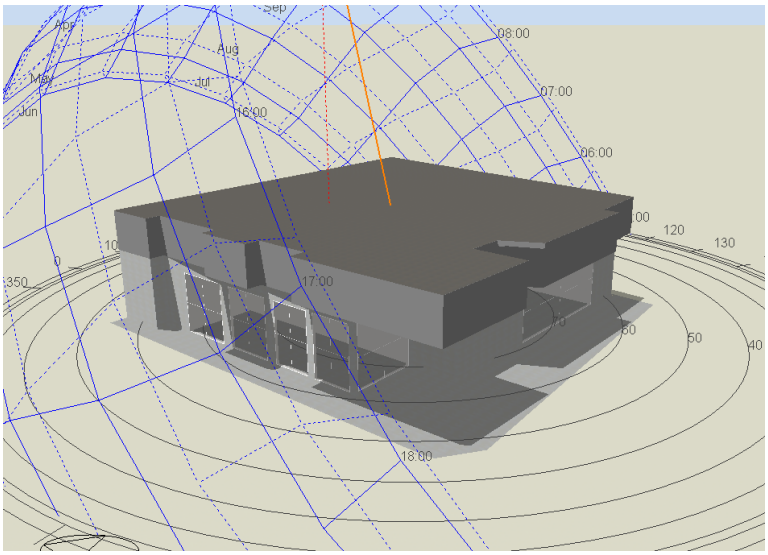


Figure 3 – DesignBuilder (DB) Dynamic Thermal Simulation Model

**Note: This is an DB model depiction of the commercial component of the mixed use development and does not indicate all architectural detail and only shows the commercial part*

The proposed mixed-use development consists of mainly residential areas (energy assessment will cover by NatHERS and BASIX assessment) in Level 1-14 and commercial tenancies (shops) on Ground Floor. As such, the JV3 assessment was carried out in accordance with the corresponding calculation inputs as outlined in Section 3.6 of this report.

3.4 Building – JV3

In accordance with JV3, following simulation cases are constructed for comparison to demonstrate compliance:

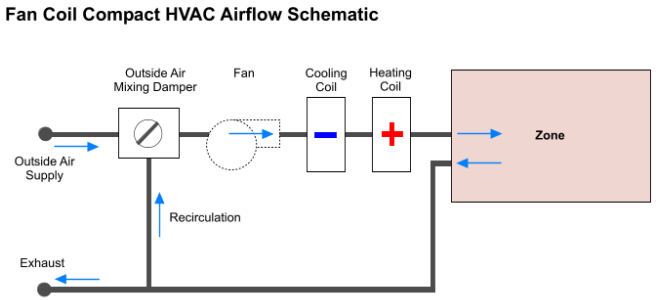
Modelling Case	Title	Description
Case 1	Reference Building+ Reference Services	All building elements and services are modelled as per the dimensional design and system type in compliance with the minimum DTS performance provisions.
Case 2	Proposed Building + Proposed Services	All building elements and services are modelled as per the proposed design.
Case 3	Proposed Building + Reference Services	All building elements are modelled as per the proposed design and the services are modelled the same as Case 1.

Table 2 – JV3 Simulation Modelling Cases

However we assumed that the proposed service will be equal or better than the reference services. Thereforeonly two models Case 1 and Case 2/3 will be constructed for comparison.

3.5 Air Conditioning System

It is assumed that reverse cycle Air-conditioning system will be used in the shop. The information below provides a summary of the key features of the air conditioning system modeled.



- Air-conditioning system selection: Reverse cycle Heat pump with COP of 2.7(Cooling) and COP of 3.0 (Heating).
- Conditioned space temperature with dead band: 21-24C±3
- Outside Air: In accordance with Part F4 (AS1668.2)

3.6 Simulation Input:

Location: Stratified, NSW 2135

Orientation : 290 deg from true north

External shading: As per detail Architectural drawing

External surfaces solar absorptions: 0.6 for external walls

No internal blind provided

Winter & Summer Clothing- 0.55/1.1

Occupant density: In accordance with Table D1.13- 1m^2/P

Internal heat gains from appliances and equipment: 5 W/m2 for whole buildings

Internal heat gains from artificial lighting-As per J6 (14 W/m2)

Availability of plant: As per JV3 profile

Infiltration air change rate per hour when no mechanically supplied outdoor air: 0.7 ACH

Infiltration air change rate per hour when Conditioned: 0.35 ACH

Miscellaneous Mechanical Exhaust: Considered same in both cases.

Metabolic Rate- 75 W sensible heat gain and 55 W latent heat gain

Daily occupancy and operating profile: (JV3 Profile):

Weekdays				
Time Period	**Occupancy**	**Lighting**	**Equipment**	**HVAC**
0:00 - 1:00	0%	5%	15%	OFF
1:00 - 2:00	0%	5%	15%	OFF
2:00 - 3:00	0%	5%	15%	OFF
3:00 - 4:00	0%	5%	15%	OFF
4:00 - 5:00	0%	5%	15%	OFF
5:00 - 6:00	0%	5%	15%	OFF
6:00 - 7:00	5%	40%	40%	OFF
7:00 - 8:00	5%	40%	40%	ON
8:00 - 9:00	5%	60%	60%	ON
9:00 - 10:00	5%	60%	60%	ON
10:00 - 11:00	20%	90%	90%	ON
11:00 - 12:00	50%	90%	90%	ON
12:00 - 13:00	80%	90%	90%	ON
13:00 - 14:00	70%	90%	90%	ON
14:00 - 15:00	40%	90%	90%	ON
15:00 - 16:00	20%	90%	90%	ON
16:00 - 17:00	25%	90%	90%	ON
17:00 - 18:00	50%	90%	90%	ON
18:00 - 19:00	80%	90%	90%	ON
19:00 - 20:00	80%	90%	90%	ON
20:00 - 21:00	80%	90%	90%	ON
21:00 - 22:00	50%	90%	90%	ON
22:00 - 23:00	35%	50%	50%	ON
23:00 - 24:00	20%	30%	30%	ON

Table 3 – Load Profile for Occupancy, Lighting, Equipment and HVAC

Following are the data remain same for both DTS and proposed building:

- Annual GHG emissions calculation method
- Greenhouse gas emissions factors
- location where the building is to be constructed
- Adjacent structures and features

- Building orientation
- Building form

Testing standards-

- Quality of insulation installation
- Thermal resistance of air films
- Dimensions of external, internal and separating walls
- Internal shading devices

4 DTS PROVISIONS & ASSOCIATED MODEL INPUTS

4.1 Building Fabric:

Part J1 of Section J outlines the requirements for Building Fabric elements that form part of the envelope of conditioned spaces. Based on the architectural information received, Wall type, construction make-up of elements forming part of the envelope and the DTS total R value has shown in the table below.

	DTS construction	**DTS Total R** (m^2K/W)
	Roof / Ceiling	
RF-1	200mm Concrete Roof: Outside Air Film + Concrete + Insulation+ Ceiling Air Space+ Plasterboard + Inside Air Film	3.7
	External Walls	
WT-1	140mm Concrete block: Outside Air Film +140mm Concrete Block+ Air Cavity+ Insulation + Plaster board+ Inside Air Film	1.5
	Internal Walls	
WT-2	Single skin block : Outside Air Film + 140mm Concrete Block +Air Cavity+ Insulation +Plaster board+ Inside Air Film	1.5
	Floor	
F-1	Concrete Floor: Outside Air film+ Tiles + Concrete block above carpark	2.0

4.2 Glazing detail:

The following table summarises the DTS compliant glazing system selections as used within the reference building (Case 1). The data has been obtained from the WERS website for actual certified products. Detail data input shown in the glazing calculator in Appendix.

Glass Configuration	**Framing Material**	**U-Value (NFRC)**	**SHGC (NFRC)**	**Façade Use**
Single Glazed Clear	Aluminium	5.8	0.70	South- Comm-1 & comm.-2
Dbl Glazed Low E	Aluminium	2.5	0.26	West Coms -1

Table 4 – DTS Compliant Glazing System Types – Case 1 Model

4.3 Hot Water Supply

Hot water systems have been considered equivalent between the simulation cases and therefore the energy consumption of such equipment has been excluded from the assessment.

5 PROPOSED BUILDING ENERGY CONSUMPTION ASSESSMENT

5.1 Proposed building Energy Model Inputs

The following section lists the inputs used within the computer simulation modelling cases.

5.2 Building Fabric

The following table summarizes the thermal performance of the building fabric utilised within the Case 2/3 proposed building model to achieve compliance.

Construction **Case 1 Model Reference**	**DTS Total R (m2K/W)**	**Case 2/3** **Proposed Building**
Roof / Ceiling		
RF-1:200mm Concrete Roof:	3.7	3.7
External Walls		
WT-1:140mm Concrete block:	1.5	1.5
Internal Walls		
WT-2:140mm Concrete block:	1.5	1.55
Floor		
FT1: Concrete Floor:	2.0	0.32

Table 5 – Building Fabric Thermal Resistance

5.3 External Glazing

The glazing systems as utilised within the Case 1 reference building model can be found within Section 4.2.

The following table summarises the glazing types utilized within the Case 2/3 proposed building model as necessary in order to achieve compliance. The thermal performance values outlined are window system value.

Glass Configuration	**U-Value**	**SHGC**	**VLT**	**Façade Use**
Thermally broken Dbl Glazed low E clear	2.9	0.51	0.65	All glazing in Commercial

Table 6 – Proposed Glazing

5.4 Other Compliance:

Clause JV3 (g) outlines that the building design must include 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 turning lighting, and air-conditioning plant on and off in accordance with the occupancy and operating profiles used. The building design must also be in compliance with the following requirements:

- J1.2 for general thermal construction
- J1.6(a)(ii), J1.6(b) and J1.6(c) for floor edge insulation

- AS/NZS 3823.1.2 at test condition T1 for testing package air-conditioning equipment (See Section 4.4).

5.5 Thermal Comfort &Temperature Range Assessment

- The proposed building fabric was further assessed in conjunction with proposed services in order to satisfy the predicted mean vote requirements of the JV3 verification method. It shows that thermal comfort level of between a Predicted Mean Vote of -1 to +1 is achieved across not less than 95% of the floor area of all occupied zones.

- The temperature range of 21 to 24 degrees for the conditioned spaces on the reference model is compliant for 98% of the time.

5.6 Simulation Results

The following table summarises the total annual energy consumption for the simulation cases of the development.

Component	Annual Emission (kgCO2-e/GJ)	
	Case 1	Case 2/3
Heating	2460	2094
Cooling	51289	46635
Lighting	53747	53747
Equipment	3737	3737
Total	111234	106214

Table 7 – Total Annual Energy Consumption

The results in Table 7.0 above show that the total annual green house gas emission of Case 2/3 is not more than Case 1.

5.7 Conclusion

The results outlined above show that the total annual Green House Emission of 106214

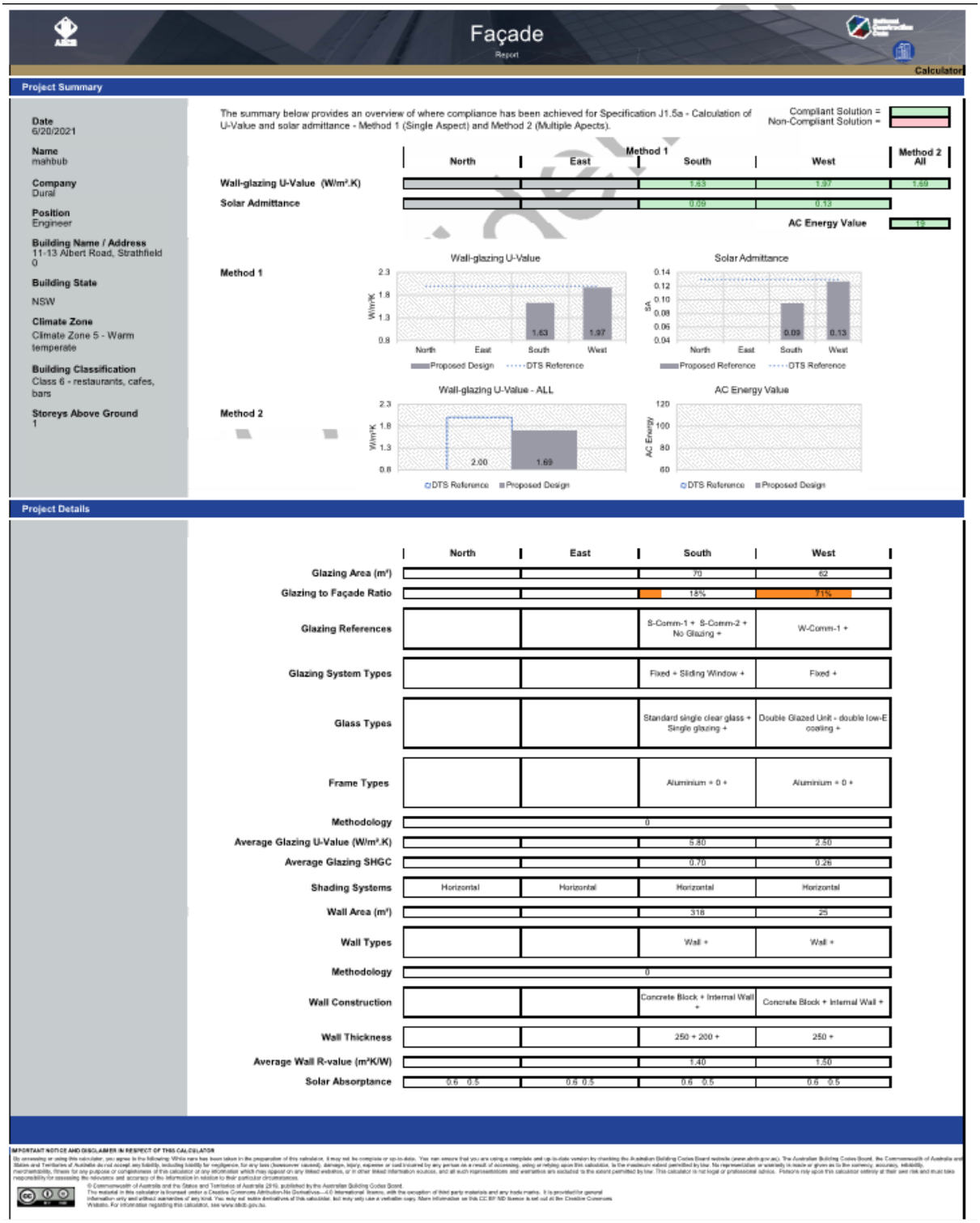
kgCO2-e/GJ for Case 2/3 is not more than the annual energy consumption of 111234

kgCO2-e/GJ for Case 1, therefore the proposed building fabric and glazing as outlined within the report are compliant with performance requirement JP1 using verification method JV3.

As a combined Case 2/3 model was utilised, the services designs must achieve all applicable DTS performance requirements for the development to comply with Section J as the services performance of proposed model Case 2/3 were set to the minimum DTS performance level. The simulation models used for the energy calculations are based on the design current at the time of this assessment including the assumptions and values listed within this report.

6 APPENDIX

6.1 Glazing Calculation Results – Case 1 Model (DTS)



Façade

Report

Calculator

Project Summary

Date
6/20/2021

Name
mahbub

Company
Dural

Position
Engineer

Building Name / Address
11-13 Albert Road, Strathfield
0

Building State
NSW

Climate Zone
Climate Zone 5 - Warm temperate

Building Classification
Class 6 - restaurants, cafes, bars

Storeys Above Ground
1

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 Apects).

Compliant Solution =
Non-Compliant Solution =

	North	East	Method 1 South	West	Method 2 All
Wall-glazing U-Value (W/m².K)			1.63	1.97	1.69
Solar Admittance			0.09	0.13	
AC Energy Value					92

Method 1

Method 2

Project Details

	North	East	South	West
Glazing Area (m²)			70	62
Glazing to Façade Ratio			18%	71%
Glazing References			S-Comm-1 + S-Comm-2 + No Glazing +	W-Comm-1 +
Glazing System Types			Fixed + Sliding Window +	Fixed +
Glass Types			Standard single clear glass + Single glazing +	Double Glazed Unit - double low-E coating +
Frame Types			Aluminium + 0 +	Aluminium + 0 +
Methodology	0			
Average Glazing U-Value (W/m².K)			5.80	2.50
Average Glazing SHGC			0.70	0.26
Shading Systems	Horizontal	Horizontal	Horizontal	Horizontal
Wall Area (m²)			318	25
Wall Types			Wall +	Wall +
Methodology	0			
Wall Construction			Concrete Block + Internal Wall +	Concrete Block + Internal Wall +
Wall Thickness			250 + 200 +	250 +
Average Wall R-value (m²K/W)			1.40	1.50
Solar Absorptance	0.6 0.5	0.6 0.5	0.6 0.5	0.6 0.5

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THIS CALCULATOR

6.2 PMV & Temp Check –

ASHRAE55 90% Acceptability Limits [Hours]
Pass-PMV

Time Setpoint Not Met	During Occupied Heating [hr]	During Occupied Cooling [hr]
LEVELG:COMMS1	3.00	0
LEVELG:COMMS2	2.00	0

6.3 Construction Detail (Proposed)

Roof Type -RF1 (Concrete Roof):

Construction Layer	**Nominal Thickness (mm)**	**Thermal Resistance (m² K/W)**
Outside Air Film 3.0m/s wind	–	0.03
Concrete Slab	500	0.34
PIR foam	-	3.0
Ceiling Air Cavity	20	0.17
Plasterboard Ceiling	13	0.07
Inside Air Film (still air	–	0.16
Total		3.77

Wall Type-WT-1 (140mm Block Wall):

Construction Layer	**Nominal Thickness (mm)**	**Thermal Resistance (m² K/W)**
Outside Air Film (7.0m/s wind assumed)	–	0.03
Hollow Concrete Block Work (1250kg/m3	140	0.16
Insulation		1.0
Air Cavity*	24	0.17
Plasterboard Sheeting	13	0.07
Inside Air Film (still air assumed)	–	0.12
Total		**1.55**

Wall Type-WT-2 (Internal Single skin block):

Construction Layer	Nominal Thickness (mm)	Thermal Resistance (m^2 K/W)
Outside Air Film (7.0m/s wind assumed)	–	0.03
Hollow Concrete Block Work (1250kg/m3	140	0.16
Insulation	-	1.0
Air Cavity		0.17
Plasterboard Sheeting	13	0.07
Inside Air Film (still air assumed)	–	0.12
Total		**1.55**

Floor Type- FT-1 (Concrete Slab above car park):

Construction Layer	Nominal Thickness (mm)	Thermal Resistance (m^2 K/W)
Outside Air Film (7.0m/s wind assumed)	–	0.03
Concrete Slab	200	0.13
Inside Air Film (still air assumed)	–	0.16
	Total	**0.32**