RTTV Calculation report

For

Proposed House Development

in Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T.

24 May 2021

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RTTV Calculation Report

INTRODUCTION

- 1.1 The building is Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long
- 1.2 The General Building Plan has been submitted to Buildings Department under letter dated 2 Feb 2021.

This document is the Residential Thermal Transfer Value calculation.

DEMONSTRATION OF COMPLIANCE

- 2.1 To improve the energy efficiency of residential buildings, the compliance with the following design and construction requirements is included as one of the pre-requisites for the granting of gross floor area (GFA) concessions for green / amenity features and non-mandatory / non-essential plant rooms and services in a residential building under Practice Note for Authorized Persons, Registered Structural Engineers and Registered Geotechnical Engineers (PNAP) APP-151:-
- (a) The RTTV of wall (RTTV Wall) and roof (RTTV Roof) should not exceed 14Watt/m² and 4 Watt/m² respectively;
- (d) Glass forming part of the building envelope such as curtain wall, cladding, skylight, window and door of the residential building and RRF should have a VL Glass of not less than 50% and an ER Glass of not more than 20%.

Support calculation, building information, glazing information and general building plan are submitted in the attached document.



PERFORMANCE DATA

Project: Proposed Residential Development at Lot No 2115 in D.D.105, Ngau Tam Mei, Yuen Long, New Territories

Date: 21-Jun-18 Prepared by: Phoebe Hu

N		COMPOSITION		Visi	ble Light (%)	Shading Coefficient	U-Value (W/m2 K)	
	NO		Туре	Transmittance	Reflectance			
					Outdoor	Indoor		
	1	10mm SBTS61B #2 HS + 12A (BLK) + 12mm Clear glass	IGU	53%	17%	10%	0.43	1.74

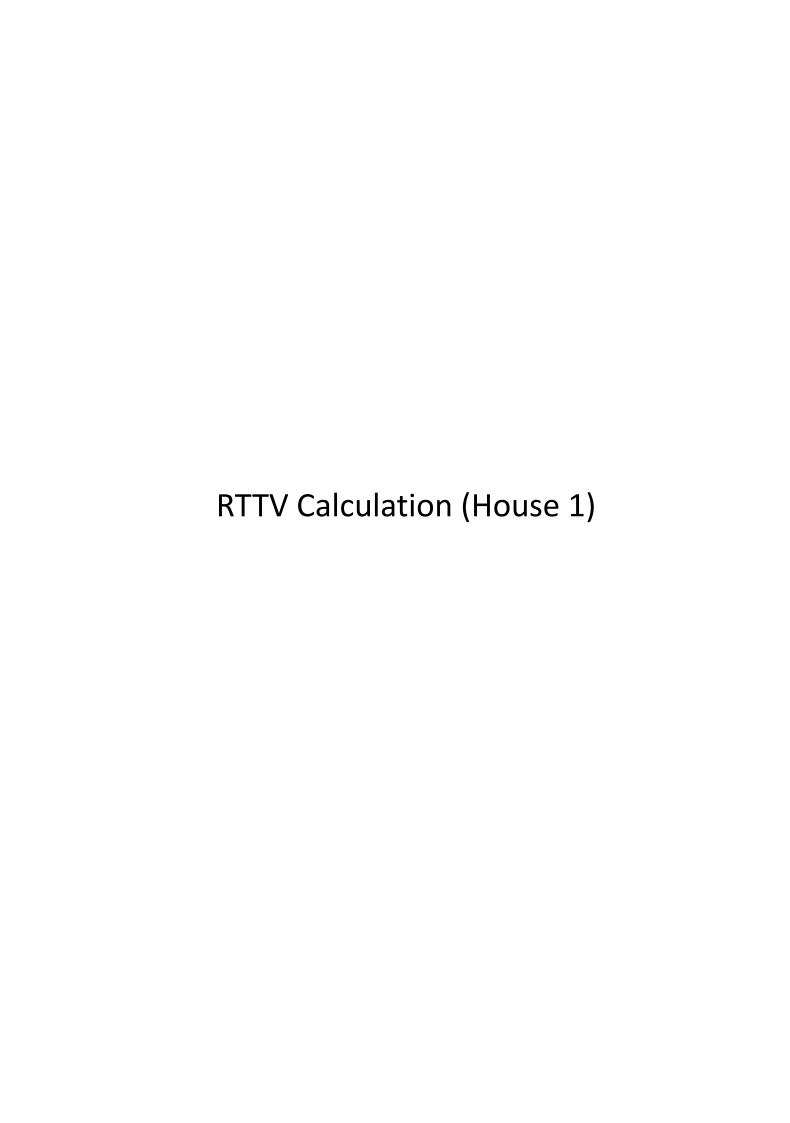
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Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                     Sheet no. 1
                                                                              Storey heights (Residential Units):
                                                                              G/F
                                                                                                                   4.20 m
                                                                                                                                1 storey)
                                                                              1/F
                                                                                                                   3.60 m
                                                                                                                              ( 1 storey)
                                                                              R/F
                                                                                                                   1.90 m
                                                                                                                              ( 1 storey)
West Elevations (House 1) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                                             )x 4.20 x 1 = 8.34 x 4.20 x 1 =
                                                                                                                  35.02 m<sup>2</sup>
1/F
                                                             )x 3.60 x 1 =
                                1.52 + 8.01
                                                                                 9.53 \times 3.60 \times 1 =
                                                                                                                  34.32 m<sup>2</sup>
R/F
                                                             )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                   0.00 \text{ m}^2
                                                                                                                  Gross Wall Areas
                                                                                                                                        69.33 m<sup>2</sup>
North Elevations (House 1) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                2.35
                                                             )x 4.20 x 1 = 2.35 x 4.20 x 1 =
                                                                                                                   9.87 m<sup>2</sup>
1/F
                                6.12 + 1.73
                                                             )x 3.60 \times 1 = 7.85 \times 3.60 \times 1 =
                                                                                                                  28.26 m<sup>2</sup>
                                                             )x 1.90 x 1 =
                                                                                 0.00 \times 1.90 \times 1 =
R/F
                                                                                                                   0.00 m<sup>2</sup>
                                                                                                                  Gross Wall Areas
                                                                                                                                        38.13 m<sup>2</sup>
East Elevations (House 1) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                                                                 2.32 x 4.20 x 1 =
G/F
                                2.32
                                                             )x 4.20 x 1 =
                                                                                                                   9.74 m<sup>2</sup>
1/F
                                2.42 + 4.50
                                                             )x 3.60 x 1 =
                                                                                 6.92 \times 3.60 \times 1 =
                                                                                                                  24.93 m<sup>2</sup>
R/F
                                                             )x 1.90 x 1 =
                                                                                 0.00 \times 1.90 \times 1 =
                                                                                                                   0.00 \, \text{m}^2
                                                                                                                  Gross Wall Areas
                                                                                                                                        34.67 m<sup>2</sup>
South Elevations (House 1) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                                             )x 4.20 x 1 = 4.43 x 4.20 x 1 =
                             (3.53 + 0.90)
                                                                                                                  18.61 m<sup>2</sup>
1/F
                                8.22
                                                             )x 3.60 x 1 =
                                                                                 8.22 \times 3.60 \times 1 =
                                                                                                                  29.59 m<sup>2</sup>
R/F
                                                             )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                   0.00 m<sup>2</sup>
                                                                                                                  Gross Wall Areas
                                                                                                                                        48.20 m<sup>2</sup>
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Total Gross Wall Areas 190.33 m²

Total Glazing Area (Window + Balcony) Calculation		Sheet no. 2
	Glazing heights (Residential Units)	:
		5 m (1 storey)
	1/F (Window GL02) - B = 2.6	4 m (1 storey)
West Elevations (House 1) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. o	of Storevs	
G/F (Window GL02) - A (8.10) x 3.05 x 1	•	66 m²
1/F (Window GL02) - B (8.01 + +)x 2.85 x 1		83 m ²
	Gross	Glazing Areas 47.49 m ²
North Elevations (House 1) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. o	of Storeys	
Troiting Eloration (Floured Ty Close Citating Floure Total Long at Citating Floure Troiting Troiting Floure Troiting	5.6.5,5	
	Gross	Glazing Areas 0.00 m ²
East Elevations (House 1) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. o	of Storeys	
G/F (Window GL02) - A ()x 3.05 x 1	= 0.00 x 3.05 x 1 $=$ 0.0	00 m²
1/F (Window GL02) - B (0.80 + 0.85 + 2.85)x 2.64 x 1	= 4.50 x 2.64 x 1 $=$ 11.8	86 m²
	Gross	Glazing Areas 11.86 m ²
South Elevations (House 1) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. o	of Storeys	
	•	
G/F (Window GL02) - A (3.53) x 3.05 x 1	= 3.53 x 3.05 x 1 $=$ 10.7	75 m²
G/F (Window GL02) - A (3.53)x 3.05 x 1 1/F (Window GL02) - B ()x 2.64 x 1		75 m² 00 m²

Gross Glazing Areas 10.75 m²

Total Gross Glazing Areas 70.10 m²

West Elevations (House 1)

Gross Wall Areas 69.33 m² (Opaque Walls + Glazing Areas) (Ao) at West Elevations (House 1) West Elevations (House 1) 47.49 m² Glazing Areas at **Breakdown of Glazing Areas Glazing Areas** Unshaded (**W-F1**) = 27.15 m² ECS = 1.000 **Glazing Areas** Shaded by Cover of Balcony (W-F2) = 10.90 m² Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.58 x 3.05 10.90 m² G/F

OPF 1.50 / 3.50 = 0.43 **ECS** =

Opaque Wall Areas at West Elevations (House 1) = 21.84 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (W-W1) = 21.84 m²

Window to Wall Ratio (WWF = 47.49 / 69.33 = **0.68**

Sheet no.

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 1)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (Refer \ to \ Table \ 5)$		
Stone cladding	90.0%	0.9		
Wall Tiles	10.0%	0.8		

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$ where

Surface film resistance of internal surface (Refer to **Table 2**)

Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

W-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

 $Uw1 = \frac{1}{0.293}$ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	4	BD Ref No.	BD 2/9179/15
Building Address Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 1)			
	•		
Facade Orientation Facing	West	Gross Wall Area (Ao) =	69.33
Window to Wall Ratio (WWR)	0.68	Wall Orientation Factor (Gw) =	1.131

Components / Details		Code No.			
Description	Units	W-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material					
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	21.84			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	3.87			

Heat Conduction through Opaque Walls	=	3.57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, n
	=	3.87	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing					
Components / Details	Code No.				
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	27.15	10.90	9.44	
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.49	0.20	0.17	

Heat Conduction through Glazing	= 0.64	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n
	=	0.86	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details	Code No.	Code No.				
Description	Units	W-F1	W-F2	W-F3		
Glazing Type		Tinted	Tinted	Tinted		
Thickness	m	0.01	0.01	0.01		
Glazing Area (Afi)	m²	27.15	10.90	9.44		
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43		
Visible Light Transmittance (VLT)	%	53	53	53		
External Reflectance (ER)	%	17	17	17		
External Shading Miltiplier (ESC)		1.00	0.76	0.71		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	7.95	2.41	1.97		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 12.34 W/m^2

Summary of RTTV at West Elevations (House 1)

North Elevations (House 1)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 1)

Glazing Areas at North Elevations (House 1) = 0.00 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 0.00 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 1) = 38.13 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(N-W1) = 38.13 m²

Window to Wall Ratio (WWR) = 0.00 / 38.13 = 0.00

Sheet no. 5

(Refer to Table 9)

Wall Orientation Factor Gw = 0.79

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 1)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (Refer \ to \ Table \ 5)$	
Stone cladding	90.0%	0.9	
Wall Tiles	10.0%	0.8	

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

Uw1 = ____1 = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTVwall of Each Facade

Sheet No.	6	BD Ref No. B	D 2/9179/15		
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 1)				
	•				
Facade Orientation Facing	North	Gross Wall Area (Ao) =	38.13		
Window to Wall Ratio (WWR)	0.00	Wall Orientation Factor (Gw) =	0.79		

Components / Details		Code No.			
Description	Units	N-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.90			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.03			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material					
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	38.13			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.67			

Heat Conduction through Opaque Walls	=	3.57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, n
	=	8.67	W/m²	

Components / Details		Code No.		
Description	Units	N-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	0.00		
U-value of Glazing (Ufi)	W/m²K	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.00		

Heat Conduction through Glazing	=	0.64 (Afi/Ao) U	Jfi Gw	where i= 1, 2,, n
	=	0.00	W/m²	

Part 3 - Calculation of Solar Radiation th	rough Glazing			
Components / Details		Code No.		
Description	Units	N-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	0.00		
Shading Coefficient of Glazing (SCf)		0.43		
Visible Light Transmittance (VLT)	%	53		
External Reflectance (ER)	%	17		
External Shading Miltiplier (ESC)		1.00		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	0.00		

Solar Radiation through Glazing	= 41.7	75 (Afi/Ao)(SCfi)(ESCwi)Gw	where i= 1, 2,, r	n	
	=	0.00	W/m²			
Summary of RTTV	at Nor	th Elevation	ons (House 1)			
	=	8.67	+	0.00	+	0.00
	=	8.67	W/m²			

East Elevations (House 1)

Gross Wall Areas
(Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 1)

Glazing Areas at East Elevations (House 1) = 11.86 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 11.86 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 1) = 22.81 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (E-W1) = 22.81 m²

Window to Wall Ratio (WWF = 11.86 / 34.67 = 0.34

Sheet no. 7

Wall Orientation Factor

w = 1.072

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 1)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (Refer \ to \ Table \ 5)$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
_		

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to Table 2)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

E-W1 Description: RC Wall Areas

vvali ivlateriai					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total				,	0.293

 $Uw1 = \frac{1}{0.000} = 3.42 \text{ W/m}^2\text{K}$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	8	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
	•		
Facade Orientation Facing	East	Gross Wall Area (Ao) =	34.67
Window to Wall Ratio (WWR)	0.34	Wall Orientation Factor (Gw) =	1.072

Components / Details		Code No.				
Description	Units	E-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	22.81				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	7.66				

Heat Conduction through Opaque Walls	=	3.57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, r
	=	7.66	W/m²	

Components / Details	•	Code No.	·
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	11.86	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.41	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw			where i= 1, 2,, n
	=	0.41	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details		Code No.				
Description	Units	E-F1				
Glazing Type		Tinted				
Thickness	m	0.01				
Glazing Area (Afi)	m²	11.86				
Shading Coefficient of Glazing (SCf)		0.43				
Visible Light Transmittance (VLT)	%	53				
External Reflectance (ER)	%	17				
External Shading Miltiplier (ESC)		1.00				
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	6.58				

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 6.58 W/m^2

Summary of RTTV at East Elevations (House 1)

South Elevations (House 1)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 1) = 48.20 m²

Glazing Areas at South Elevations (House 1) = 10.75 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 10.75 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 1) = 37.45 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (S-W1) = 37.45 m²

Window to Wall Ratio (WWR) = 10.75 / 48.20 = 0.22

Sheet no. 9

Wall Orientation Factor Gw = 0.975 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 1)

External Wall Material (Colour/Finish)	% of wall area	α Absorptivity (Refer to Table 5)
Stone cladding	98.0%	0.9
AGT Tiles	2.0%	0.8

Average Absorptivity = 0.898

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

S-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

 $Uw1 = \frac{1}{0.293}$ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	10	BD Ref No. I	BD 2/9179/15		
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 1)				
Facade Orientation Facing	South	Gross Wall Area (Ao) =	48.20		
Window to Wall Ratio (WWR)	0.22	Wall Orientation Factor (Gw) =	0.975		

Components / Details			Code No.	
Description	tion Units S-W1		S-W2	
External Finish Material		30mm Stone cladding	10mm AGT Tile	
Conductivity	W/mK	2.90	1.10	
Thickness	m	0.030	0.010	
Average Absorptivity (awi)	(a)	0.90	0.80	
Intermediate component		12mm cement/ sand render	12mm cement/ sand render	
Conductivity	W/mK	0.72	0.72	
Thickness	m	0.012	0.012	
Intermediate component		200mm concrete wall	200mm concrete wall	
Conductivity	W/mK	2.16	2.16	
Thickness	m	0.20	0.20	
Intermediate component				
Conductivity				
Thickness				
Intermediate component				
Conductivity				
Thickness				
Internal Finish Material				
Conductivity	W/mK	1.10	1.10	
Thickness	m	0.010	0.010	
U-value of Opaque Area (Uwi)	W/m²K	3.42	3.42	
Opaque Wall Area (Awi)	m²	37.08	0.37	
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.22	0.07	

Heat Conduction through Opaque Walls =	nduction through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw					
=	8.29	W/m²				

Components / Details		Code No.	
Description	Units	S-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	10.75	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.24	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.24 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details		Code No.				
Description	Units	S-F1				
Glazing Type		Tinted				
Thickness	m	0.01				
Glazing Area (Afi)	m²	10.75				
Shading Coefficient of Glazing (SCf)		0.43				
Visible Light Transmittance (VLT)	%	53				
External Reflectance (ER)	%	17				
External Shading Miltiplier (ESC)		1.00				
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	3.90				

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n

= 3.90 W/m²

Summary of RTTV at South Elevations (House 1)

= 8.29 + 0.24 +

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

 Sheet No.
 11
 BD Ref No.
 BD 2/9179/15

 Building Address
 Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 1)

Overall Gross Wall Area [a] 190.33 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	69.33	3.87	0.86	12.34	17.07	6.22
North	38.13	8.67	0.00	0.00	8.67	1.74
East	34.67	7.66	0.41	6.58	14.65	2.67
South	48.20	8.29	0.24	3.90	12.43	3.15
				·		

Overall RTTVwall = 13.77 W/m²

< 14 W/m²

OK

Roof							Sheet no.
Gross Roof Areas (Opaque Walls + Skyligh	nt Areas) (Aro) at	Roof	= 194.65 m ²	Roof Orientation Factor	Gs = 2.16	1	(Refer to Tabl
Skylight Areas at	Roof		= 0.00 m ²	Average Absorptivity (α) of the External Opaq	ue Wall at Roof		
Breakdown of Skylight A	<u>Areas</u>			External Roof Material (Colour/Finish)	% of roof area	α Absorpti (Refer to Tal	
Skylight Areas	Unshaded	(S1)	= 0.00 m ²	Unglazed Porcelain Tiles (Grey) AGT Tile (Brown)	81% 9%	0.9	
					10%	0.6	
				Concrete (Jacuzzi)	Average Absorptivity		
				'U' value of Opaque Roof Areas $U=1/(Ri+x_1/k_1+x_5/k_5++x_6/k_n+Ra+Ro)$	Ro Surface f Ra Air space x Thicknes	film resistance of internal su film resistance of external si resistance (Refer to Table so of building materials conductivity of building mate	surface (Refer to Ta
				R1	Description: Roof A	ırea	
				Roof Material External surface film resistance Air space resistanace 25mm Unglazed Porcelain Tiles (Grey) 50mm cement/ sand screed	0.025 / 1.1 0.05 / 0.72		0.055 0 0.023 0.069
OpaqueAreas at	Roof		= 194.65 m ²	50mm expanded polystyrene 150mm concrete slab	0.05 / 0.034 0.15 / 2.16	=	1.471 0.069
Breakdown of Opaque R	Roof Areas	(R1)	= 180.00 m ²	Internal surface film resistance		Ri =	0.162
/F Roof		· =	m² 115.30 m²	Tot		N.	1.849
Jpper Roof			64.70 m ²	100	Uw1 = 1 1 849	=	0.54 W
Breakdown of Opaque R	Roof Areas			<u>R2</u>	Description: Roof A	ırea	
C Roof Areas		(R2)	= 6.75 m ²	Roof Material			
/F		=	m²	External surface film resistance	Ro		0.055
oof pper Roof		= =	6.75 m ² m ²	Air space resistanace	R	la =	0
				50mm cement/ sand screed	0.05 / 0.72	=	0.069
				50mm expanded polystyrene	0.05 / 0.034	=	1.471
Breakdown of Opaque R	Roof Areas			150mm concrete slab	0.15 / 2.16	=	0.069
C Roof Areas		(R3)	= 7.90 m ²	10mm AGT Tile (Brown)	0.01 / 1.1	=	0.009
/F		` =	m²	Internal surface film resistance	F	Ri =	0.162
Roof Jpper Roof		= =	7.90 m ² m ²	Tot	al		1.836
• •					Uw1 = 1	_ =	0.54 W

Description:		Roof Area			
		Ro	=	0.055	
		Ra	=	0	
0.05	1	0.72	=	0.069	
0.15	/	2.16	=	0.069	
		Ri	=	0.162	
			0.15 / 2.16	0.15 / 2.16 =	0.15 / 2.16 = 0.069

Uw1 = 1 0.356 2.81 W/m²K

0.356

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. BD 2/9179/15	
Building Address	Lot 2115, D.D. 105, I	Ngau Tam Mei, Yuen Long (House 1)	
Roof Orientation Facing	Flat	Gross Roof Area (Aro) = 194.65	
Skylight to Roof Ratio (SRR) =	<u> </u>	Roof Orientation Factor (Gs) = 2.16	

Components / Details			Code No.			
Description	Units	R1	R2	R3		
External Finish Material		25mm Unglazed Porcelain Tiles (Grey)	10mm AGT Tile (Brown)	Concrete (Jacuzzi		
Conductivity	W/mK	1.10	1.10	2.16		
Thickness	m	0.025	0.010	0.150		
Average Absorptivity	(a)	0.9	0.8	0.7		
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed	50mm cement/ sand scree		
Conductivity	W/mK	0.72	0.72	0.72		
Thickness	m	0.050	0.050	0.050		
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene	50mm expanded polystyrer		
Conductivity	W/mK	0.034	0.034	0.034		
Thickness	m	0.05	0.05	0.05		
Intermediate component		150mm concrete slab	150mm concrete slab	150mm concrete sla		
Conductivity	W/mK	2.16	2.16	2.16		
Thickness	m	0.15	0.15	0.15		
Intermediate component						
Conductivity	W/mK					
Thickness	m					
Internal Finish Material						
Conductivity	W/mK	0.38	0.38	0.38		
Thickness	m	0.01	0.01	0.01		
U-value of the Roof (Uri)	W/m²K	0.53	0.53	0.53		
Opaque Roof Area (Ari)	m²	180.00	6.75	7.90		
Heat Conduction = 3.47(Ari/A	Aro) Uri ari Gs	2.93	0.11	0.75		

Heat Conduction	on throu	ıgh Opaque Ro	oof =	3.47(A	ıri/Aro) U	ri ari	Gs	where i= 1,	2,, n
			=		3.79		W/m²		

Part 2 - Calculation of Heat Conduction t	Part 2 - Calculation of Heat Conduction through Skylight									
Components / Details			Code No.							
Description	Units	S 1								
Skylight Glazing Type		-								
Thickness	m	-								
Skylight Area (Asi)	m²	0.00								
U-value of Skylight Glazing (Usi)	W/m²K	-								
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00								

Heat Conduction through Skylight	t = 0.40	(Asi/Aro)	Usi Gs	where i= 1, 2,, n
	=	0.00	W/m²	

Part 3 - Calculation of Solar Radiation three	Part 3 - Calculation of Solar Radiation through Skylight										
Components / Details											
Description	Units	S 1									
Skylight Glazing Type		-									
Thickness	m	-									
Skylight Area (Asi)	m²	0.00									
Shading Coefficient of Skylight Glazing (SCr)	-									
Visible Light Transmittance (VLT)		-									
External Reflectance (ER)		-									
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00									

Solar Radiation through	Skylight	= 41.10 (Asi/A	Aro) (SCri) Gs	where i= 1, 2,	, n
		= 0.00	W/m²		
Summary of RTTV at R	oof				
=	3.79	+	0.00	+	0.00
=_	3.79	W/m²			

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 1)	

Overall Roof Area [a] 194.65 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	194.65	3.79	0.00	0.00	3.79	3.79

Overall RTTVroof = 3.79 W/m² < 4 W/m² OK

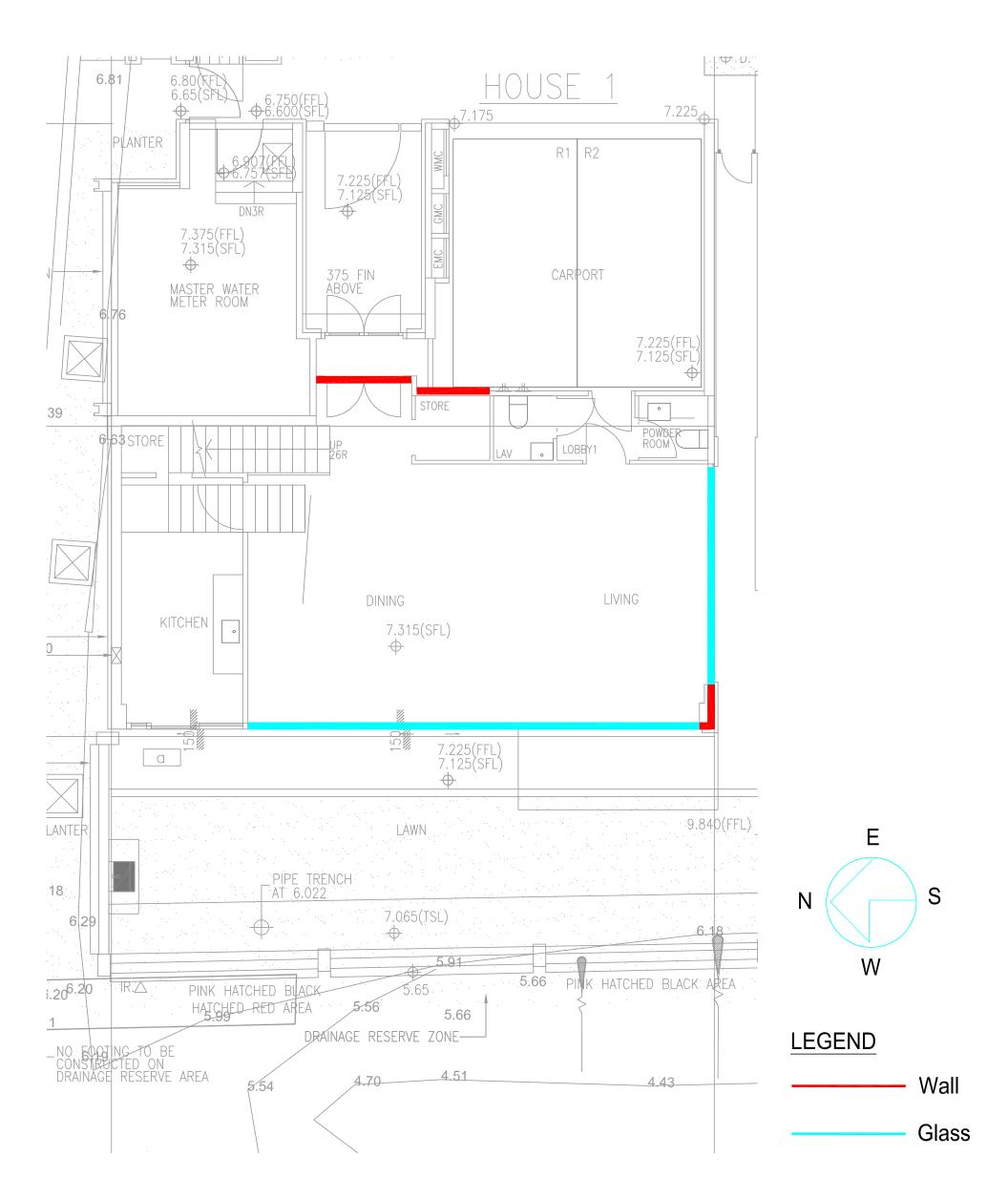
BD Ref. No.

RTTV Summary Sheet

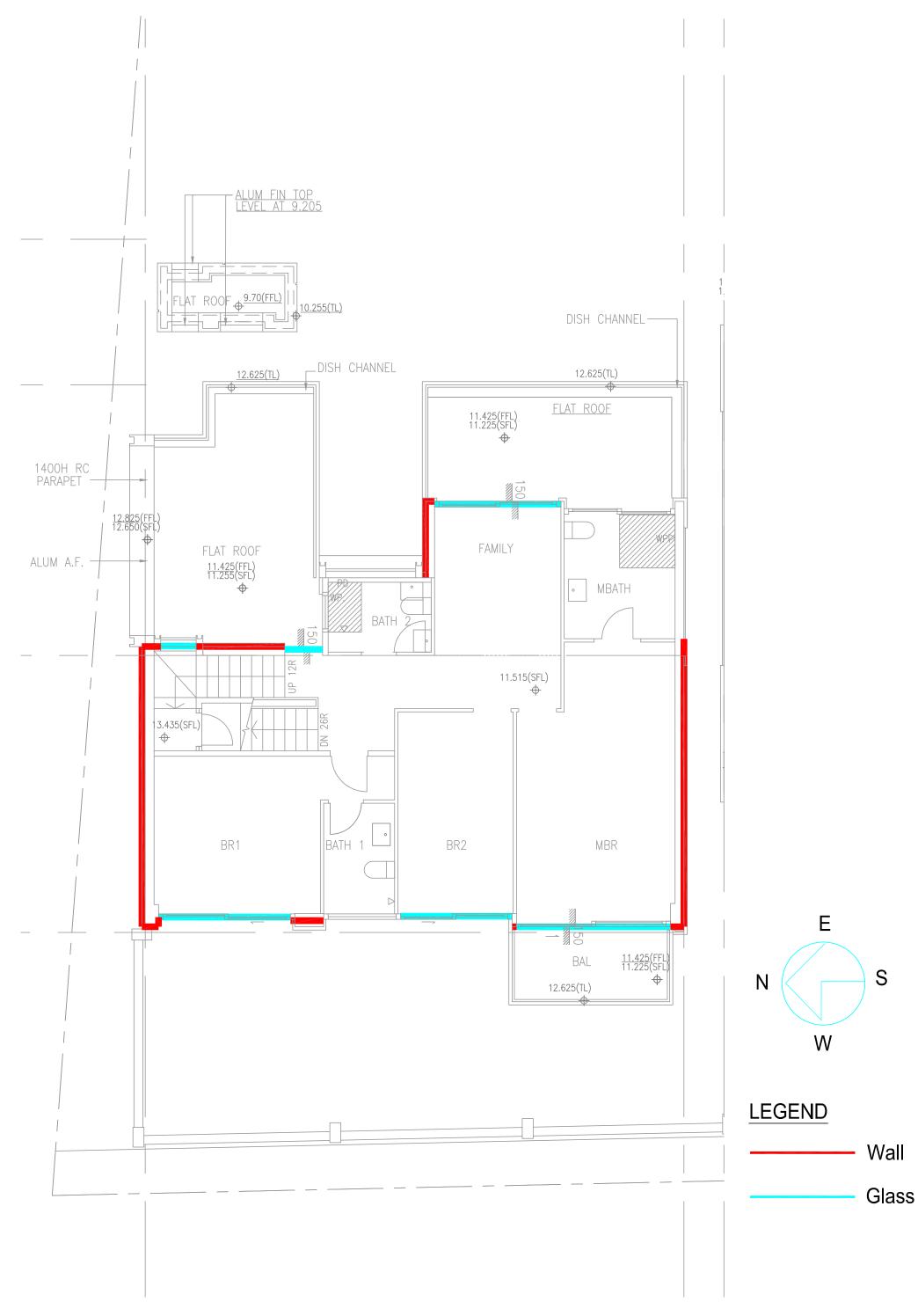
																								BE	2/9179/15	
Building Type	:	Resident	ial																							
RTTV Calcula	ited by:	/ 1.	Registered I	Professiona		Thomas Anderson	a & Partners	Consulting	Engineers	Ltd.																
		<u> </u>	Architect																							
			Others, plea	ase specify:-																						
No. of Storeys		2	,																							
(Residential U	nits)																									
Table 1									Deer	ned to Sati	efy RTTV															
Facade Orienta	tion Facing		West			North		East			South	Wall	l													
Average Absor			0.795		+	0.795		0.795 0.795																		
	ow to Wall Ratio		0.62		_	0.00	0.40 0.46																+			
	icient of Glazing		0.43		_	0.00	0.40				0.43													_		
	ng Coefficient of		0.43					0.43			0.43													_		
Facade	ing Coefficient of		0.43					0.43			0.43															
Visable Light	Γransmittance		53	%		%		53	%	5	3	%				%			%				%			%
External Refle	ctance		17	%		%		17	%	1	7 '	%				%			%				%			%
Table 2																										
										RTTV	Wall															
Facade Orienta		West					North						East							South						
Wall Orientation				1.13					0.79						1	1.072							0.97			
Total External (Residential U			78.0	n	n ² Win	ndow to Wall Ratio		23.2	m ²	Window t	o Wall Rati	io		25.0		m ²	Windov	w to W	all Ratio		5	50.2	r	n ² Wi	ndow to Wall	Ratio
Total Window	Area		48.30	n	n ² =	0.62		0.00	m ²	=	0.00			10.09		m ²	=		0.04		2	23.19	r	n ² =	0.4	16
Heat	Opaque Wall		3.	87	=	W/m ²		8.67	7	W	/m ²			7.	66	-		W/m ²				8.29)	-	W/m^2	
Conduction	Window		0.	86		W/m ²		0.00)	W	/m ²			0.	41			W/m ²				0.41			W/m ²	
Window	Glass Type	D 4	Area =	SC		VLT = %		Area =	SC	VĽ	[= °	%		Area =		SC	,	VLT =	%			Area =	SC		VLT =	%
			m ²	=		ER = %	Reflective	m ²	=	ER	= '	%	Reflective	m ²		=	1	ER =	%	Reflec	tive 1	m ²	=		ER =	%
		Z Tinte	ed Area =	48.3 SC	0.4	13 VLT = 53 %	☐ Tinted	Area =	SC	VL	r = -	%	Z Tinted	Area =	14.23	SC	0.43	VLT =	53 %	Z Ti	nted	Area =	13.09 SC	0.	43 VLT =	53 %
			m ²	=		ER = 17 %		m ²	=	ER	= ′	%		m ²		=	1	ER =	17 %	7	2	m ²	=		ER =	17 %
		Clean	r Area =	SC		VLT = %	☐ Clear	Area =	SC	VL	r =	%	Clear	Area =		SC	,	VLT =	%	☐ Cl	ear	Area =	SC	2	VLT =	%
			m ²	=		ER = %		m ²	=	ER	= '	%		m ²		=	1	ER =	%	7	,	m ²	=		ER =	%
	Double Glazing	Z Yes		☐ No			☐ Yes ☐ No				✓ Yes					Z Y	s		No		<u> </u>					
	External	Overhan	- 101 1/		N.		Overhang Yes No				Overhang Yes No				Ol-	Overhang Yes No			l NI-							
	Shading				No								_	_												
C. I. D. I'.	_	Sidefin	☐ Yes		No	2	Sidefin	Yes	1				Sidefin	Yes		Z N	0	2		Sidefii	1	Yes] No	2	
Solar Radiation Gazing	i through		12	.34		W/m ²		0.00)	W	/m ²			6.	58			W/m ²				3.90)		W/m ²	
Average Absor	ptivity			0.79	5				0.795				0.795								0.79	95				
RTTV _{Wall} at ea	nch Facade		17.	.07		W/m ²		8.67	7	W	/m ²		14.65 W/m ²					12.43 W/m ²								
Overall RTTV	Wall						•			1	3.77		W/m ²							•						
Table 3																										
										RTTV	Roof															
Roof Orientati		/	2.16	$\overline{}$																						
Total Roof Are Units)	ea (Residential	(194.65		m	2																				
						2																				
Total Skylight		-	~	$\overline{}$	m																					
Heat Conduction	Roof		3.79		W/r																					
	Skylight		-0		W/r	n-																				
	Glass Type	Refle		Area =					SC =						VLT =					%		ER =				%
		Tinte		Area =					SC =						VLT =					%		ER =				%
		Clean	r	Area =				m ² S	SC =						VLT =					%	,]	ER =				%
Skylight	Double Glazing	☐ Yes		☐ No																						
	External	☐ Yes		☐ No																						
	Shading					2																				
	n through Gazing	L/		\sim	W/r	n ⁻																				
Average Absor		<u> </u>	0.8																							
Overall RTTV	Roof	1 <i>l</i>	3.79	イ	W/r	n²																				

ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance

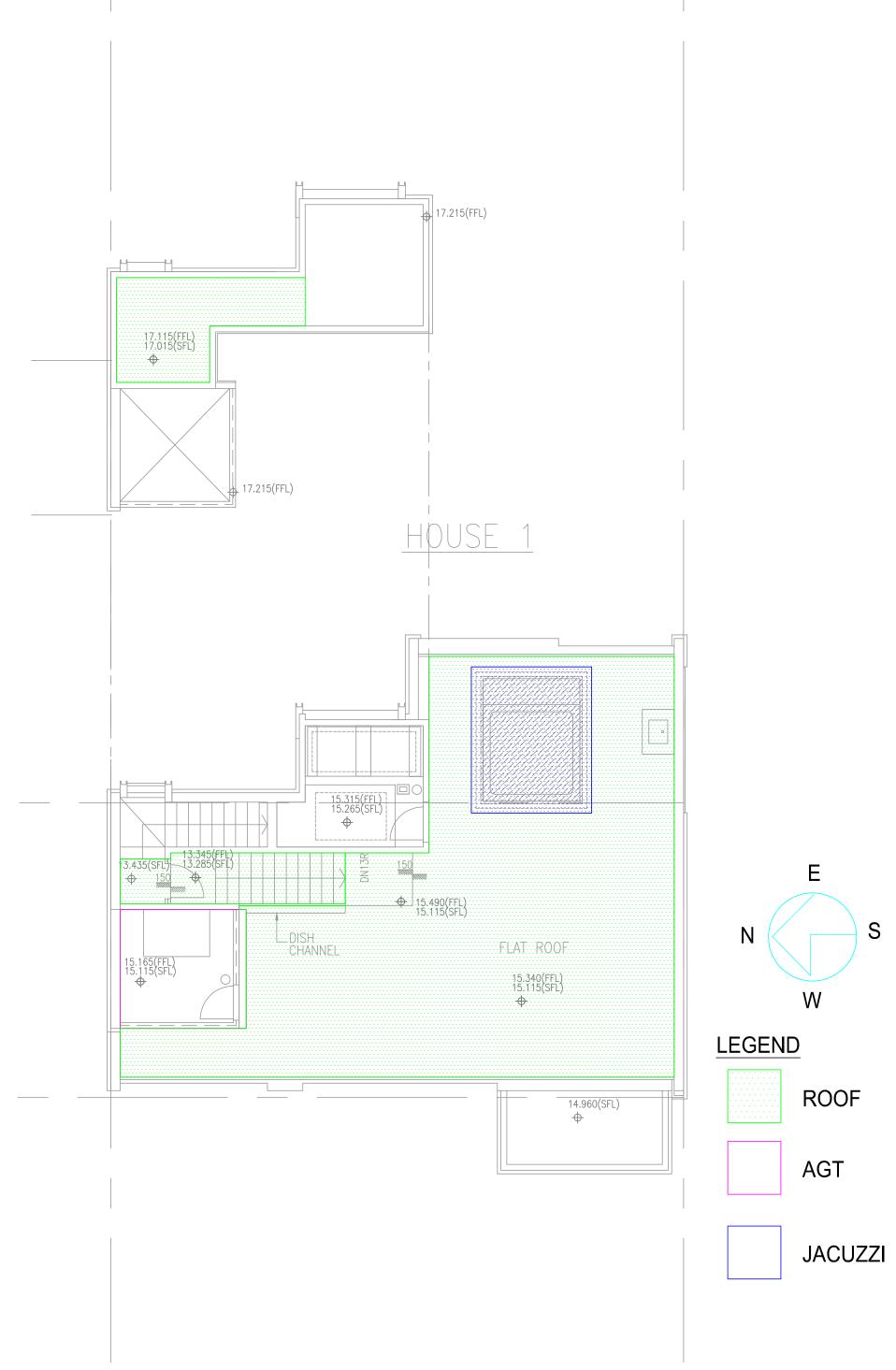
Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 1)



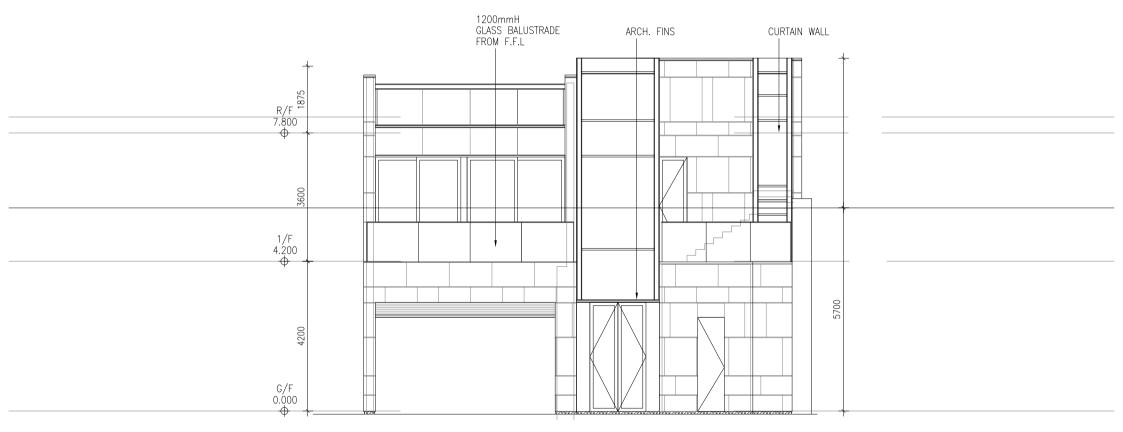
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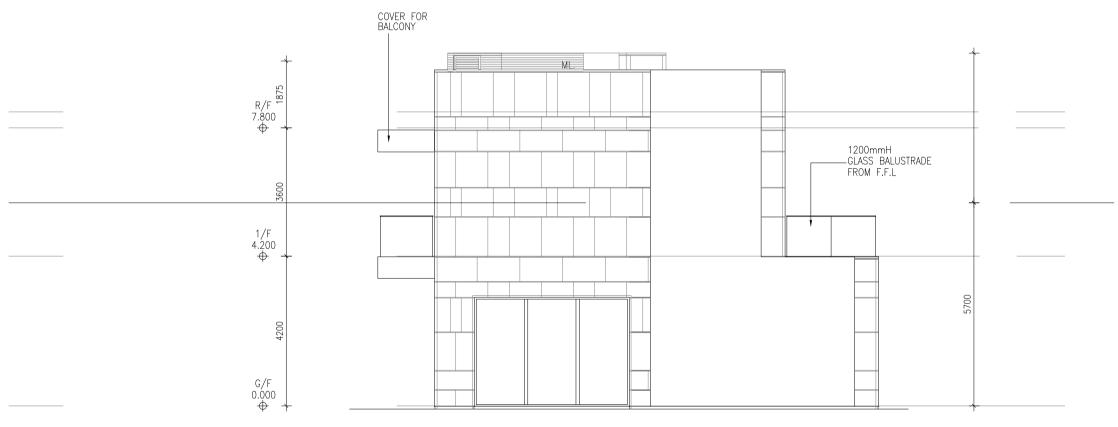
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DRAWING TITLE: HOUSE 1 ROOF FLOOR PLAN SCALE: 1:150@A4

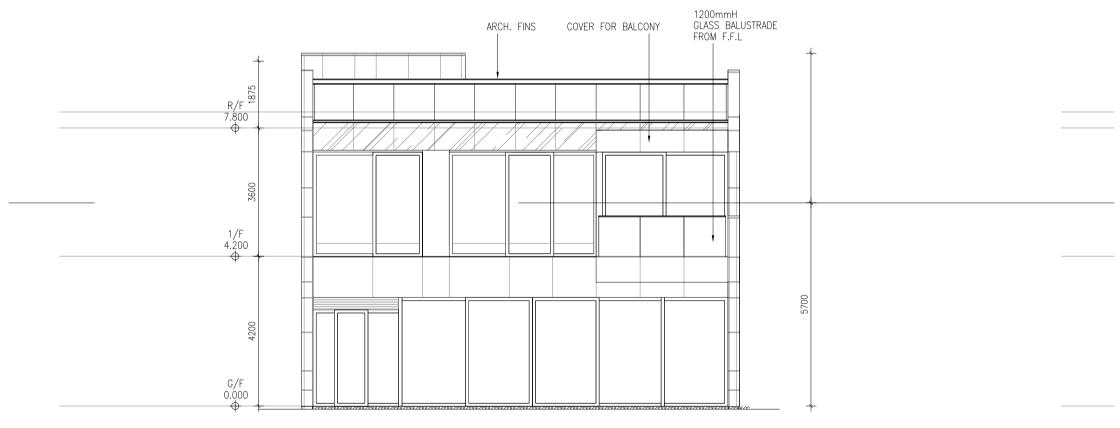


15 EAST ELEVATION 1:75
HOUSE 1



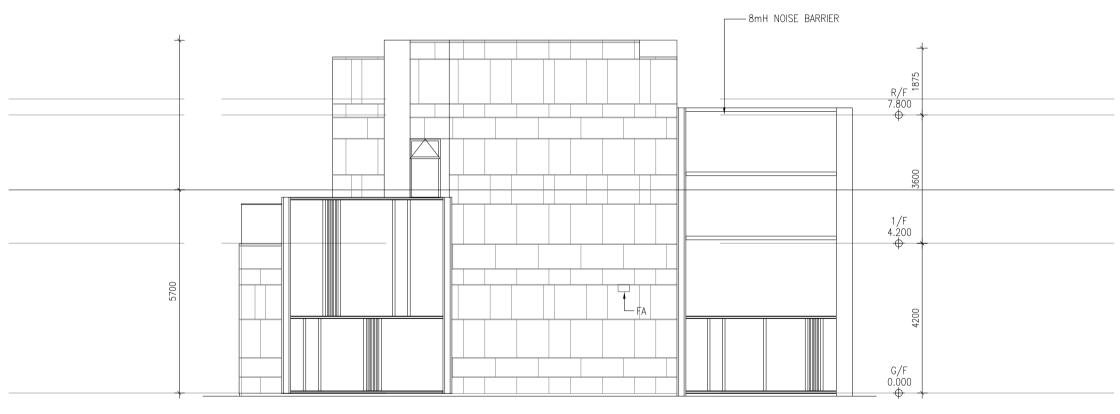
17 SOUTH ELEVATION 1:75

HOUSE 1



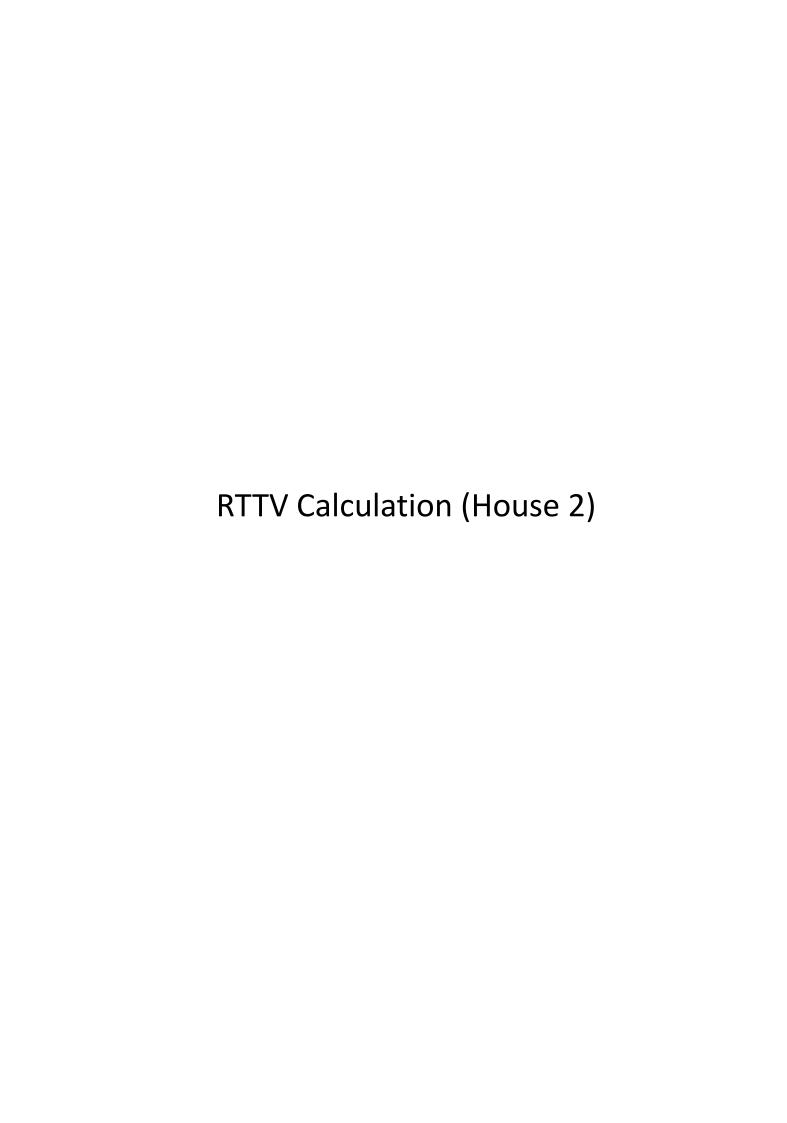
16 WEST ELEVATION 1:75

HOUSE 1



NORTH ELEVATION 1:75

HOUSE 1



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Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                                     Sheet no. 1
                                                                                              Storey heights (Residential Units):
                                                                                              G/F
                                                                                                                                   4.20 m
                                                                                                                                                1 storey)
                                                                                              1/F
                                                                                                                                   3.60 m
                                                                                                                                              ( 1 storey)
                                                                                              R/F
                                                                                                                                   1.90 m
                                                                                                                                              ( 1 storey)
West Elevations (House 2)
                                Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                 3.13 + ####
                                                                              )x 4.20 x 1 = 14.83 x 4.20 x 1 =
                                                                                                                                  62.29 m<sup>2</sup>
1/F
                                 4.90 + 0.64
                                                                              )x 3.60 x 1 =
                                                                                                 5.54 x
                                                                                                            3.60 \times 1 =
                                                                                                                                  19.94 m<sup>2</sup>
R/F
                                                                              )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                   0.00 m<sup>2</sup>
                                                                                                                                  Gross Wall Areas
                                                                                                                                                        82.23 m<sup>2</sup>
North Elevations (House 2) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                 0.59 + 0.35 + 5.57
                                                                              )x 4.20 x 1 = 6.51 x 4.20 x 1 =
                                                                                                                                  27.34 m<sup>2</sup>
1/F
                                 6.50 + 1.40
                                                                              )x 3.60 x 1 = 7.90 x 3.60 x 1 =
                                                                                                                                  28.44 m<sup>2</sup>
R/F
                                                                              )x 1.90 x 1 =
                                                                                                 0.00 \times 1.90 \times 1 =
                                                                                                                                   0.00 m<sup>2</sup>
                                                                                                                                  Gross Wall Areas
                                                                                                                                                        55.78 m<sup>2</sup>
East Elevations (House 2)
                                Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                 5.40 + 0.50 + 2.00
G/F
                                                                              )x 4.20 x 1 =
                                                                                               7.90 x 4.20 x 1
                                                                                                                                  33.18 m<sup>2</sup>
                                                                                                 6.30 \times 3.60 \times 1 =
1/F
                                 5.50 + 0.80
                                                                              )x 3.60 x 1 =
                                                                                                                                  22.68 m<sup>2</sup>
R/F
                                                                              )x 1.90 x 1 =
                                                                                                 0.00 \times 1.90 \times 1 =
                                                                                                                                   0.00 \, \text{m}^2
                                                                                                                                  Gross Wall Areas
                                                                                                                                                        55.86 m<sup>2</sup>
South Elevations (House 2) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                               (7.88 + 4.07)
                                                                              )x 4.20 x 1 = 11.95 x
                                                                                                            4.20 \times 1 =
                                                                                                                                  50.19 m<sup>2</sup>
1/F
                                 8.50
                                                                              )x 3.60 x 1 =
                                                                                                 8.50 \times 3.60 \times 1 =
                                                                                                                                  30.60\ m^2
R/F
                                                                              )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                   0.00 m<sup>2</sup>
                                                                                                                                  Gross Wall Areas
                                                                                                                                                        80.79 m<sup>2</sup>
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Total Gross Wall Areas 274.66 m²

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Total Glazing Area (Window + Balcony) Calculation
                                                                                                                                                                                    Sheet no. 2
                                                                                                                          Glazing heights (Residential Units):
                                                                                                                          G/F (Window GL02) - A
                                                                                                                                                                 3.05 m
                                                                                                                                                                                   storey)
                                                                                                                          G/F (Window GL02) - B
                                                                                                                                                        =
                                                                                                                                                                 3.15 m
                                                                                                                                                                                   storey)
                                                                                                                          1/F (Window GL02) - C
                                                                                                                                                        =
                                                                                                                                                                 2.66 m
                                                                                                                                                                                   storey)
                                                                                                                          1/F (Window GL02) - D
                                                                                                                                                                 2.74 m
                                                                                                                                                                               1
                                                                                                                                                                                   storey)
West Elevations (House 2)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                                                                                         )x 3.05 x 1 =
                                                                                                                             8.30 x
                                                                                                                                         3.05 \times 1 =
                                                                                                                                                                25.27 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                         )x 3.15 x 1 =
                                                                                                                             0.00 x
                                                                                                                                         3.15 \times 1 =
                                                                                                                                                                 0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                    4.90
                                                                                                         )x 2.66 x 1 =
                                                                                                                             4.90 x
                                                                                                                                         2.66 \times 1 =
                                                                                                                                                                13.01 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                         )x 2.74 x 1 =
                                                                                                                            0.00 \times 2.74 \times 1 =
                                                                                                                                                                 0.00 m<sup>2</sup>
                                                                                                                                                             Gross Glazing Areas
                                                                                                                                                                                       38.28 m<sup>2</sup>
North Elevations (House 2)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                    0.59 +
                                                                                                         )x 3.05 x 1 =
                                                                                                                             0.59 x
                                                                                                                                         3.05 \times 1 =
                                                                                                                                                                  1.80 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                         )x 3.15 x 1 =
                                                                                                                             0.00 x
                                                                                                                                         3.15 x 1 =
                                                                                                                                                                 0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                                                                                         )x 2.66 x 1 =
                                                                                                                             0.00 x
                                                                                                                                         2.66 \times 1 =
                                                                                                                                                                 0.00 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                                             0.00 \times 2.74 \times 1 =
                                                                                                                                                                 0.00 m<sup>2</sup>
                                                                                                         )x 2.74 x 1 =
                                                                                                                                                             Gross Glazing Areas
                                                                                                                                                                                        1.80 m<sup>2</sup>
East Elevations (House 2)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                                                                                         )x 3.05 x 1 =
                                                                                                                             0.00 x
                                                                                                                                         3.05 \times 1 =
                                                                                                                                                                 0.00 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                             0.00 x
                                                                                                                                         3.15 x 1 =
                                                                                                                                                                 0.00 m<sup>2</sup>
                                                                                                         )x 3.15 x 1 =
G/F (Window GL02)
                                                                                                         )x 2.66 x 1 =
                                                                                                                             0.00 x
                                                                                                                                         2.66 \times 1 =
                                                                                                                                                                 0.00 m<sup>2</sup>
1/F (Window GL02)
                                                                                                         )x 2.64 x 1 =
                                                                                                                             5.25 x
                                                                                                                                         2.64 \times 1 =
                                                                                                                                                                13.86 m<sup>2</sup>
                                    3.10 + 2.15 + 0.50
                                                                                                                                                             Gross Glazing Areas
                                                                                                                                                                                       13.86 m<sup>2</sup>
South Elevations (House 2)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storevs
G/F (Window GL02) - A
                                    2.63 + 4.25
                                                                                                         )x 3.05 x 1 =
                                                                                                                             6.88 x
                                                                                                                                         3.05 \times 1 =
                                                                                                                                                                20.95 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                             0.00 x
                                                                                                                                         3.15 \times 1 =
                                                                                                                                                                 0.00 m<sup>2</sup>
                                                                                                         )x 3.15 x 1 =
1/F (Window GL02) - C
                                                                                                         )x 2.66 x 1 =
                                                                                                                             0.00 x
                                                                                                                                         2.66 \times 1 =
                                                                                                                                                                 0.00 m<sup>2</sup>
1/F (Window GL02) - D
                                    5.50 + 2.50
                                                                                                         )x 2.74 x 1 =
                                                                                                                             8.00 \times 2.74 \times 1 =
                                                                                                                                                                21.88 m<sup>2</sup>
```

Gross Glazing Areas Total Gross Glazing Areas 96.77 m²

42.83 m²

West Elevations (House 2)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	nzing Areas) (Ao) at West Elevations (House 2)	=	82.23 m²
Glazing Areas at	West Elevations (House 2)	=	38.28 m²
Breakdown of Glazin Glazing Areas	ng Areas Unshaded (W-F1) ECS =	= 1.000	16.80 m²
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.15 x 3.05 = 9.61 m²	=	9.61 m²
Glazing Areas	OPF 1.90 / 3.05 = 0.62 ECS = 0.666 Shaded by Built-Fin (Projection on Right) (W-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys	=	11.88 m²
Opaque Wall Areas	·	=	43.95 m²
Breakdown of Opaq RC Wall Areas	<u>ue Wall Areas</u> (W-W1)	=	43.95 m²

38.28

82.23

0.47

Sheet no. 3

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 2)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

W-W1	Description:			RC Wall Are	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	/	2.9	=	0.010
12mm cement/ sand render		0.012	/	0.72	=	0.017
200mm concrete wall		0.2	/	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
To	otal					0.293

3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	4	BD Ref No. BD 2/9	179/15
Building Address	Lot 2115, D.D. 105	Ngau Tam Mei, Yuen Long (House 2)	
Facade Orientation Facing	West	Gross Wall Area (Ao) =	82.23
Window to Wall Ratio (WWR)	0.47	Wall Orientation Factor (Gw) =	1.131

Components / Details		Code No.			
Description	Units	W-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	43.95			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	6.56			

Heat Conduction through Opaque Wal	ls = :	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=_	6.56	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing					
Components / Details	Code No.				
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	38.28	9.61	11.88	
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.59	0.15	0.18	

Heat Conduction through Glazing	= 0.64	(Afi/Ao) l	Jfi Gw	where i= 1, 2,, n
	=	0.92	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing							
Components / Details		Code No.	Code No.				
Description	Units	W-F1	W-F2	W-F3			
Glazing Type		Tinted	Tinted	Tinted			
Thickness	m	0.01	0.01	0.01			
Glazing Area (Afi)	m²	16.80	9.61	11.88			
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43			
Visible Light Transmittance (VLT)	%	53	53	53			
External Reflectance (ER)	%	17	17	17			
External Shading Miltiplier (ESC)		1.00	0.67	0.99			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	Cwi)Gw	4.15	1.58	2.90			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 8.63 W/m^2

Summary of RTTV at West Elevations (House 2)

= 6.56 + 0.92 + 8.63 = 16.11 W/m²

North Elevations (House 2)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 2) = 55.78 m²

Glazing Areas at North Elevations (House 2) = 1.80 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 1.80 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 2) = 53.99 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(N-W1) = 53.99 m²

Window to Wall Ratio (WWR) = 1.80 / 55.78 = 0.03

Sheet no. 5

(Refer to Table 9)

Wall Orientation Factor Gw = 0.79

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 2)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

U = $1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$ where

Ri Surface film resistance of internal surface (Refer to **Table 2**)

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)

χ Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

Uw1 = ____ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTVwall of Each Facade

Sheet No.	6	BD Ref No. I	BD 2/9179/15		
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 2)				
			_		
Facade Orientation Facing	North	Gross Wall Area (Ao) = _	55.78		
Window to Wall Ratio (WWR)	0.03	Wall Orientation Factor (Gw) =	0.79		

Components / Details		Code No.				
Description	Units	N-W1	/1			
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (αwi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	53.99				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.30				

Heat Conduction through Opaque Walls	3 =	3.57(Awi/Ao) Uwi α\	vi Gw	where i= 1, 2,, n
	=	8.30	W/m²	

Components / Details		Code No.	
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	1.80	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.03	

Heat Conduction through Glazing	=	0.64 (Afi/Ao)	Ufi Gw	where i= 1, 2,, n
	=	0.03	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details	Code No.				
Description	Units	N-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	1.80			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	0.46			

Solar Radiation through Glazing	= 41.	75 (Afi/Ao)	(SCfi)(ESCwi)Gw	where i= 1, 2,,	, n	
	=	0.46	_W/m²			
Summary of RTTV	at No	rth Elevati	ons (House 2)			
	=	8.30	+	0.03	+	0.46
	=	8.78	W/m²			

East Elevations (House 2)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 2)

Glazing Areas at East Elevations (House 2) = 13.86 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 13.86 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 2) = 42.00 m²

Breakdown of Opaque Wall Areas
RC Wall Areas

(E-W1) = 42.00 m²

Window to Wall Ratio (WWR) = 13.86 / 55.86 = 0.25

Sheet no. 7

(Refer to Table 9)

Wall Orientation Factor Gw = 1.072

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 2)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

U = $1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$ where

Ri Surface film resistance of internal surface (Refer to **Table 2**)

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

E-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

Uw1 = ____ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	8	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	, Ngau Tam Mei, Yuen Long (House 2)	
			_
Facade Orientation Facing	East	Gross Wall Area (Ao) =	55.86
Window to Wall Ratio (WWR)	0.25	Wall Orientation Factor (Gw) =	1.072

Components / Details		Code No.			
Description	Units	E-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	42.00			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.75			

Heat Conduction through Opaque Walls	=	3.57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, n
	=	8.75	W/m²	

Components / Details		Code No.	
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	13.86	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.30	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	ı	where i= 1, 2,, n
	=	0.30 W/m	1 ²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details		Code No.				
Description	Units	E-F1				
Glazing Type		Tinted				
Thickness	m	0.01				
Glazing Area (Afi)	m²	13.86				
Shading Coefficient of Glazing (SCf)		0.43				
Visible Light Transmittance (VLT)	%	53				
External Reflectance (ER)	%	17				
External Shading Miltiplier (ESC)		1.00				
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	4.78				

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 4.78 W/m^2

Summary of RTTV at East Elevations (House 2)

South Elevations (House 2)

Gross Wall Areas 80.79 m² (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 2) Glazing Areas at South Elevations (House 2) 42.83 m² **Breakdown of Glazing Areas Glazing Areas** Unshaded (S-F1) 42.83 m² ECS = 1.000

Opaque Wall Areas at South Elevations (House 2) 37.96 m²

Breakdown of Opaque Wall Areas RC Wall Areas (S-W1) 37.96 m²

42.83 Window to Wall Ratio (WWR) = 80.79 0.53 Sheet no. 9

Wall Orientation Factor Gw = 0.975(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 2)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

> Air space resistance (Refer to Table 3) Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

S-W1 Description: RC Wall Areas

Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

3.42 W/m²K Uw1 = $\frac{1}{0.293}$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
	•		_
Facade Orientation Facing	South	Gross Wall Area (Ao) =	80.79
Window to Wall Ratio (WWR)	0.53	Wall Orientation Factor (Gw) =	0.975

Components / Details			Code No.	
Description	Units	S-W1		
External Finish Material		30mm Stone cladding		
Conductivity	W/mK	2.90		
Thickness	m	0.030		
Average Absorptivity (awi)	(a)	0.89		
Intermediate component		12mm cement/ sand render		
Conductivity	W/mK	0.72		
Thickness	m	0.01		
Intermediate component		200mm concrete wall		
Conductivity	W/mK	2.16		
Thickness	m	0.20		
Intermediate component				
Conductivity				
Thickness				
Intermediate component				
Conductivity				
Thickness				
Internal Finish Material		10mm AGT Tile		
Conductivity	W/mK	1.10		
Thickness	m	0.01		
U-value of Opaque Area (Uwi)	W/m²K	3.42		
Opaque Wall Area (Awi)	m²	37.96		
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	4.97		

Heat Conduction through Opaque Walls =	onduction through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw				
=	4.97	W/m²			

Part 2 - Calculation of Heat Conduction through Glazing						
Components / Details	Code No.					
Description	Units	S-F1				
Glazing Type		Tinted				
Thickness	m	0.01				
Glazing Area (Afi)	m²	42.83				
U-value of Glazing (Ufi)	W/m²K	1.74				
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.58				

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.58 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	S-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	42.83			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw		9.28			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 9.28 W/m^2

Summary of RTTV at South Elevations (House 2)

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 2)	

Overall Gross Wall Area [a] 274.66 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	82.23	6.56	0.92	8.63	16.11	4.82
North	55.78	8.30	0.03	0.46	8.78	1.78
East	55.86	8.75	0.30	4.78	13.82	2.81
South	80.79	4.97	0.58	9.28	14.83	4.36

Overall RTTVwall = 13.78 W/m²

< 14 W/m²

OK

Upper Roof

Sheet no	12

Gross Roof Areas (Opaque Walls + Sk	ylight Areas) (Aro) at	F	loof			=	167.82 m²
Skylight Areas at	Roof					=	0.00 m ²
Breakdown of Skyli	ght Areas						
Skylight Areas	Unshaded	(S 1)		=	0.00 m ²
OpaqueAreas at	Roof					=	167.82 m²
Breakdown of Opac	ue Roof Areas						
RC Roof Areas 1/F		(R1) =	25.16 m²	=	152.66 m ²
Roof				=	93.80 m ²		
Upper Roof				=	33.70 m²		
Breakdown of Opac	ue Roof Areas						
RC Roof Areas		(R2)	5.50	=	15.16 m²
1/F Roof				=	5.56 m ² 9.60 m ²		

Average Absorptivity (a) of the External Opaque Wall at

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8
		·

Average Absorptivity =

0.896

'U' value of Opaque Roof Areas

U = $1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$

 $where \ \ Ri \qquad \text{Surface film resistance of internal surface (Refer to \textbf{Table 2})}$

Ro Surface film resistance of external surface (Refer to Table 2)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
Internal surface film resistance			Ri	=	0.162
-	Total				1.849

Uw1 =
$$\frac{1}{1.849}$$
 = 0.54 W/m²k

R2	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
50mm cement/ sand screed	0.05	/	0.72	=	0.069
50mm expanded polystyrene	0.05	/	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
Т	otal				1.836

$$Uw1 = \frac{1}{1.836} = 0.54 \text{ W/m}^2\text{I}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. BD 2/91	79/15
Building Address	Lot 2115, D.D. 105, I	Ngau Tam Mei, Yuen Long (House 2)	
Roof Orientation Facing	Flat	Gross Roof Area (Aro) =16	67.82
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) =	2.16

Components / Details		Code No.				
Description	Units	R1	R2			
External Finish Material		25mm Unglazed Porcelain Tiles (Grey)	10mm AGT Tile (Brown)			
Conductivity	W/mK	1.10	1.10			
Thickness	m	0.025	0.010			
Average Absorptivity (awi)	(a)	0.9	0.8			
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed			
Conductivity	W/mK	0.72	0.72			
Thickness	m	0.050	0.050			
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene			
Conductivity	W/mK	0.034	0.034			
Thickness	m	0.05	0.05			
Intermediate component		150mm concrete slab	150mm concrete slab			
Conductivity	W/mK	2.16	2.16			
Thickness	m	0.15	0.15			
Intermediate component						
Conductivity	W/mK					
Thickness	m					
Internal Finish Material						
Conductivity	W/mK	0.38	0.38			
Thickness	m	0.01	0.01			
U-value of the Roof (Uri)	W/m²K	0.53	0.53			
Opaque Roof Area (Ari)	m²	152.66	15.16			
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.25	0.29			

Heat Conduction	through Opaque Roof : :	= 3.47(Ari/Aro) Uri	ari Gs W/m ²	where i= 1, 2,, n
duction = 3.47(Ari/	'Aro) Uri ari Gs	3.25	0.29	
Roof Area (Ari)	m²	152.66	15.16	
t the Root (Uri)	W/m²K	0.53	0.53	

Components / Details			Code No.		
Description	Units	S 1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
U-value of Skylight Glazing (Usi)	W/m²K	-			
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00			

Heat Conduction through Skylight	= 0.40	(Asi/Aro)	Usi Gs	where i= 1, 2,, n
:	=	0.00	W/m²	

Part 3 - Calculation of Solar Radiation through Skylight					
Components / Details		Code No.			
Description	Units	S1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
Shading Coefficient of Skylight Glazing (SCr)		-			
Visible Light Transmittance (VLT)		-			
External Reflectance (ER)		-			
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00			

Solar Radiation throug	h Skylight	= 41.10 (Asi/A = 0.00	Aro) (SCri) Gs W/m²	where i= 1, 2,	,, n
Summary of RTTV at R	loof 3.54	+	0.00	+	0.00
=_	3.54	W/m²	0.00	•	0.00

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 2)	

Overall Roof Area [a] 167.82 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	167.82	3.54	0.00	0.00	3.54	3.54

Overall RTTVroof =	3.54	W/m²	
<	4	W/m²	OK

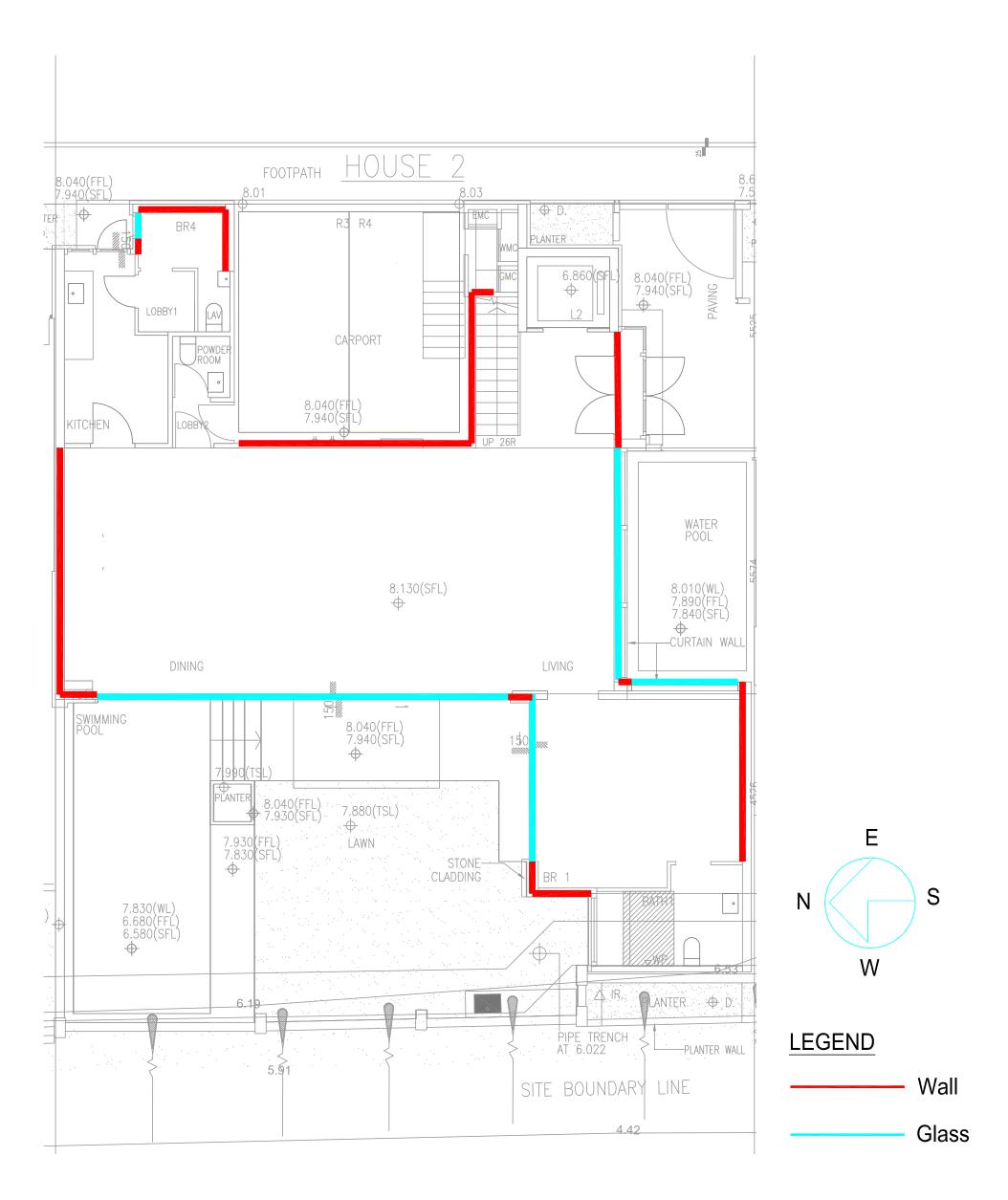
BD Ref. No. BD 2/9179/15

RTTV Summary Sheet

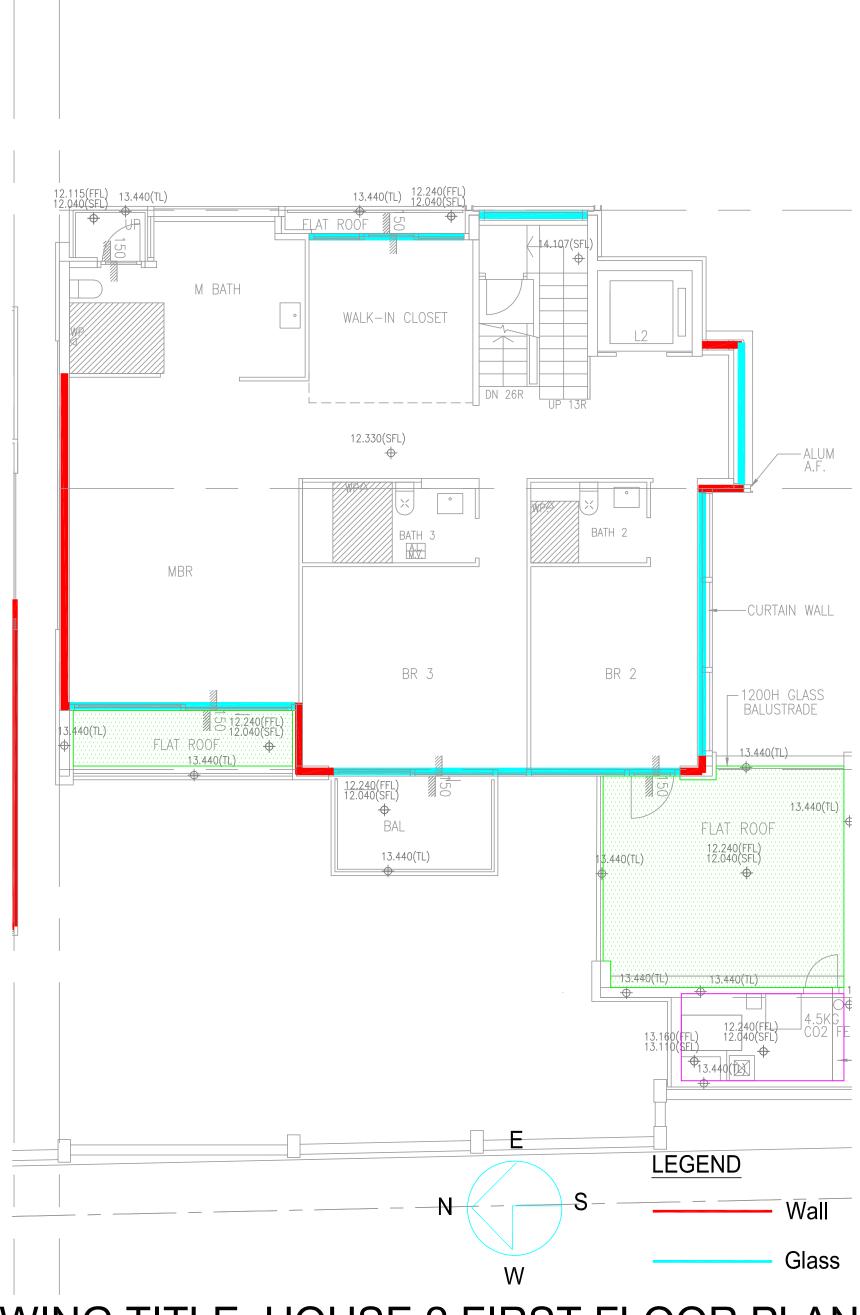
Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 2)

ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance

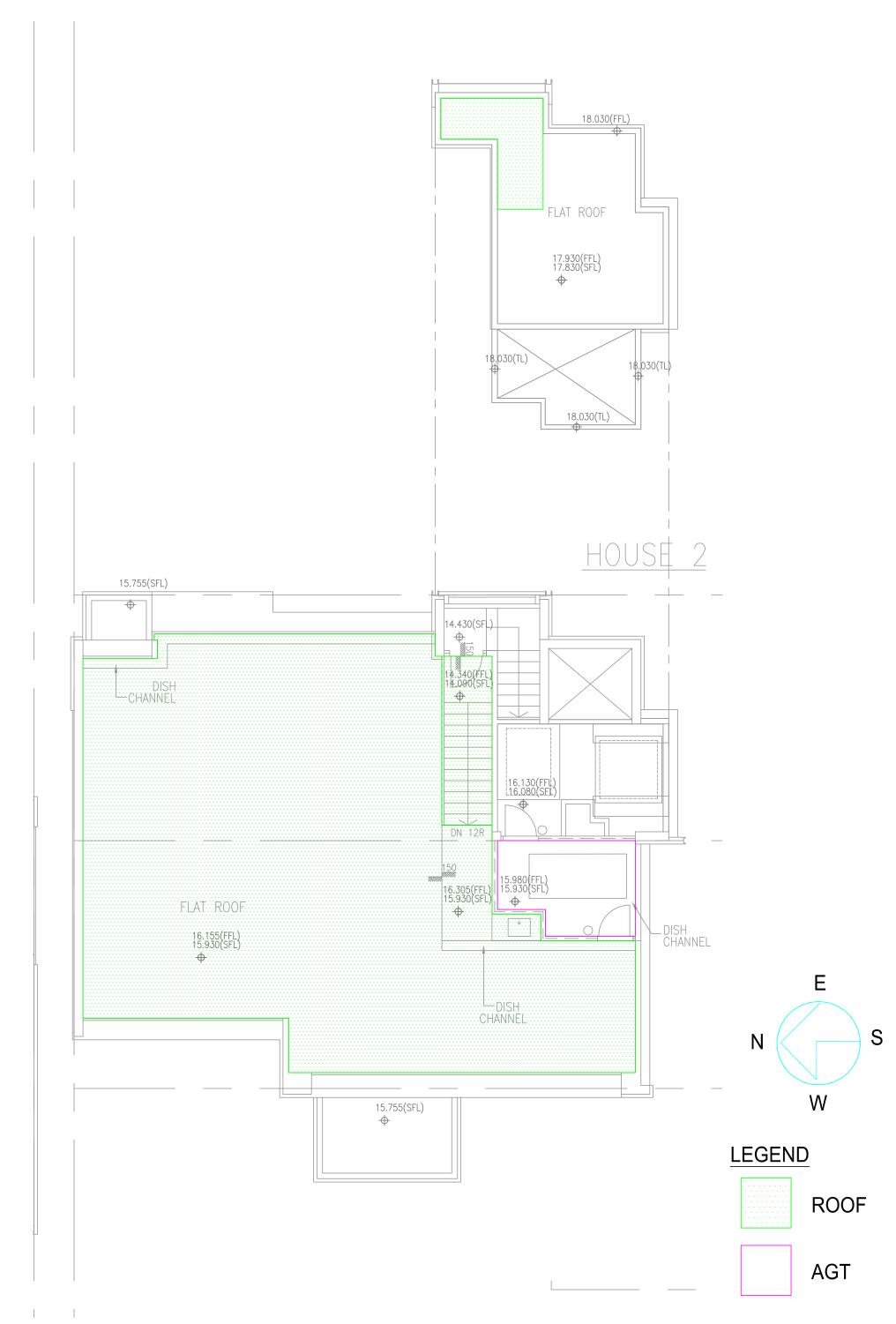
Building Type:		Residential	l																			
RTTV Calculat	ted by:	✓ 1. Re	egistered Pro	ofessional		Thomas Anderson	& Partners	Consulting	Engineers L	td.												
		2. At	rchitect																			
		3. O	thers, please	e specify:-																		
No. of Storeys Residential Un	uits)	2																				
Γable 1																						
									Deem	ed to	Satisfy RTTV	Wall										
acade Orienta	tion Facing		West			North		East			South											
Average Absorp	ptivity		0.795			0.8		0.8			0.8											
	w to Wall Ratio		0.51			0.37		0.18			0.23											
	cient of Glazing		0.43			0.43		0.43			0.43											\neg
	ng Coefficient of		0.43			0.43		0.43			0.43				-							
acade																						
Visable Light T			53	%		53 %		53	%		53	%			%		%			%		%
External Reflec	tance		17	%		17 %		17	%		17	%			%		%			%		%
Γable 2																						
										R	TTV _{Wall}											
Facade Orienta	tion Facing	West					North						East					South				
Wall Orientatio	n Factor			1.131					0.79						1.072					0.975		
Total External Residential Un			120.0	m ²	Windo	ow to Wall Ratio		63.1	m ²	Windo	w to Wall Rat	io		46.4	m ² W	indow to Wal	l Ratio		78.1	m ² V	Vindow to Wall Rat	io
Total Window	Area		61.73	m ²	=	0.51		23.37	m ²	=	0.37			8.25	m ² =	0	.18		18.12	m ²	0.23	
leat	Opaque Wall		6.56	5		W/m ²		8.30			W/m ²			8.75		W/m ²			4.97		W/m ²	
Conduction	Window		0.92	2		W/m ²		0.03			W/m ²			0.30		W/m ²			0.58		W/m ²	
Window	Glass Type		Area =	SC		VLT = %		Area =	SC		VLT =	%		Area =	SC	VLT =	%		Area =	SC	VLT =	%
		n a	m ²	=	ŀ	ER = %	Reflective	m ²	=		ER =	%	Reflective	m ²	=	ER =	%	Reflective	m ²	=	ER =	%
			Area =	61.73 SC	0.43	VLT = 53 %	Z Tinted	Area = 2	23.37 SC	0.43	VLT = 53	%		Area = 8.2	5 SC 0	.43 VLT =	53 %	Tinted	Area = 18.1	2 SC	0.43 VLT = 53	%
			m ²	=	ŀ	ER = 17 %		m ²	=		ER = 17			m ²	=	ER =	17 %		m ²	=	ER = 17	%
		Clear	Area =	SC		VLT = %	☐ Clear	Area =	SC			%	Clear	Area =	SC	VLT =	%	☐ Clear	Area =	SC		%
			m ²	=		ER = %		m ²	=			%		m ²	=	ER =	%	_	m ²	=		%
	Double	✓ Yes		No			✓ Yes		No				✓ Yes	□ N	0			✓ Yes	□ N	0		$\dot{-}$
	Glazing		_					_	_				_						_			
	External	Overhang	Z Yes		No		Overhang	☐ Yes	Z N	0			Overhang	Yes	Z No			Overhang	Yes	Z No		\dashv
	Shading	Sidefin	∠ Yes				Sidefin	☐ Yes	Z N				Sidefin	☐ Yes	Z No			Sidefin	☐ Yes	Z No		-
Solar Radiation	through		8.63			W/m ²		0.46			W/m ²			4.78		W/m ²			9.28		W/m ²	_
Gazing	inougn		0.02			W/III		0.10			W/III			1.70		W/III			7.20		W/III	
Average Absorp	ntivity			0.795					0.795						0.795					0.795		_
RTTV _{wall} at ea			16.1			W/m ²		8.78			W/m ²			13.82	0.773	W/m ²			14.83	0.775	W/m ²	_
Overall RTTV _v			10.1			W/III		0.70			13.78		xx// 2	13.02		W/III			14.03		W/III	_
Fable 3	Wall										13.78		W/m ²									
i abie 5										D'	PTEX 7											— ₁
260	Fratan		216								TTV _{Roof}											_
Roof Orientation		(2.16 167.82		m ²																	_
Jnits) Fotal Skylight	Area				m ²																	_
	Roof	<i> (</i>	3.54	\	m W/m ²																	-
	Skylight	_	پ		W/m ²																	-
	Glass Type	Reflect		Area =				m ² S	C =					VLT :				%	ER =			%
	34	☐ Tinted		Area =					C =					VLT :				%	ER =			%
		Clear		Area =					C =					VLT :				%	ER =			%
Clarkobt	D 11							m ² S	<u> </u>					VL1				70	EK -			70
	Double Glazing	☐ Yes		□ No																		
	External	☐ Yes		No			-															
	Shading																					
	through Gazing				W/m ²																	
Average Absorp		(0.8	<u>.) </u>																		
Overall RTTV _r		. 💙	3 54	/	W/m^2																	



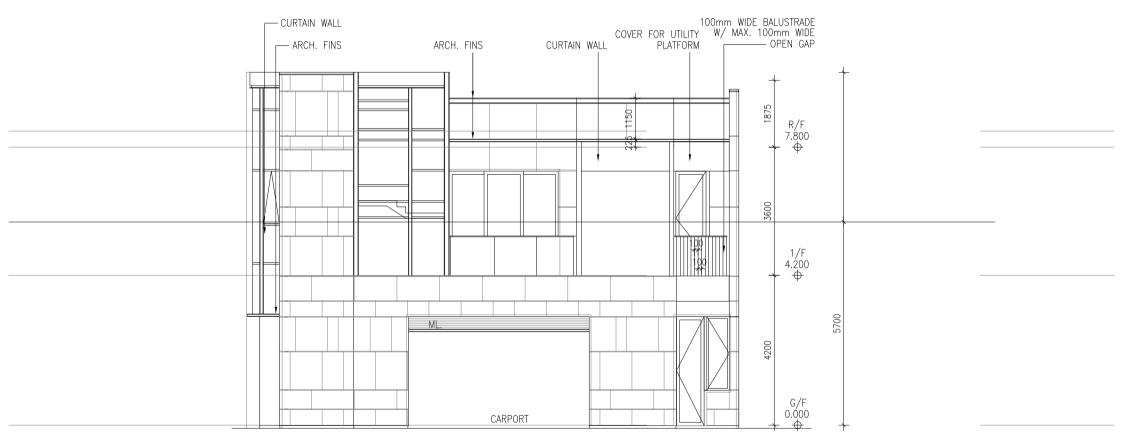
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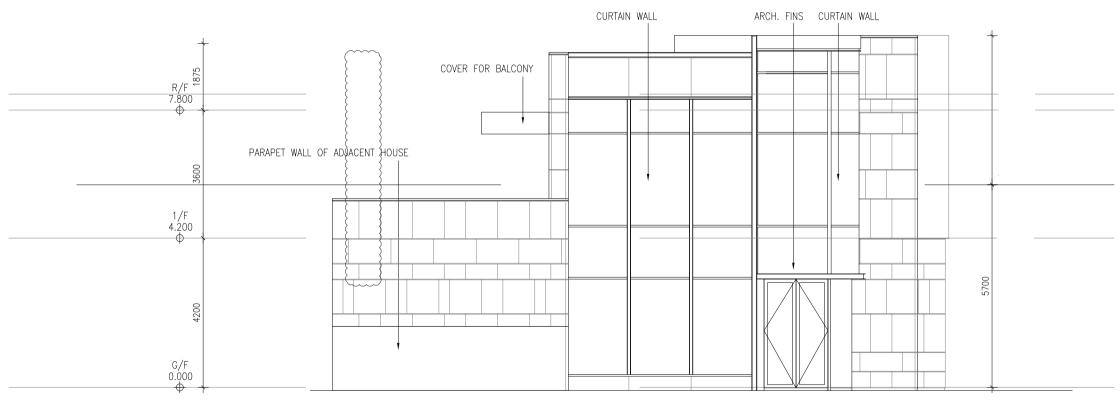
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DRAWING TITLE: HOUSE 2 ROOF FLOOR PLAN SCALE: 1:150@A4

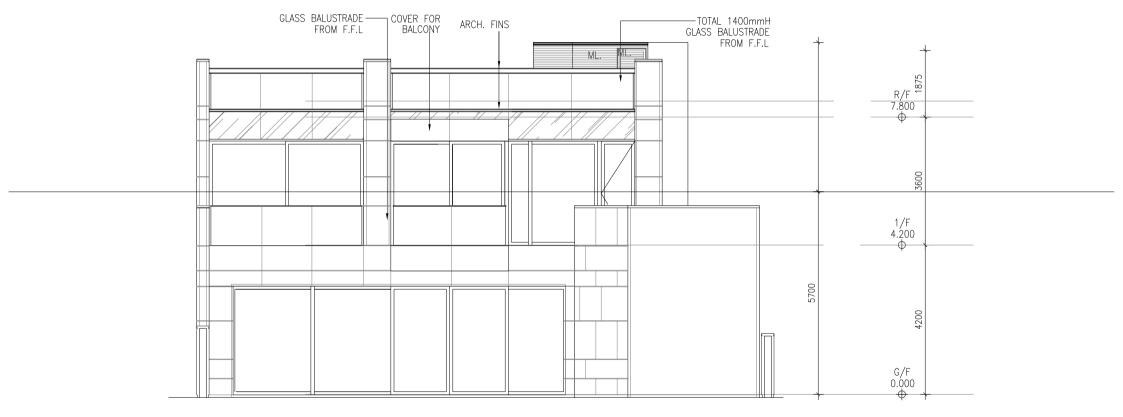


1 EAST ELEVATION 1:75 HOUSE 2

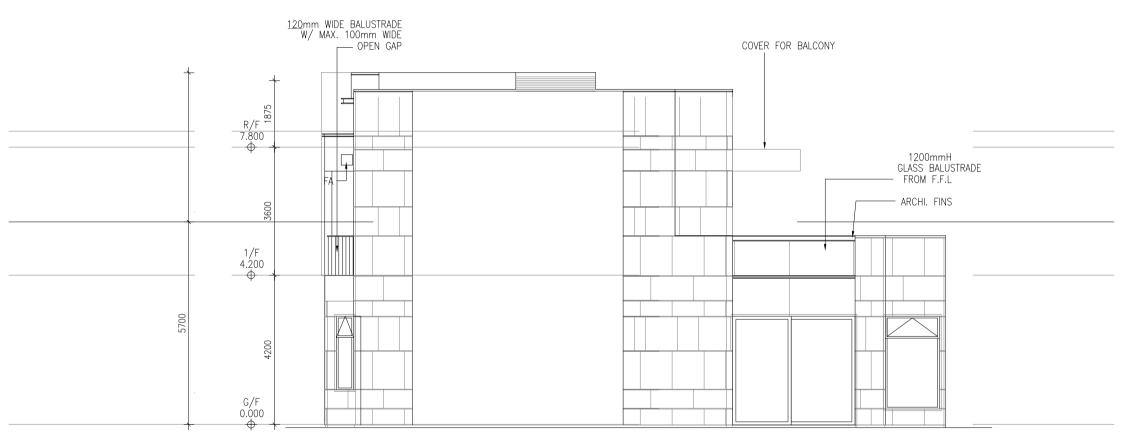


8 SOUTH ELEVATION 1:75

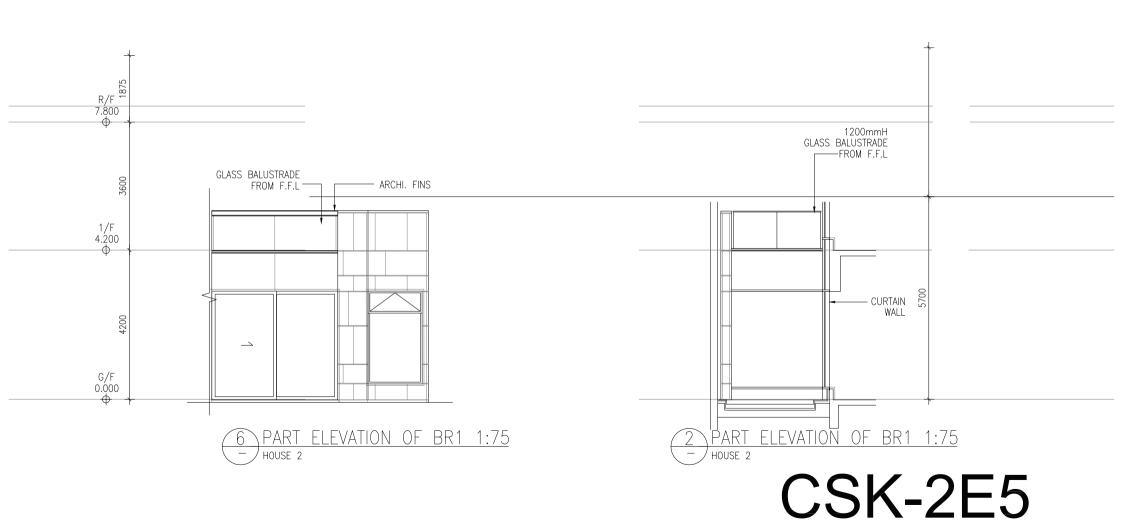
- HOUSE 2

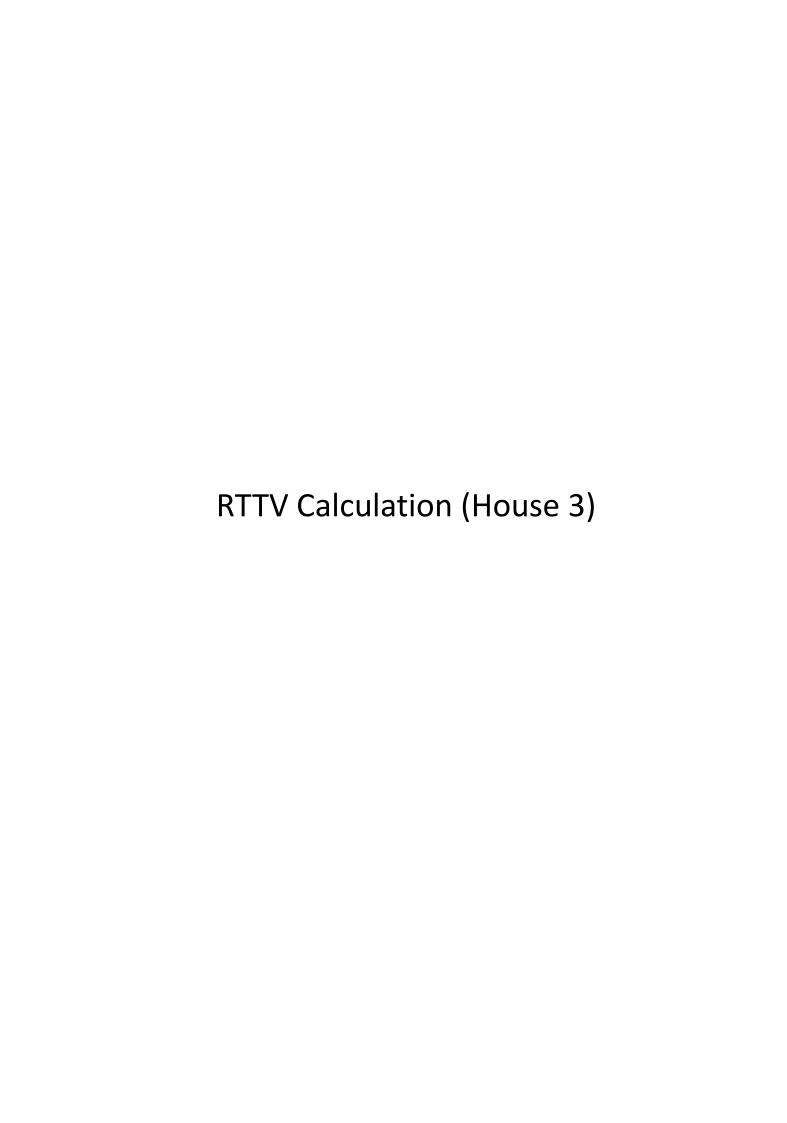


9 WEST ELEVATION 1:75
HOUSE 2



7 NORTH ELEVATION 1:75
HOUSE 2





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Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                                     Sheet no. 1
                                                                                              Storey heights (Residential Units):
                                                                                              G/F
                                                                                                                                   4.20 m
                                                                                                                                                1 storey)
                                                                                              1/F
                                                                                                                                   3.60 m
                                                                                                                                             ( 1 storey)
                                                                                              R/F
                                                                                                                                   1.90 m
                                                                                                                                              ( 1 storey)
West Elevations (House 3)
                                Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                                                              )x 4.20 x 1 = 14.30 x 4.20 x 1 =
G/F
                               (10.20 + 4.10)
                                                                                                                                  60.06 m<sup>2</sup>
1/F
                                 4.50 + 8.30
                                                                              )x \ 3.60 \ x \ 1 = 12.80 \ x \ 3.60 \ x \ 1 =
                                                                                                                                  46.08 m<sup>2</sup>
R/F
                                                                              )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                   0.00 m<sup>2</sup>
                                                                                                                                  Gross Wall Areas
                                                                                                                                                      106.14 m<sup>2</sup>
North Elevations (House 3) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                 5.60 + 3.65 + 3.80 + 1.50
                                                                              )x 4.20 x 1 = 14.55 x 4.20 x 1 =
                                                                                                                                  61.11 m<sup>2</sup>
1/F
                                 1.00 + 6.65 + 1.56
                                                                              )x 3.60 x 1 = 9.21 x 3.60 x 1 =
                                                                                                                                  33.16 m<sup>2</sup>
R/F
                                                                              )x 1.90 x 1 =
                                                                                                 0.00 \times 1.90 \times 1 =
                                                                                                                                   0.00 m<sup>2</sup>
                                                                                                                                  Gross Wall Areas
                                                                                                                                                       94.27 m<sup>2</sup>
East Elevations (House 3)
                                Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                5.40 + 2.00 + 3.20 + 2.00
G/F
                                                                              )x 4.20 x 1 = 12.60 x 4.20 x 1 =
                                                                                                                                  52.92 m<sup>2</sup>
1/F
                                 3.20 + 2.10 + 2.10
                                                                              )x 3.60 x 1 = 7.40 x 3.60 x 1 =
                                                                                                                                  26.64 m<sup>2</sup>
R/F
                                                                              )x 1.90 x 1 =
                                                                                                 0.00 \times 1.90 \times 1 =
                                                                                                                                   0.00 \, \text{m}^2
                                                                                                                                  Gross Wall Areas
                                                                                                                                                       79.56 m<sup>2</sup>
South Elevations (House 3) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                               (5.20 + 2.37 + 1.25)
                                                                              )x 4.20 x 1 =
                                                                                                 8.82 \times 4.20 \times 1 =
                                                                                                                                  37.02 m<sup>2</sup>
1/F
                                 0.80 + 5.40
                                                                              )x 3.60 x 1 =
                                                                                                 0.80 \times 3.60 \times 1 =
                                                                                                                                   2.88 m<sup>2</sup>
R/F
                                                                              )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                   0.00 m<sup>2</sup>
                                                                                                                                  Gross Wall Areas
                                                                                                                                                        39.90 m<sup>2</sup>
```

Total Gross Wall Areas 319.87 m²

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Total Glazing Area (Window + Balcony) Calculation
                                                                                                                                                                                  Sheet no. 2
                                                                                                                         Glazing heights (Residential Units):
                                                                                                                         G/F (Window GL02) - A
                                                                                                                                                               3.05 m
                                                                                                                                                                                storey)
                                                                                                                         G/F (Window GL02) - B
                                                                                                                                                      =
                                                                                                                                                               3.15 m
                                                                                                                                                                                storey)
                                                                                                                         1/F (Window GL02) - C
                                                                                                                                                      =
                                                                                                                                                               2.66 m
                                                                                                                                                                                storey)
                                                                                                                         1/F (Window GL02) - D
                                                                                                                                                               2.74 m
                                                                                                                                                                             1
                                                                                                                                                                                storey)
West Elevations (House 3)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
                                                                                                        )x 3.05 x 1 =
G/F (Window GL02) - A
                                   9.54
                                                                                                                            9.54 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              29.03 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                   7.43 + 4.50
                                                                                                        )x 2.66 x 1 =
                                                                                                                          11.93 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              31.66 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 = 0.00 x 2.74 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     60.69 m<sup>2</sup>
North Elevations (House 3)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   3.65 + 0.50
                                                                                                        )x 3.05 x 1 =
                                                                                                                           4.15 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                               12.62 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                                                                                        )x 2.66 x 1 =
                                                                                                                           0.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                        )x 2.74 x 1 =
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     12.62 m<sup>2</sup>
East Elevations (House 3)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   150 + 200
                                                                                                        )x 3.05 x 1 =
                                                                                                                            3.50 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              10.66 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                        )x 3.15 x 1 =
G/F (Window GL02)
                                                                                                        )x 0.86 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       0.86 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02)
                                   3.20 + 2.10 + 2.10
                                                                                                        )x 2.64 x 1 =
                                                                                                                            5.30 x
                                                                                                                                       2.64 \times 1 =
                                                                                                                                                              13.99 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     24.65 m<sup>2</sup>
South Elevations (House 3)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storevs
G/F (Window GL02) - A
                                   5.10
                                                                                                        )x 3.05 x 1 =
                                                                                                                            5.10 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              15.53 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 \text{ m}^2
                                                                                                        )x 3.15 x 1 =
1/F (Window GL02) - C
                                                                                                        )x 2.66 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - D
                                   0.80 + 5.40
                                                                                                        )x 2.74 x 1 =
                                                                                                                           6.20 \times 2.74 \times 1 =
                                                                                                                                                              16.96 m<sup>2</sup>
```

Gross Glazing Areas

Total Gross Glazing Areas

32.49 m²

130.45 m²

West Elevations (House 3)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	zing Areas) (Ao) at West Elevations (House 3)	=	106.14 m²
Glazing Areas at	West Elevations (House 3)	=	60.69 m²
Breakdown of Glazin Glazing Areas	ng Areas Unshaded (W-F1) ECS =	= 1.000	39.21 m²
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.15 x 3.05 = 9.61 m²	=	9.61 m²
Glazing Areas	OPF 1.90 / 3.05 = 0.62 ECS = 0.666 Shaded by Built-Fin (Projection on Right) (W-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 4.50 x 2.64 = 11.88 m²	=	11.88 m²
Opaque Wall Areas a	SPF 1.60 / 4.28 = 0.37 ECS = 0.989 at West Elevations (House 3)	=	45.45 m²
Breakdown of Opaq RC Wall Areas	ue Wall Areas (W-W1)	=	45.45 m ²

60.69

106.14

0.57

Sheet no. 3

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 3)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

W-W1	Description:			RC Wall Ar	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding	1	0.03	/	2.9	=	0.010
12mm cement/ sand render	1	0.012	/	0.72	=	0.017
200mm concrete wall		0.2	/	2.16	=	0.093
10mm AGT Tile		0.01	/	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
Tota	I					0.293

3.42

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	4	BD Ref No. BI	2/9179/15
Building Address	Lot 2115, D.D. 105,	Ngau Tam Mei, Yuen Long (House 3)	
			_
Facade Orientation Facing	West	Gross Wall Area (Ao) =	106.14
Window to Wall Ratio (WWR)	0.57	Wall Orientation Factor (Gw) =	1.131

Components / Details		Code No.					
Description	Units	W-W1					
External Finish Material		30mm Stone cladding					
Conductivity	W/mK	2.90					
Thickness	m	0.030					
Average Absorptivity (awi)	(a)	0.89					
Intermediate component		12mm cement/ sand render					
Conductivity	W/mK	0.72					
Thickness	m	0.01					
Intermediate component		200mm concrete wall					
Conductivity	W/mK	2.16					
Thickness	m	0.20					
Intermediate component							
Conductivity							
Thickness							
Intermediate component							
Conductivity							
Thickness							
Internal Finish Material		10mm AGT Tile					
Conductivity	W/mK	1.10					
Thickness	m	0.01					
U-value of Opaque Area (Uwi)	W/m²K	3.42					
Opaque Wall Area (Awi)	m²	45.45					
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	5.26					

Heat Conduction through Opaque Wall	s =	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	5.26	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing								
Components / Details	Code No.	Code No.						
Description	Units	W-F1	W-F2	W-F3				
Glazing Type		Tinted	Tinted	Tinted				
Thickness	m	0.008	0.008	0.008				
Glazing Area (Afi)	m²	60.69	9.61	11.88				
U-value of Glazing (Ufi)	W/m²K	1.65	1.65	1.65				
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.68	0.11	0.13				

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details		Code No.				
Description	Units	W-F1	W-F2	W-F3		
Glazing Type		Tinted	Tinted	Tinted		
Thickness	m	0.008	0.008	0.008		
Glazing Area (Afi)	m²	39.21	9.61	11.88		
Shading Coefficient of Glazing (SCf)		0.40	0.40	0.40		
Visible Light Transmittance (VLT)	%	57	57	57		
External Reflectance (ER)	%	7	7	7		
External Shading Miltiplier (ESC)		1.00	0.67	0.99		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	6.98	1.14	2.09		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 10.21 W/m²

Summary of RTTV at West Elevations (House 3)

= 5.26 + 0.92 + 10.21 = 16.39 W/m²

North Elevations (House 3)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 3) = 94.27 m²

Glazing Areas at North Elevations (House 3) = 12.62 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 12.62 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 3) = 81.64 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(N-W1) = 81.64 m²

Window to Wall Ratio (WWR) = 12.62 / 94.27 = 0.13

Sheet no. 5

Wall Orientation Factor Gw = 0.79 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 3)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to Table 2)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to Table 2)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

N-W1 Description: RC Wall Areas

Total					0.293
Internal surface film resistance			Ri	=	0.12
10mm AGT Tile	0.01	1	1.1	=	0.009
200mm concrete wall	0.2	1	2.16	=	0.093
12mm cement/ sand render	0.012	1	0.72	=	0.017
30mm Stone cladding	0.03	1	2.9	=	0.010
Air space resistanace			Ra	=	0
External surface film resistance			Ro	=	0.044
Wall Material					

Uw1 = ____ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	6	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	5, Ngau Tam Mei, Yuen Long (House 3)	
	•		
Facade Orientation Facing	North	Gross Wall Area (Ao) =	94.27
Window to Wall Ratio (WWR)	0.13	Wall Orientation Factor (Gw) =	0.79

Components / Details	Components / Details		Code No.				
Description	Units	N-W1					
External Finish Material		30mm Stone cladding					
Conductivity	W/mK	2.90					
Thickness	m	0.030					
Average Absorptivity (awi)	(a)	0.89					
Intermediate component		12mm cement/ sand render					
Conductivity	W/mK	0.72					
Thickness	m	0.01					
Intermediate component		200mm concrete wall					
Conductivity	W/mK	2.16					
Thickness	m	0.20					
Intermediate component							
Conductivity							
Thickness							
Intermediate component							
Conductivity							
Thickness							
Internal Finish Material		10mm AGT Tile					
Conductivity	W/mK	1.10					
Thickness	m	0.01					
U-value of Opaque Area (Uwi)	W/m²K	3.42					
Opaque Wall Area (Awi)	m²	81.64					
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	7.43					

Heat Conduction through Opaque Walls =	gh Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw			
=		7.43	W/m²	

Components / Details		Code No.	
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.008	
Glazing Area (Afi)	m²	12.62	
U-value of Glazing (Ufi)	W/m²K	1.65	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.11	

Heat Conduction through Glazing	=	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n
	=	0.11 W	//m²	

Part 3 - Calculation of Solar Radiation thr	ough Glazing			
Components / Details		Code No.		
Description	Units	N-F1		
Glazing Type		Tinted		
Thickness	m	0.008		
Glazing Area (Afi)	m²	12.62		
Shading Coefficient of Glazing (SCf)		0.40		
Visible Light Transmittance (VLT)	%	57		
External Reflectance (ER)	%	7		
External Shading Miltiplier (ESC)		1.00		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	cwi)Gw	1.77		

Solar Radiation through Glazing	= 41.	75 (Afi/Ao)(SCfi)(ESCwi)Gw	where i= 1, 2,, n
	=	1.77	W/m²	

Summary of RTTV at North Elevations (House 3)
= 7.43 + 0.11 + 1.77
= 9.31 W/m²

East Elevations (House 3)

Gross Wall Areas 79.56 m² (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 3) Glazing Areas at East Elevations (House 3) 24.65 m² **Breakdown of Glazing Areas Glazing Areas** Unshaded (E-F1) 24.65 m² ECS = 1.000

East Elevations (House 3) Opaque Wall Areas at 54.91 m²

Breakdown of Opaque Wall Areas RC Wall Areas (E-W1) 54.91 m²

Window to Wall Ratio (WWR) = 24.65 79.56 0.31 Sheet no. 7

Wall Orientation Factor

Gw = 1.072

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 3)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

E-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total	•		•		0.293

3.42 W/m²K Uw1 = $\frac{1}{0.293}$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	8	BD Ref No.	BD 2/9179/15		
Building Address	Lot 2115, D.D. 105	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 3)			
Facade Orientation Facing	East	Gross Wall Area (Ao) =	79.56		
Window to Wall Ratio (WWR)	0.31	Wall Orientation Factor (Gw) =	1.072		

Components / Details		Code No.			
Description	Units	E-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10	_		
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	54.91			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.03			

Heat Conduction through Opaque Wal	ls = 3	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=_	8.03	W/m²	

Components / Details		Code No.	
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.008	
Glazing Area (Afi)	m²	24.65	
U-value of Glazing (Ufi)	W/m²K	1.65	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.35	

Heat Conduction through Glazing	=	0.64 (Afi/Ao)	Ufi Gw	where i= 1, 2,, n
	=	0.35	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	E-F1			
Glazing Type		Tinted			
Thickness	m	0.008			
Glazing Area (Afi)	m²	24.65			
Shading Coefficient of Glazing (SCf)		0.40			
Visible Light Transmittance (VLT)	%	57			
External Reflectance (ER)	%	7			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	5.55			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n= 5.55 W/m^2

Summary of RTTV at East Elevations (House 3)

South Elevations (House 3)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 3) = 39.90 m²

Glazing Areas at South Elevations (House 3) = 32.49 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 32.49 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 3) = 7.42 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (S-W1) = 7.42 m²

Window to Wall Ratio (WWR) = 32.49 / 39.90 = 0.81

Sheet no. 9

Wall Orientation Factor Gw = 0.975 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 3)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = \frac{1}{(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)}$ where $Ri \qquad \text{Surface film resistance of internal surface (Refer to Table 2)}$

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

S-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

Uw1 = ____1 = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	10	BD Ref No.	BD 2/9179/15		
Building Address	Lot 2115, D.D. 105	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 3)			
	•		_		
Facade Orientation Facing	South	Gross Wall Area (Ao) =	39.90		
Window to Wall Ratio (WWR)	0.81	Wall Orientation Factor (Gw) =	0.975		

Components / Details		Code No.				
Description	Units	S-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	7.42				
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	1.97				

Heat Conduction through Opaque Walls	= ;	3.57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, r
	=_	1.97	W/m²	

Components / Details		Code No.	
Description	Units	S-F1	
Glazing Type		Tinted	
Thickness	m	0.008	
Glazing Area (Afi)	m²	32.49	
U-value of Glazing (Ufi)	W/m²K	1.65	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.84	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.84 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	S-F1			
Glazing Type		Tinted			
Thickness	m	0.008			
Glazing Area (Afi)	m²	32.49			
Shading Coefficient of Glazing (SCf)		0.40			
Visible Light Transmittance (VLT)	%	57			
External Reflectance (ER)	%	7			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	13.26			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 13.26 W/m²

Summary of RTTV at South Elevations (House 3)

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 3)	,

Overall Gross Wall Area [a] 319.87 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	106.14	5.26	0.92	10.21	16.39	5.44
North	94.27	7.43	0.11	1.77	9.31	2.74
East	79.56	8.03	0.35	5.55	13.93	3.46
South	39.90	1.97	0.84	13.26	16.06	2.00

Overall RTTVwall = 13.65 W/m²

< 14 W/m²

OK

Sheet no.	12

Gross Roof Areas (Opaque Walls + Sky	rlight Areas) (Aro) at		Roof	Ŧ.		=	131.58 m²
Skylight Areas at	Roof					=	0.00 m ²
Breakdown of Skylig	ht Areas						
Skylight Areas	Unshaded	(S1)		=	0.00 m ²
OpaqueAreas at	Roof					=	131.58 m²
Breakdown of Opaqu RC Roof Areas 1/F Roof Upper Roof	ue Roof Areas	(R1) = = =	22.43 m² 94.30 m² 3.69 m²	=	120.42 m²
Breakdown of Opaqu RC Roof Areas 1/F Roof Upper Roof	ue Roof Areas	(R2	?) = = =	5.12 m² 6.04 m² m²	=	11.16 m²

	Roof Orientation Factor	Gs = 2.16	(Refer to Table 9
--	-------------------------	-----------	-------------------

Average Absorptivity (a) of the External Opaque Wall at

Roof

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	95%	0.9
AGT Tile (Brown)	5%	0.8

Average Absorptivity =

ty = 0.895

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$

 $where \ \ Ri \qquad \text{Surface film resistance of internal surface (Refer to \textbf{Table 2})}$

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
Tot	al				1.858

$$Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$$

_R2	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
Tota	d[1.836

$$Uw1 = \frac{1}{1.836} = 0.54 \text{ W/m}^2\text{K}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. BD 2/9179/15	
Building Address	Lot 2115, D.D. 105, N	lgau Tam Mei, Yuen Long (House 3)	
Roof Orientation Facing	Flat	Gross Roof Area (Aro) = 131.58	
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) = 2.16	
			_

Components / Details			Code No.	
Description	Units	R1	R2	
External Finish Material		25mm Unglazed Porcelain Tiles (Grey)	10mm AGT Tile (Brown)	
Conductivity	W/mK	1.10	1.10	
Thickness	m	0.025	0.010	
Average Absorptivity (awi)	(a)	0.9	0.8	
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed	
Conductivity	W/mK	0.72	0.72	
Thickness	m	0.050	0.050	
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene	
Conductivity	W/mK	0.034	0.034	
Thickness	m	0.05	0.05	
Intermediate component		150mm concrete slab	150mm concrete slab	
Conductivity	W/mK	2.16	2.16	
Thickness	m	0.15	0.15	
Intermediate component				
Conductivity	W/mK			
Thickness	m			
Internal Finish Material				
Conductivity	W/mK	0.38	0.38	
Thickness	m	0.01	0.01	
U-value of the Roof (Uri)	W/m²K	0.53	0.53	
Opaque Roof Area (Ari)	m²	120.42	11.16	
Heat Conduction = 3.47(Ari/A	ιτο) Uri αri Gs	3.27	0.27	

	111	0.01	0.01	
f the Roof (Uri)	W/m²K	0.53	0.53	
Roof Area (Ari)	m²	120.42	11.16	
duction = 3.47(Ari/Aro) U	ri αri Gs	3.27	0.27	
Heat Conduction throug	nh Opaque Roof = =	3.47(Ari/Aro) Uri ari 3.54	Gs _W/m²	where i= 1, 2,, n

Components / Details			Code No.					
Description	Units	S1						
Skylight Glazing Type		-						
Thickness	m	-						
Skylight Area (Asi)	m²	0.00						
U-value of Skylight Glazing (Usi)	W/m²K	-						
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00						

Heat Conduction through Skylight	Heat Conduction through Skylight = 0.40 (Asi/Aro) Usi Gs						
	=	0.00	W/m²				

Part 3 - Calculation of Solar Radiation through Skylight Components / Details Code No.									
Components / Details									
Description	Units	S 1							
Skylight Glazing Type		-							
Thickness	m	-							
Skylight Area (Asi)	m²	0.00							
Shading Coefficient of Skylight Glazing (SCr)		-							
Visible Light Transmittance (VLT)		-							
External Reflectance (ER)		-							
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00							

Solar Radiation throu	gh Skylight	= 41.10 (Asi/A = 0.00	uro) (SCri) Gs W/m²	where i= 1, 2,	, n					
Summary of RTTV at Roof										
=	3.54	+	0.00	+	0.00					
=	3.54	W/m²								

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 3)	

Overall Roof Area [a] 131.58 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	131.58	3.54	0.00	0.00	3.54	3.54

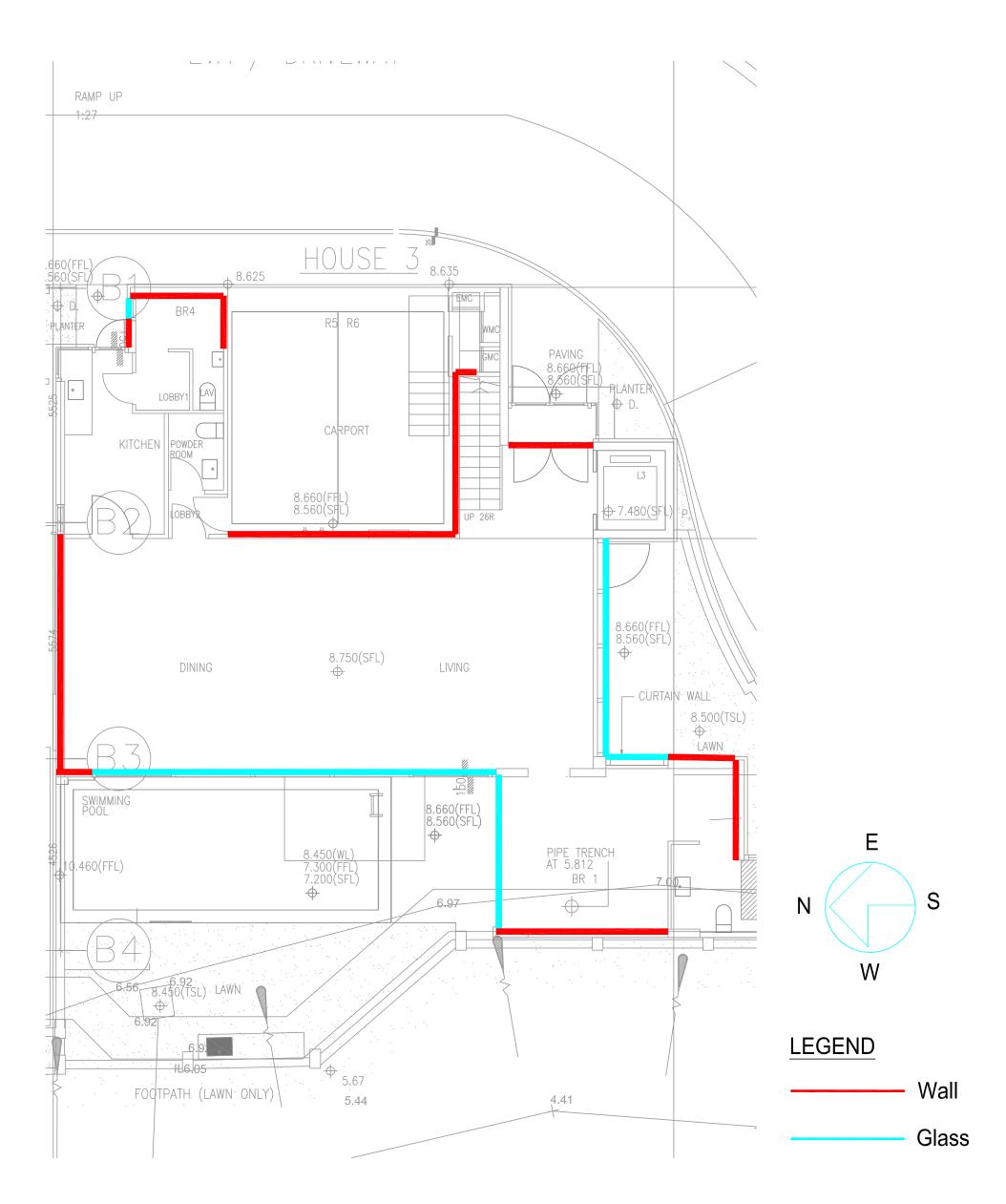
Overall RTTVroof =	3.54	W/m²	
<	4	W/m²	OK

RTTV Summary Sheet

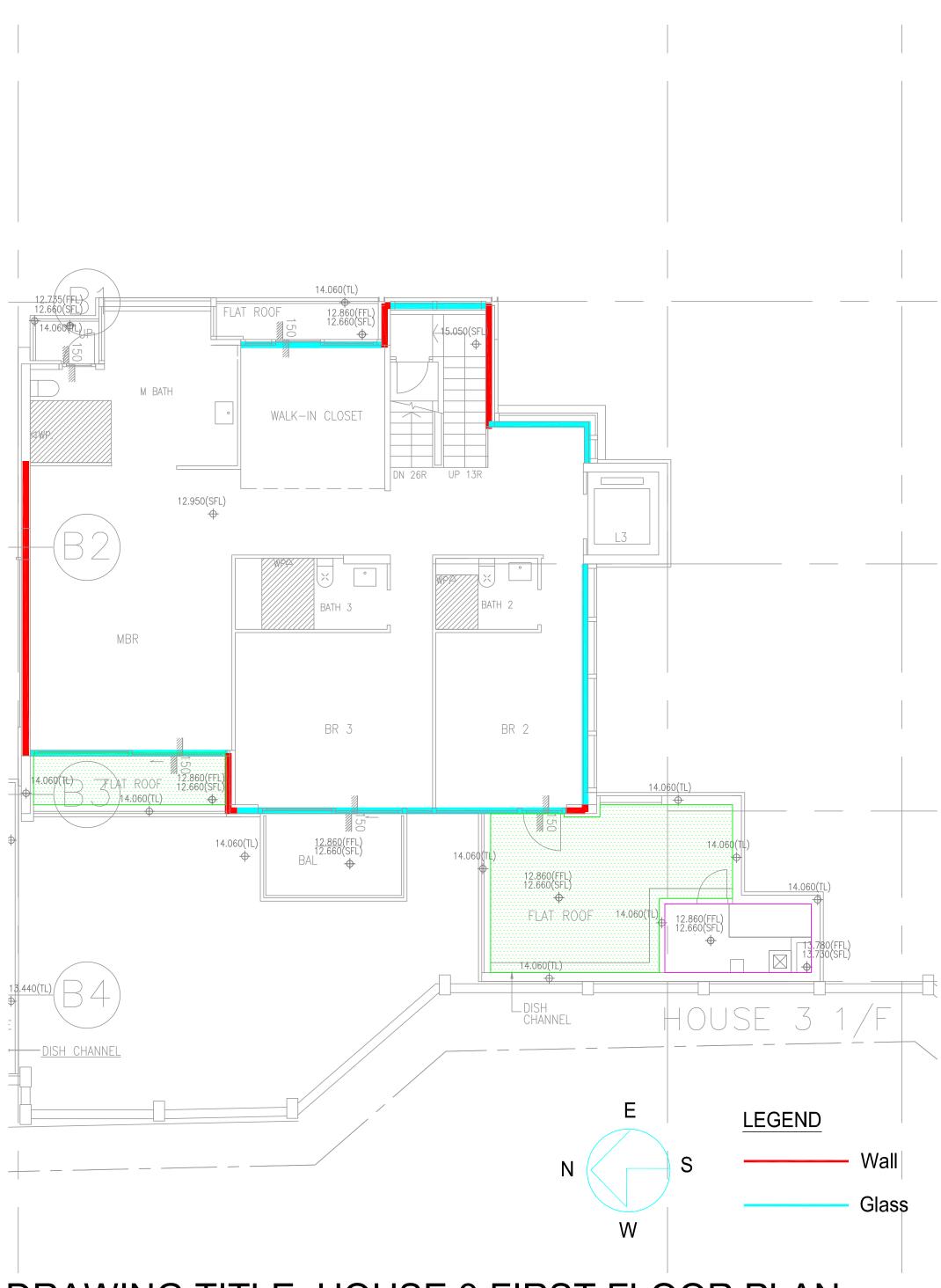
Address:	Lot 2115, D.D. 10	05, Ngau Ta	am Mei, Yuen I	Long (House	e 3)																BD Ref. No	
D., I.I., T.,		Residential	1																		BD 2/9179/	15
Building Type:				nional	Thomas A	dorani	e Postnoso	Consulting E	n ain aara I	td.												
RTTV Calculat	ied by:		egistered Profes rchitect	sionai	I nomas Ai	idersor	a Parmers	Consulting E	ngineers i	AG.												
				naifi ii																		
No. of Storeys		3.00	thers, please spe	ecny:-																		
(Residential Un	nits)	2																				
Table 1									_	1												
Farada Oniontes	tion Position	1	W4	-	N4b		1	F4	Deen	ned to S	atisfy RTTV	Wall								1		
Facade Orientat			West		North			East			South											
Average Absorp			0.795 0.51		0.8			0.8			0.8											
	ow to Wall Ratio				0.43			0.18			0.23											
	cient of Glazing		0.43																			
Average Snadir Facade	ng Coefficient of		0.43		0.43			0.43			0.43											
Visable Light T	ransmittance		53	%	53	%		53	%		53	%			%		%			%		%
External Reflec	tance		17	%	17	%		17	%		17	%			%		%			%		%
Table 2		Į.					Į.					•						ļ.		J		
5 10:		leve :					I			RT	TV _{Wall}	- 1										
Facade Orientat		West					North						East					South				
Wall Orientatio			1000	1.131					0.79	lvvv. v	*** ***				1.072				#0.4	0.975		
Total External ' (Residential Un			120.0	m ² W	indow to Wall R	atio		63.1	m ²	Windo	w to Wall Rati	0		46.4	m²	Window to W	all Ratio		78.1	m²	Window to	Wall Ratio
Total Window	Area		61.73	m ²	0.51			23.37	m ²	l=	0.37	Ī		8.25	m ²	=	0.18		18.12	m ²	=	0.23
Heat	Opaque Wall		5.26		W/m ²			7.43			W/m ²			8.03		W/m ²	2		1.97		W/ı	n ²
Conduction	Window		0.92		W/m ²			0.11			W/m ²			0.35		W/m²	2		0.84		W/ı	m ²
Window	Glass Type	D	Area =	SC	VLT =	%		Area =	SC		VLT =	%		Area =	SC	VLT =	%		Area =	SC	VLT	= %
			m ²	=	ER =	%	Reflective	m ²	=		ER =	%	Reflective	m ²	=	ER =	%	Reflective	m ²	=	ER =	%
		∠ Tinted	Area = 61.7 m^2	73 SC 0.	.43 VLT = 5:			Area = 23 m ²	3.37 SC =	L	VLT = 53		Z Tinted	Area = 8.2 m^2	25 SC	0.43 VLT =		Tinted	Area = 18.1	2 SC		= 53 %
			m			7 %		m			ER = 17				_	ER =	17 %		m²		ER =	
		Clear	Area =	SC =	VLT =	%	☐ Clear	Area =	SC =	L		%	Clear	Area =	SC =	VLT =		☐ Clear	Area =	SC =	VLT	
			m ²		ER =	%		m ²			ER =	%		m ²		ER =	%		m ²		ER =	%
	Double Glazing	☑ Yes	□ N	10			☑ Yes		No				∠ Yes		No			☑ Yes	_ N	ю		
	External	Overhang	Z Yes	☐ No			Overhang	Yes	ΖN	lo			Overhang	☐ Yes	Z No)		Overhang	Yes	Z N)	
	Shading	Sidefin	Yes	☐ No			Sidefin	☐ Yes	ΖN	lo			Sidefin	☐ Yes	Z No)		Sidefin	☐ Yes	Z N)	
Solar Radiation	through		10.21		W/m ²			1.77			W/m ²			5.55		W/m²	2		13.26		W/ı	m ²
Gazing																						
Average Absorp				0.795					0.795						0.795					0.795		
RTTV _{Wall} at ea			16.39		W/m ²			9.31			W/m ²			13.93		W/m²	2		16.06		W/t	n ²
Overall RTTV _v	Vall										13.65		W/m ²									
Table 3																						
Roof Orientatio	m Footon	1	2.16							KI	TV _{Roof}											
Total Roof Area			131.58		2																	
Units)	a (Residential		کٹ ا) "	n ²																	
Total Skylight A	Area		2	n	n ²																	
Heat	Roof	(3.54	W	/m ²																	
Conduction	Skylight	\		W	/m ²																	
	Glass Type	Reflect	ive Area					m ² SC	=					VLT	`=			%	ER =			%
	J	Tinted						m ² SC						VLT				%	ER =			%
		Clear	Area					m ² SC						VLT				%	ER =			%
Skylight	Daubla		□ N					m SC						VLI				70	EK-			/0
SKYIIBIII	Double Glazing	Yes																				
	External Shading	☐ Yes	□ N	lo																		
Solar Radiation	through Gazing	 	~	33.7	/m ²																	
Average Absorp		 (0.8	vv.	****																	
Overall RTTV.	parity (10001)	 	3 54	33.7	/m ²																	

ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance

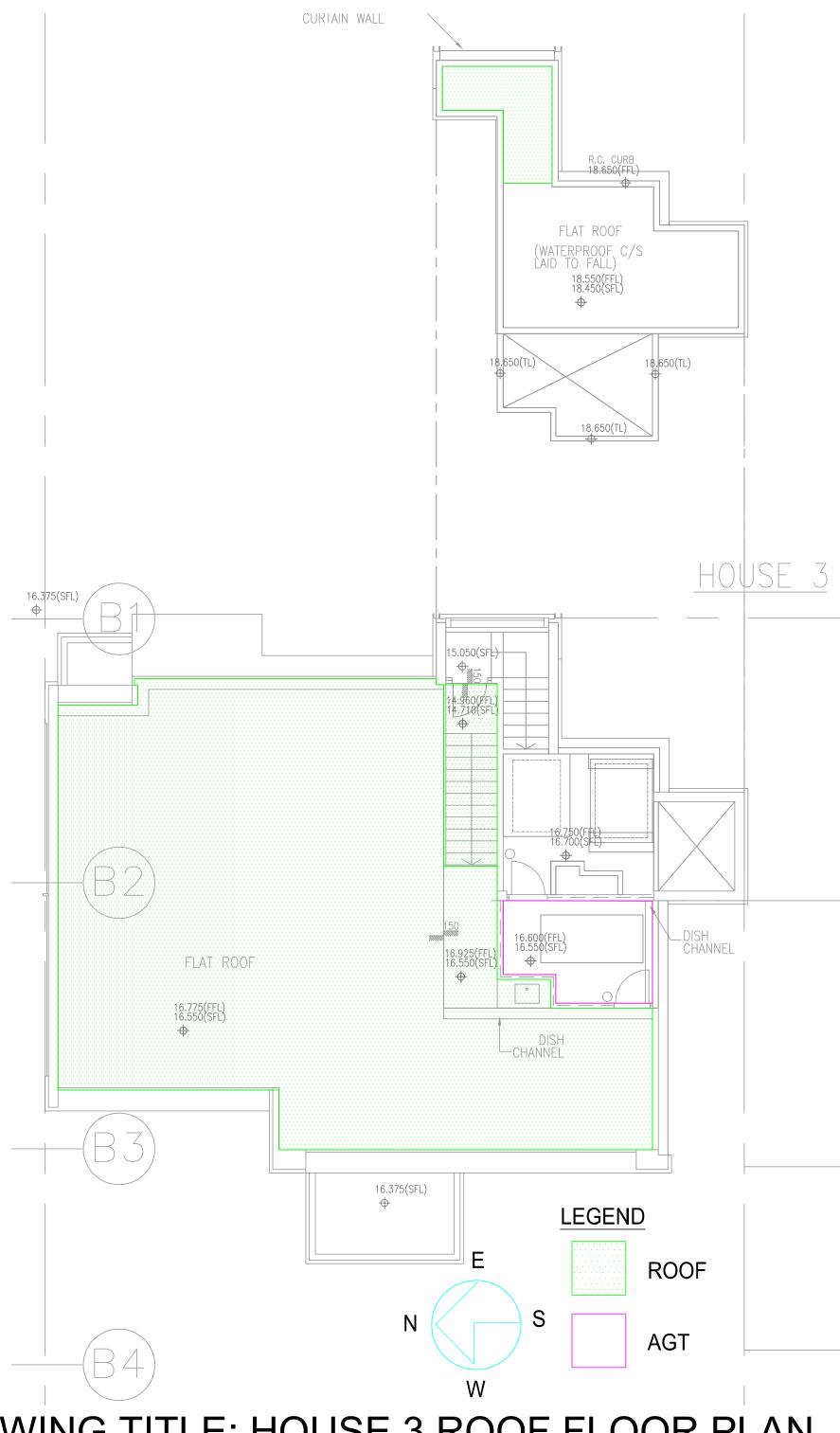
Address:



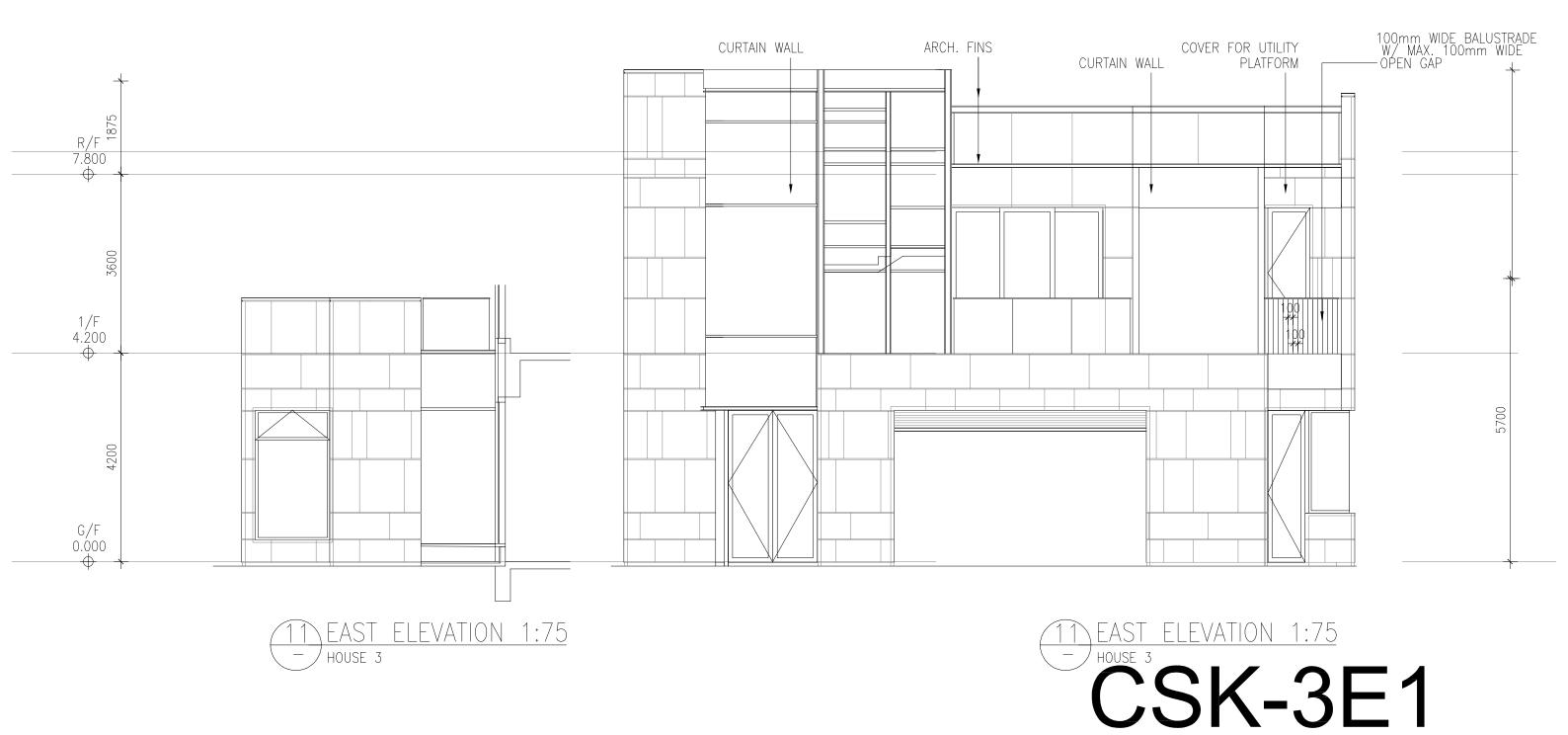
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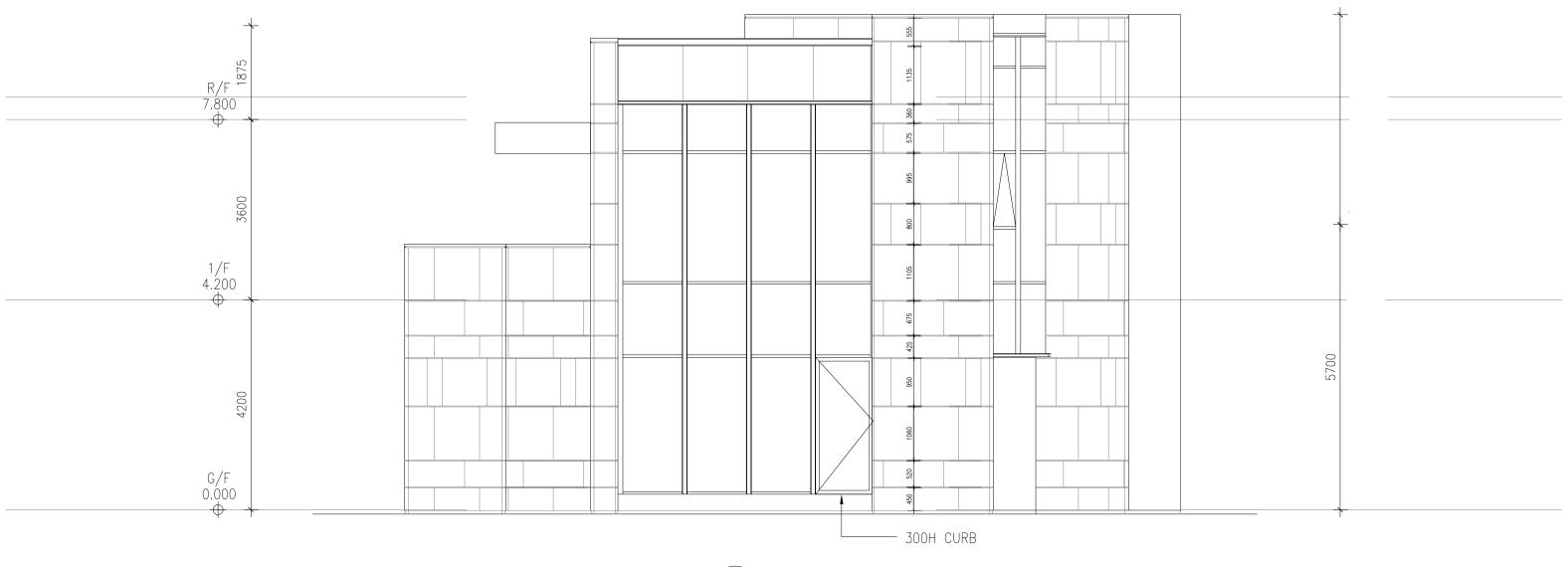


DRAWING TITLE: HOUSE 3 FIRST FLOOR PLAN SCALE: 1:150@A4



DRAWING TITLE: HOUSE 3 ROOF FLOOR PLAN SCALE: 1:150@A4

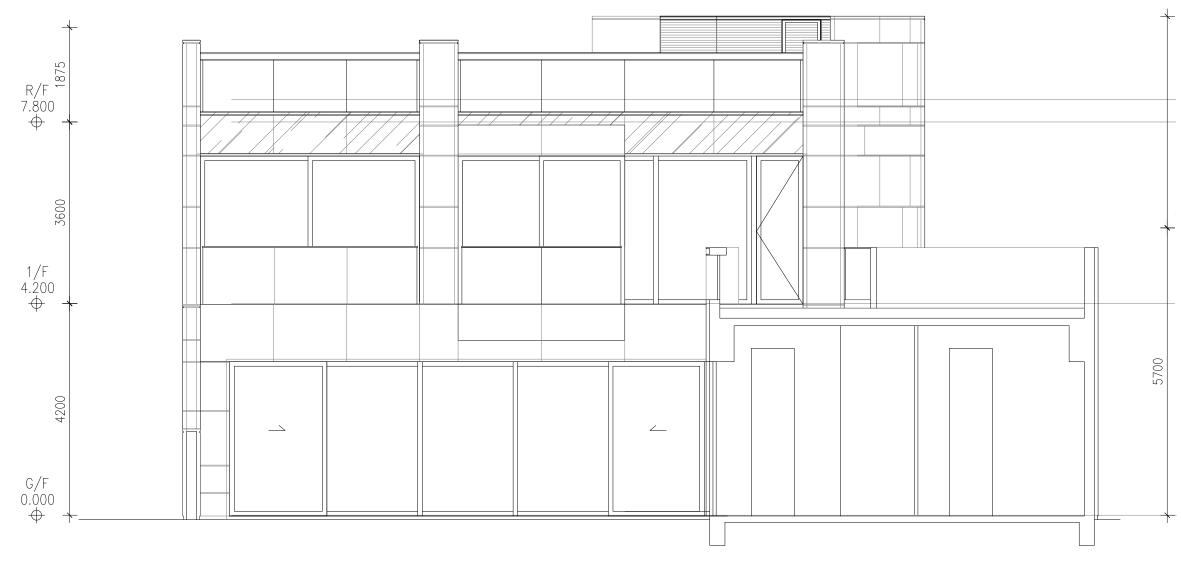




SOUTH ELEVATION 1:75

HOUSE 3

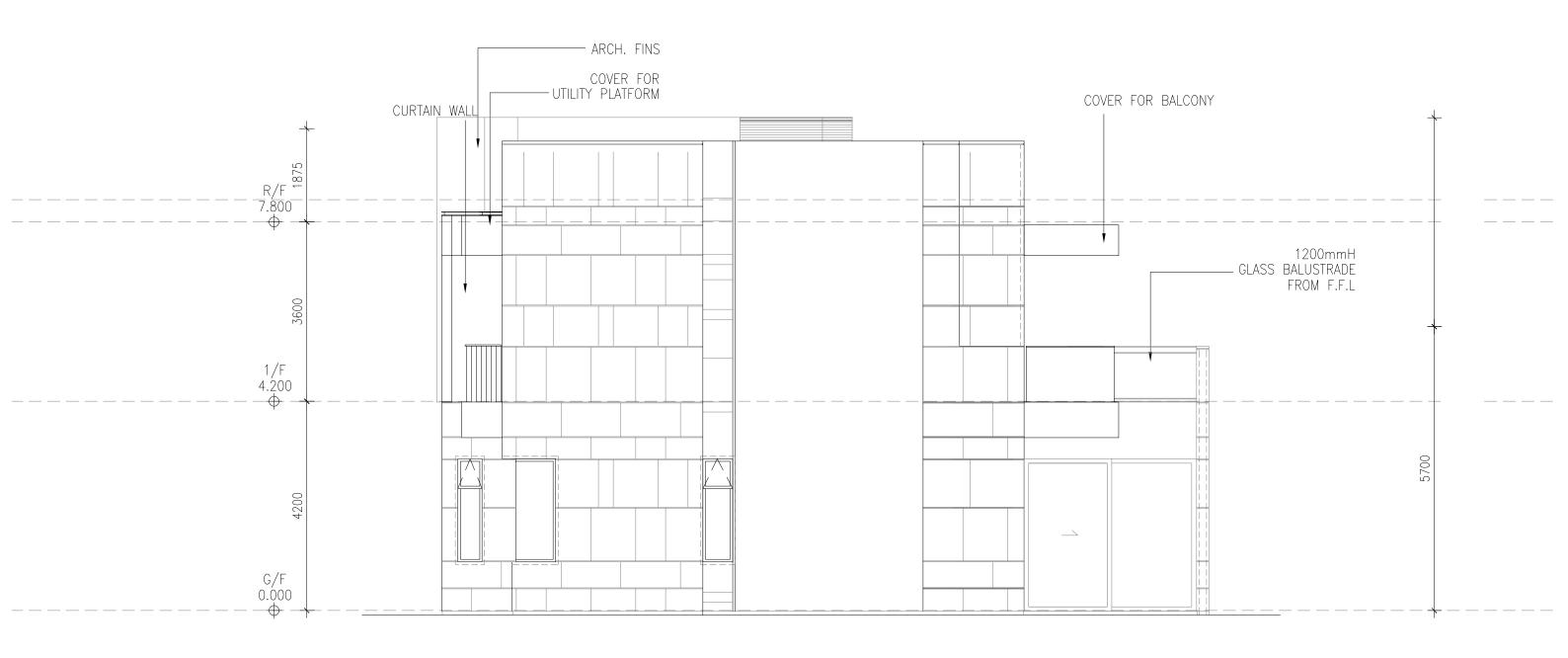
CSK-3E2



WEST ELEVATION 1:75

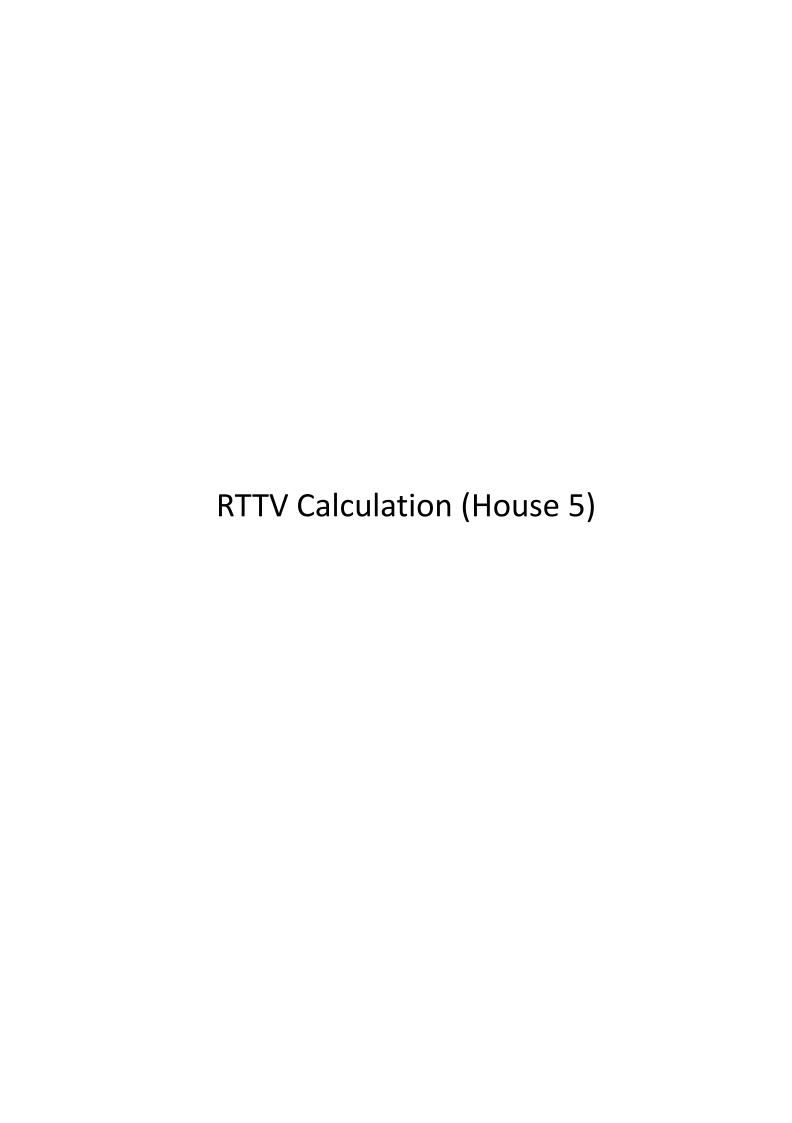
HOUSE 3

CSK-3E3





CSK-3E4



```
Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                                        Sheet no. 1
                                                                                                 Storey heights (Residential Units):
                                                                                                 G/F
                                                                                                                                      4.20 m
                                                                                                                                                 ( 1 storey)
                                                                                                 1/F
                                                                                                                                      3.60 m
                                                                                                                                                 ( 1 storey)
                                                                                                 R/F
                                                                                                                                      1.90 m
                                                                                                                                                 ( 1 storey)
West Elevations (House 5)
                                Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                                                                )x 4.20 x 1 = 13.40 x 4.20 x 1 =
                                                                                                                                     56.28 m<sup>2</sup>
1/F
                                   10.70
                                                                                )x 3.60 x 1 = 10.70 x
                                                                                                               3.60 \times 1 =
                                                                                                                                     38.52 m<sup>2</sup>
R/F
                                                                                )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                      0.00 m<sup>2</sup>
                                                                                                                                     Gross Wall Areas
                                                                                                                                                           94.80 m<sup>2</sup>
North Elevations (House 5) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                   8.00 + 1.50
                                                                                )x 4.20 x 1 =
                                                                                                    9.50 x
                                                                                                               4.20 \times 1 =
                                                                                                                                     39.90 m<sup>2</sup>
1/F
                                   3.60 + 5.90
                                                                                )x 3.60 x 1 =
                                                                                                    9.50 \times 3.60 \times 1 =
                                                                                                                                     34.20 m<sup>2</sup>
R/F
                                                                                )x 1.90 x 1 =
                                                                                                    0.00 \times 1.90 \times 1 =
                                                                                                                                      0.00 m<sup>2</sup>
                                                                                                                                     Gross Wall Areas
                                                                                                                                                           74.10 m<sup>2</sup>
East Elevations (House 5)
                                Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                   4.55 + 8.20 + 2.00
G/F
                                                                                )x 4.20 x 1 = 14.75 x 4.20 x 1 =
                                                                                                                                     61.95 m<sup>2</sup>
1/F
                                   8.05
                                                                                )x 3.60 x 1 =
                                                                                                    8.05 x
                                                                                                               3.60 \times 1 =
                                                                                                                                     28.98 m<sup>2</sup>
R/F
                                                                                )x 1.90 x 1 =
                                                                                                    0.00 \times 1.90 \times 1 =
                                                                                                                                      0.00 m<sup>2</sup>
                                                                                                                                     Gross Wall Areas
                                                                                                                                                           90.93 m<sup>2</sup>
South Elevations (House 5) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                  12.00 + 1.50
                                                                                )x 4.20 x 1 = 13.50 x 4.20 x 1 =
                                                                                                                                     56.70 m<sup>2</sup>
1/F
                                   6.70
                                                                                )x 3.60 x 1 =
                                                                                                   6.70 x
                                                                                                               3.60 \times 1 =
                                                                                                                                     24.12 m<sup>2</sup>
R/F
                                                                                )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                      0.00 m<sup>2</sup>
                                                                                                                                     Gross Wall Areas
                                                                                                                                                           80.82 m<sup>2</sup>
```

Total Gross Wall Areas

340.65 m²

```
Total Glazing Area (Window + Balcony) Calculation
                                                                                                                                                                                  Sheet no. 2
                                                                                                                         Glazing heights (Residential Units):
                                                                                                                         G/F (Window GL02) - A
                                                                                                                                                               3.05 m
                                                                                                                                                                                storey)
                                                                                                                         G/F (Window GL02) - B
                                                                                                                                                      =
                                                                                                                                                              3.15 m
                                                                                                                                                                                storey)
                                                                                                                         1/F (Window GL02) - C
                                                                                                                                                      =
                                                                                                                                                               2.66 m
                                                                                                                                                                                storey)
                                                                                                                         1/F (Window GL02) - D
                                                                                                                                                               2.74 m
                                                                                                                                                                             1
                                                                                                                                                                                storey)
West Elevations (House 5)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   9.90
                                                                                                        )x 3.05 x 1 =
                                                                                                                            9.90 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              30.15 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                   4.50
                                                                                                        )x 2.66 x 1 =
                                                                                                                            4.50 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              11.95 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 = 0.00 x 2.74 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     42.09 m<sup>2</sup>
North Elevations (House 5) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   5.50 + 2.25
                                                                                                        )x 3.05 x 1 =
                                                                                                                           7.75 \times 3.05 \times 1 =
                                                                                                                                                              23.60 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 \times 3.15 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                      1 + 5.40
                                                                                                        )x 2.66 x 1 =
                                                                                                                            6.40 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              16.99 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     40.59 m<sup>2</sup>
East Elevations (House 5)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   2.60 + 2.00
                                                                                                                            4.60 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              14.01 m<sup>2</sup>
                                                                                                        )x 3.05 x 1 =
G/F (Window GL02) - B
                                                                                                                                       3.15 x 1 =
                                                                                                        )x 3.15 x 1 =
                                                                                                                            4.40 x
                                                                                                                                                              13.84 m<sup>2</sup>
G/F (Window GL02)
                                                                                                        )x 0.86 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       0.86 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02)
                                   2.20 +
                                                                                                        )x 2.64 x 1 =
                                                                                                                           2.20 x
                                                                                                                                       2.64 x 1 =
                                                                                                                                                               5.81 m<sup>2</sup>
                                           2.20
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     33.65 m<sup>2</sup>
South Elevations (House 5) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   0.50 + 2.25 + 3.60
                                                                                                        )x 3.05 x 1 =
                                                                                                                            6.35 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              19.34 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 \text{ m}^2
                                                                                                        )x 3.15 x 1 =
1/F (Window GL02) - C
                                                                                                        )x 2.66 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                               0.00 \, m^2
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 \, m^2
```

Gross Glazing Areas

Total Gross Glazing Areas

19.34 m²

135.67 m²

West Elevations (House 5)

Gross Wall Areas (Opaque Walls + Gla	azing Areas) (Ao) at	West Elevation	ıs (House 5)		=	94.80 m²
Glazing Areas at	West Elev	ations (House 5))		=	42.09 m ²
Breakdown of Glazing Glazing Areas	ng Areas Unshaded			(W-F1)	= 1.000	14.20 m²
Glazing Areas G/F	Shaded by Cover of Glazing Area = Leng 3.15 x	gth of Glazing x G	Glazing Height =	(W-F2) x No. of Storeys 9.61 m ²	=	9.61 m²
Glazing Areas	OPF 1.90 / Shaded by Built-Fit Glazing Area = Leng 4.50 x	n (Projection on Ri	ght)	0.666 (W-F3) x No. of Storeys 11.88 m ²	=	11.88 m²
Glazing Areas	SPF 1.60 / Shaded by Built-Fir Glazing Area = Leng 2.10 x	4.28 = 0.37		0.989 (W-F4)	=	6.41 m²
	SPF 6.00 /	2.10 = 2.86	ECS =	0.955		
Opaque Wall Areas	at West Elev	ations (House 5)		=	52.71 m²
Breakdown of Opaq RC Wall Areas	ue Wall Areas			(W-W1)	=	52.71 m²
Window to Wall Rati	io (WWR) =	42.09	I	94.80	=	0.44

Sheet no.	3

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 5)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials Thermal conductivity of building materials (Refer to Table 1)

W-W1	Description:			RC Wall Areas		
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	/	2.9	=	0.010
12mm cement/ sand render		0.012	/	0.72	=	0.017
200mm concrete wall		0.2	/	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

3.42

W/m²K

Sheet No.	4	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	5, Ngau Tam Mei, Yuen Long (House 5)	
	•		
Facade Orientation Facing	West	Gross Wall Area (Ao) =	94.80
Window to Wall Ratio (WWR)	0.44	Wall Orientation Factor (Gw) =	1.131

Components / Details		Code No.		
Description	Units	W-W1		
External Finish Material		30mm Stone cladding		
Conductivity	W/mK	2.90		
Thickness	m	0.030		
Average Absorptivity (awi)	(a)	0.89		
Intermediate component		12mm cement/ sand render		
Conductivity	W/mK	0.72		
Thickness	m	0.01		
Intermediate component		200mm concrete wall		
Conductivity	W/mK	2.16		
Thickness	m	0.20		
Intermediate component				
Conductivity				
Thickness				
Intermediate component				
Conductivity				
Thickness				
Internal Finish Material		10mm AGT Tile		
Conductivity	W/mK	1.10		
Thickness	m	0.01		
U-value of Opaque Area (Uwi)	W/m²K	3.42		
Opaque Wall Area (Awi)	m²	52.71		
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	6.83		

Heat Conduction through Opaque Walls	uction through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw			
	=	6.83	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing					
Components / Details	Code No.				
Description	Units	W-F1	W-F2	W-F3	W-F4
Glazing Type		Tinted	Tinted	Tinted	Tinted
Thickness	m	0.01	0.01	0.01	0.01
Glazing Area (Afi)	m²	14.20	9.61	11.88	6.41
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74	1.74
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.19	0.13	0.16	0.09

Heat Conduction through Glazing = 0.64 (Afi/Ao) Ufi Gw where i= 1, 2, ..., n= 0.56 W/m²

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details Code No.					
Description	Units	W-F1	W-F2	W-F3	W-F4
Glazing Type		Tinted	Tinted	Tinted	Tinted
Thickness	m	0.01	0.01	0.01	0.01
Glazing Area (Afi)	m²	14.20	9.61	11.88	6.41
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43	0.43
Visible Light Transmittance (VLT)	%	53	53	53	53
External Reflectance (ER)	%	17	17	17	17
External Shading Miltiplier (ESC)		1.00	0.67	0.99	0.96
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	3.04	1.37	2.52	1.31

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 8.24 W/m²

Summary of RTTV at West Elevations (House 5)

= 6.83 + 0.56 + 8.24 = 15.62 W/m²

North Elevations (House 5)

Gross Wall Areas 74.10 m² (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 5) Glazing Areas at North Elevations (House 5) 40.59 m² **Breakdown of Glazing Areas** Glazing Areas Unshaded (N-F1) 33.73 m² ECS = 1.000Glazing Areas Shaded by Built-Fin (Projection on Left) (N-F2) 6.86 m² Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 2.25 x 3.05 G/F 6.86 m² SPF 3.40 / 2.25 = 1.51 **ECS** = 0.977

Opaque Wall Areas at North Elevations (House 5) = 33.51 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (N-W1) = 33.51 m²

Window to Wall Ratio (WWR) = 40.59 / 74.10 = **0.55**

Sheet no. 5

Wall Orientation Factor

Gw = 0.79

(Refer to Table 9)

Average Absorptivity (α) of the External Opaque Wall at

North Elevations (House 5)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$ where

j Surface film resistance of internal surface (Refer to Table 2)

Ro Surface film resistance of external surface (Refer to Table 2)

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Tota	al				0.293

 $Uw1 = \frac{1}{0.293}$ = 3.42 W/m²K

Sheet No.	6	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
	•		
Facade Orientation Facing	North	Gross Wall Area (Ao) =	74.10
Window to Wall Ratio (WWR)	0.55	Wall Orientation Factor (Gw) =	0.79

Components / Details		Code No.		
Description	Units	N-W1		
External Finish Material		30mm Stone cladding		
Conductivity	W/mK	2.90		
Thickness	m	0.030		
Average Absorptivity (awi)	(a)	0.89		
Intermediate component		12mm cement/ sand render		
Conductivity	W/mK	0.72		
Thickness	m	0.01		
Intermediate component		200mm concrete wall		
Conductivity	W/mK	2.16		
Thickness	m	0.20		
Intermediate component				
Conductivity				
Thickness				
Intermediate component				
Conductivity				
Thickness				
Internal Finish Material		10mm AGT Tile		
Conductivity	W/mK	1.10		
Thickness	m	0.01		
U-value of Opaque Area (Uwi)	W/m²K	3.42		
Opaque Wall Area (Awi)	m²	33.51		
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	3.88		

Heat Conduction through Opaque Wa	IIs = 3.5	57(Awi/Ao) Uw	i αwi Gw	where i= 1, 2,, r
	=	3.88	W/m ²	

Components / Details	•	Code No.		
Description	Units	N-F1	N-F2	
Glazing Type		Tinted	Tinted	
Thickness	m	0.01	0.01	
Glazing Area (Afi)	m²	33.73	6.86	
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.40	0.08	

Heat Conduction through Glazing	= 0.64	(Afi/Ao) l	Jfi Gw	where i= 1, 2,, n
	=	0.48	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing				
Components / Details		Code No.		
Description	Units	N-F1	N-F2	
Glazing Type		Tinted	Tinted	
Thickness	m	0.01	0.01	
Glazing Area (Afi)	m²	33.73	6.86	
Shading Coefficient of Glazing (SCf)		0.43	0.43	
Visible Light Transmittance (VLT)	%	53	53	
External Reflectance (ER)	%	17	17	
External Shading Miltiplier (ESC)		1.00	0.98	
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	cwi)Gw	6.46	1.28	

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 7.74 W/m²

Summary of RTTV at North Elevations (House 5)

East Elevations (House 5)

Gross Wall Areas (Opaque Walls + Gla	= azing Areas) (Ao) at East Elevations (House 5)	90.93 m²
Glazing Areas at	East Elevations (House 5) =	33.65 m²
Breakdown of Glazin Glazing Areas	ng Areas Unshaded (E-F1) = ECS = 1.000	25.69 m²
Glazing Areas G/F	Shaded by Built-Fin (Projection on Right) (N-F2) = Glazing Area = Length of Glazing \times Glazing Height \times No. of Storeys 2.61 \times 3.05 = 7.96 m ²	7.96 m²
	SPF 7.80 / 3.00 = 2.60 ECS = 0.795	

Opaque Wall Areas at	East Elevations (House 5)	= 57.28 m

Breakdown of Opaque Wall Areas					
RC Wall Areas	(E-	W1)	=	57.28 m ²

Window to Wall Ratio (WWR) =	33.65	/ 90).93 =	0.37

Sheet no. 7

W/m²K

(Refer to Table 9)

Wall Orientation Factor Gw = 1.072

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 5)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (Refer \ to \ Table \ 5)$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

U = 1/(Ri+x₁/k₁+x₂/k₂+...+x_n/k_n+Ra+Ro) where
Ri Surface film resistance of internal surface (Refer to **Table 2**)
Ro Surface film resistance of external surface (Refer to **Table 2**)
Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

E-W1 Description: RC Wall Areas Wall Material External surface film resistance Ro 0.044 Air space resistanace Ra 0 30mm Stone cladding 0.03 2.9 0.010 0.72 0.017 12mm cement/ sand render 0.012 200mm concrete wall 0.2 / 2.16 0.093 10mm AGT Tile 0.009 0.01 / 1.1 Internal surface film resistance 0.12 0.293 Total

 $Jw1 = \frac{1}{0.202} = 3.42$

Sheet No.	8	BD Ref No.	BD 2/9179/15		
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 5)				
Facade Orientation Facing	East	Gross Wall Area (Ao) =	90.93		
Window to Wall Ratio (WWR)	0.37	Wall Orientation Factor (Gw) =	1.072		

Components / Details		Code No.			
Description	Units	E-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	57.28			
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	7.33			

Heat Conduction through Opaque Walls	; =	3.57(Awi/Ao) Uwi α\	wi Gw	where i= 1, 2,, r
	=	7.33	W/m²	

Components / Details	Code No.			
Description	Units	E-F1	N-F2	
Glazing Type		Tinted	Tinted	
Thickness	m	0.01	0.01	
Glazing Area (Afi)	m²	25.69	7.96	
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.34	0.10	

Part 3 - Calculation of Solar Radiation through Glazing							
Components / Details	Code No.						
Description	Units	E-F1	N-F2				
Glazing Type		Tinted	Tinted				
Thickness	m	0.01	0.01				
Glazing Area (Afi)	m²	25.69	7.96				
Shading Coefficient of Glazing (SCf)		0.43	0.43				
Visible Light Transmittance (VLT)	%	53	53				
External Reflectance (ER)	%	17	17				
External Shading Miltiplier (ESC)		1.00	0.80				
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	5.44	1.34				

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 6.78 W/m²

Summary of RTTV at East Elevations (House 5)

South Elevations (House 5)

Gross Wall Areas (Opaque Walls + Gla	zing Areas) (Ao) at South Elevations (House 5)	= 80.82 m ²
Glazing Areas at	South Elevations (House 5)	= 19.34 m ²
Breakdown of Glazin	ng Areas	
Glazing Areas	Unshaded (S-F1)	= 1.65 m ²
	ECS = 1	.000
Glazing Areas	Shaded by Built-Fin (Projection on left) (S-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys	= 17.69 m ²
G/F	$5.80 x 3.05 = 17.69 m^2$	
	SPF 10.70 / 6.00 = 1.78 ECS = 0.816	

Opaque Wall Areas at	South Elevations (House 5)	=	61.48 m ²
Opaque Hall Alcas at	oodii Licvations (nodsc o)		01. 4 0

Breakdown of Opaque Wall Areas			
RC Wall Areas	(S-W1)	=	61.48 m ²

14" I 4 14" II D 4" (1404/D)		40.04	,	00.00		
Window to Wall Ratio (WWR)	=	19.34	/	80.82	=	0.24

Sheet no. 9

Wall Orientation Factor Gw = 0.975 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 5)

External Wall Material (Colour/Finish)	% of wall area	α Absorptivity (Refer to Table 5)
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$ $Ra \qquad \text{Air space resistance (Refer to$ **Table 3** $)}$

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

S-W1	Description:			RC Wall Are	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	/	2.9	=	0.010
12mm cement/ sand render		0.012	/	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
_	Total					0.203

Uw1 = 1 = 3.42 W/m²K

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
			_
Facade Orientation Facing	South	Gross Wall Area (Ao) =	80.82
Window to Wall Ratio (WWR)	0.24	Wall Orientation Factor (Gw) =	0.975

Components / Details		Code No.				
Description	Units	S-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	61.48				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.05				

Heat Conduction through Opaque Wal	ls = 3	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	8.05	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing						
Components / Details	Code No.					
Description	Units	S-F1	S-F2			
Glazing Type		Tinted	Tinted			
Thickness	m	0.01	0.01			
Glazing Area (Afi)	m²	1.65	17.69			
U-value of Glazing (Ufi)	W/m²K	1.74	1.74			
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.02	0.24			

Heat Conduction through Glazing	= 0.64	(Afi/Ao) l	Jfi Gw	where i= 1, 2,, n
	=	0.26	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details	Code No.	Code No.				
Description	Units	S-F1	S-F2			
Glazing Type		Tinted	Tinted			
Thickness	m	0.01	0.01			
Glazing Area (Afi)	m²	1.65	17.69			
Shading Coefficient of Glazing (SCf)		0.43	0.43			
Visible Light Transmittance (VLT)	%	53	53			
External Reflectance (ER)	%	17	17			
External Shading Miltiplier (ESC)		1.00	0.82			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	0.36	3.13			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 3.48 W/m²

Summary of RTTV at South Elevations (House 5)

= 8.05 + 0.26 + 3.48 = 11.79 W/m²

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 5)	

Overall Gross Wall Area [a] 340.65 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	94.80	6.83	0.56	8.24	15.62	4.35
North	74.10	3.88	0.48	7.74	12.10	2.63
East	90.93	7.33	0.44	6.78	14.55	3.88
South	80.82	8.05	0.26	3.48	11.79	2.80

Overall RTTVwall = 13.66 W/m²

< 14 W/m²

OK

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Roof

Upper Roof

Sheet no.	12

Gross Roof Areas (Opaque Walls + Sky	ylight Areas) (Aro) at		Roof			=	169.39 m ²	
Skylight Areas at	Roof					=	0.00 m ²	
Breakdown of Skylig	<u>aht Areas</u>							
Skylight Areas	Unshaded	(S 1)		=	0.00 m ²	
OpaqueAreas at	Roof					=	169.39 m²	
Breakdown of Opaq	ue Roof Areas							
RC Roof Areas 1/F		(R1) =	29.04 m²	=	157.71 m²	
Roof				=	93.57 m² 35.10 m²			
Upper Roof				=	35.10 m²			
Breakdown of Opaqu RC Roof Areas	ue Roof Areas	(R2)		=	11.68 m²	
1/F		(112	=	5.61 m²		11.00 111	

6.07 m²

m²

Roof Orientation Factor

Gs = 2.16

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

Roof

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8
_		

Average Absorptivity =

0.896

'U' value of Opaque Roof Areas

U = $1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$

where Ri Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
Total					1.858

 $Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$

_R2	Description:			Roof Area		
Roof Material						
External surface film resistance				Ro	=	0.055
Air space resistanace				Ra	=	0
50mm cement/ sand screed	0.0	5	/	0.72	=	0.069
50mm expanded polystyrene	0.0	5	1	0.034	=	1.471
150mm concrete slab	0.1	5	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.0	1	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.162
	Total					1.836

$$Uw1 = \frac{1}{1.836} = 0.54 \text{ W/m}^2\text{K}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD 2/9179/15		
Building Address	Lot 2115, D.D. 105,			
Roof Orientation Facing	Flat	Gross Roof Area (Aro) =	169.39	
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) =	2.16	

Components / Details		Code No.					
Description	Units	R1	R2				
External Finish Material		25mm Unglazed Porcelain Tiles	10mm AGT Tile (Brown)				
Conductivity	W/mK	1.10	1.10				
Thickness	m	0.025	0.010				
Average Absorptivity (awi)	(a)	0.9	0.8				
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed				
Conductivity	W/mK	0.72	0.72				
Thickness	m	0.050	0.050				
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene				
Conductivity	W/mK	0.034	0.034				
Thickness	m	0.05	0.05				
Intermediate component		150mm concrete slab	150mm concrete slab				
Conductivity	W/mK	2.16	2.16				
Thickness	m	0.15	0.15				
Intermediate component							
Conductivity	W/mK						
Thickness	m						
Internal Finish Material							
Conductivity	W/mK	0.38	0.38				
Thickness	m	0.01	0.01				
U-value of the Roof (Uri)	W/m²K	0.53	0.53				
Opaque Roof Area (Ari)	m²	157.71	11.68				
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.33	0.22				

S	m	0.01	0.01	
of the Roof (Uri)	W/m²K	0.53	0.53	
Roof Area (Ari)	m²	157.71	11.68	
nduction = 3.47(Ari/Aro) U	ri αri Gs	3.33	0.22	
Heat Conduction throug	gh Opaque Roof = =	3.47(Ari/Aro) Uri ari 3.55	Gs . <mark>W/m²</mark>	where i= 1, 2,, n

Components / Details		Code No.					
Description	Units	\$1					
Skylight Glazing Type		-					
Thickness	m	-					
Skylight Area (Asi)	m²	0.00					
U-value of Skylight Glazing (Usi)	W/m²K	-					
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00					

Heat Conduction through Skylig	ht = 0.4	40 (Asi/Arc) Usi Gs	where i= 1, 2,, n
	=_	0.00	W/m²	

Components / Details		Code No.					
Description	Units	S1					
Skylight Glazing Type		-					
Thickness	m	-					
Skylight Area (Asi)	m²	0.00					
Shading Coefficient of Skylight Glazing (SCr)		-					
Visible Light Transmittance (VLT)		-					
External Reflectance (ER)		-					
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00					

Solar Radiation th	rough	Skylight	= 41.10 (Asi/Aro)	(SCri) Gs	where i= 1, 2,, n	
			= 0.	00	W/m²		
Summary of RTT\	at Ro	of					
	=	3.55		+	0.00	+	0.00
	=	3.55	W/m²				

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 5)	

Overall Roof Area [a] 169.39 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	169.39	3.55	0.00	0.00	3.55	3.55

Overall RTTVroof =	3.55	W/m²	
<	4	W/m²	Oł

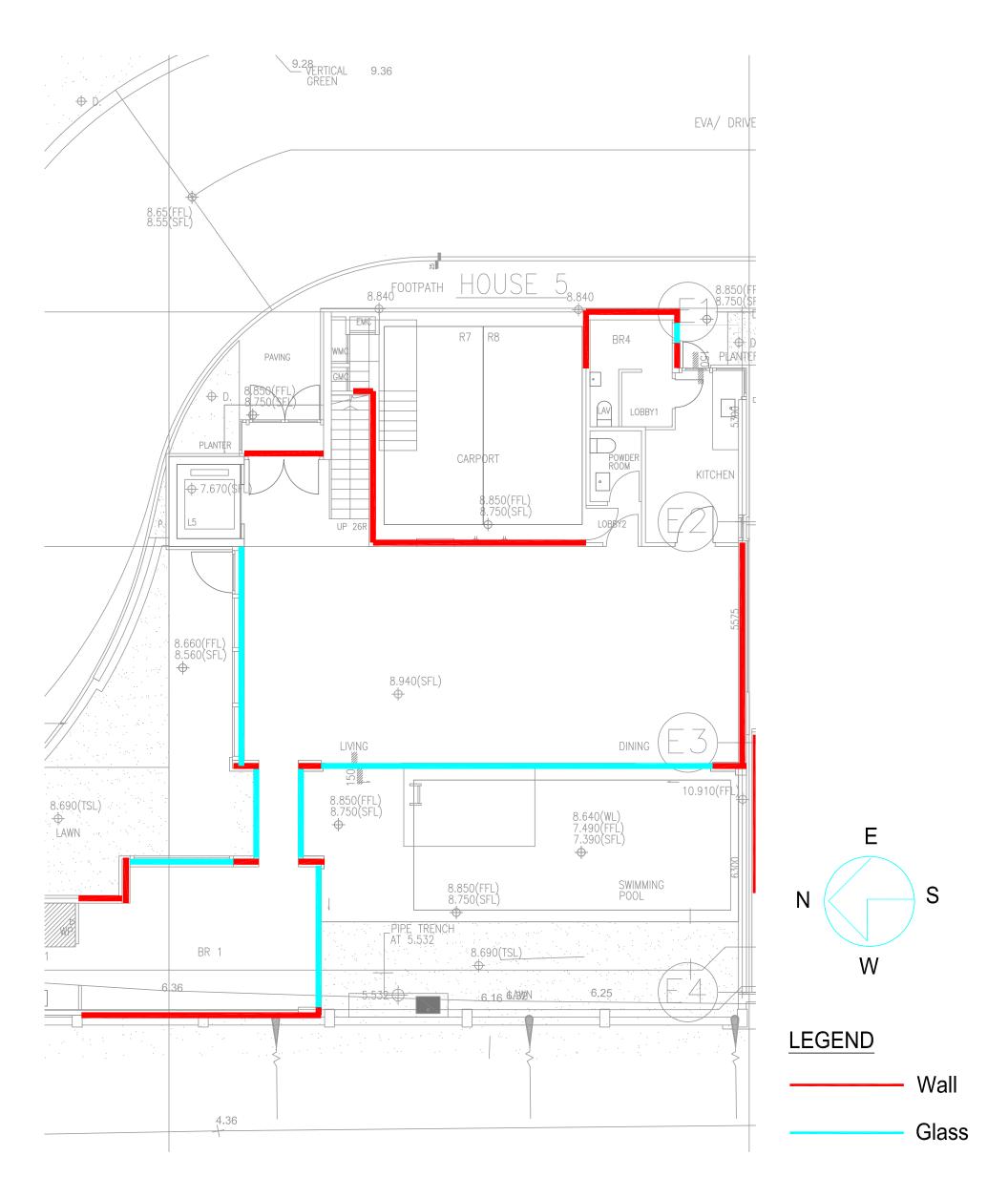
BD Ref. No. BD 2/9179/15

RTTV Summary Sheet

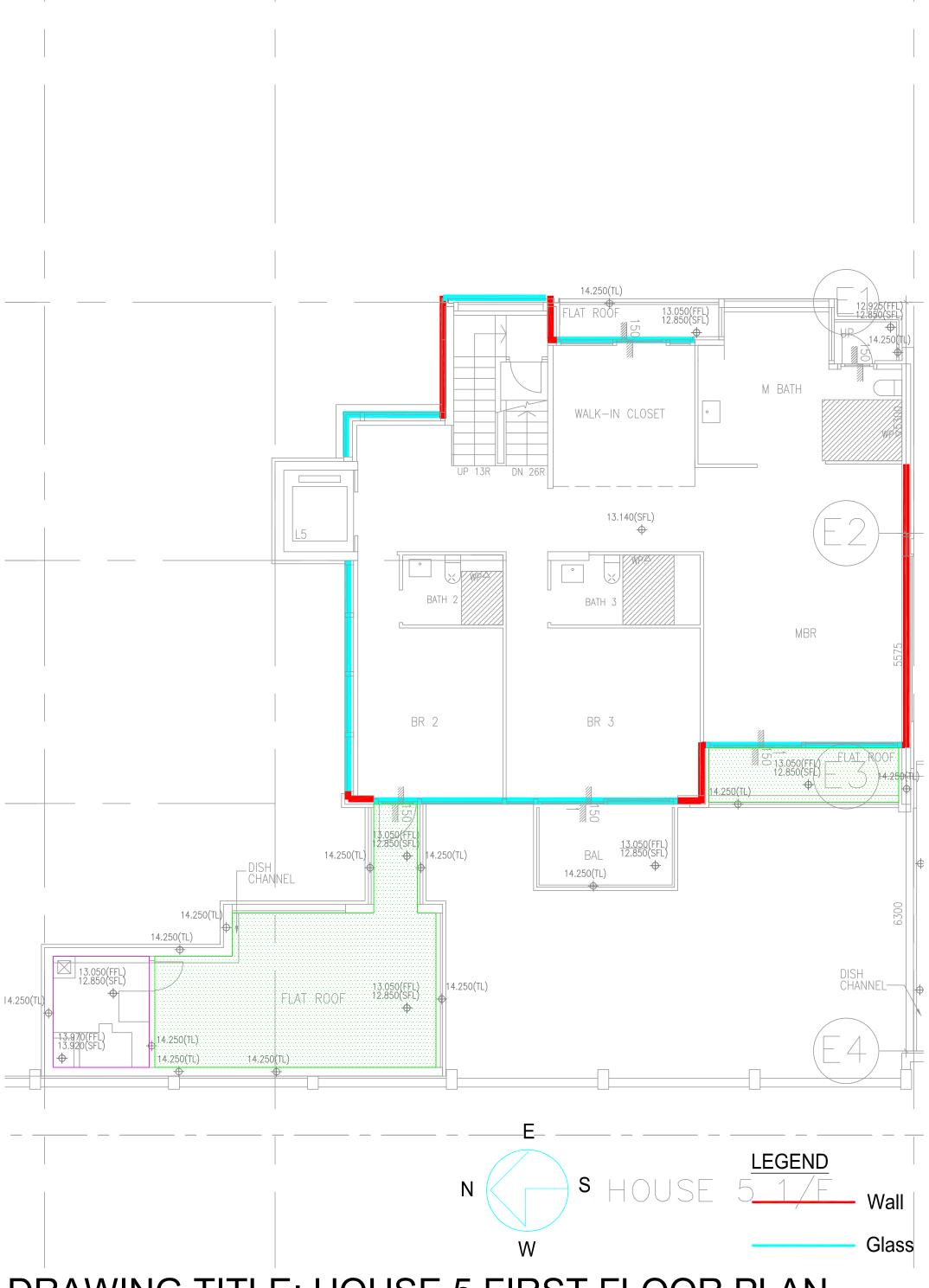
Building Type:		Residential																								
RTTV Calculat	ted by:	✓ 1. Re	egistered Prof	essional		Thomas And	lerson	& Partners	Consultin	ng Engine	eers Lt	d.														
		2. Ar	chitect																							
			hers, please s	specify:-																						
No. of Storeys		2																								
(Residential Un	nits)																									
Table 1																										
										1	Deem	ed to S	Satisfy R		•			,								
Facade Orienta			West			North			East				South	l												
Average Absor			0.795			0.8			0.8				0.8													
	w to Wall Ratio		0.51			0.37			0.18				0.23													
_	cient of Glazing		0.43			0.43			0.43				0.43													
Average Shadii Facade	ng Coefficient of		0.43			0.43			0.43				0.43													
Visable Light T	ransmittance		53	%		53	%		53	9	%		53	%			%			%			%			%
External Reflec	tance		17	%		17	%		17	9	%		17	%			%			%			%			%
Table 2																										
												RT	TTV _{Wall}													
Facade Orienta	tion Facing	West						North							East						South					
Wall Orientatio	n Factor			1.131						0.	.79						1.072						0.9	75		
Total External (Residential Ur			120.0	m ²	Windo	ow to Wall Ra	tio		63.1		m ²	Windo	ow to Wal	l Ratio		46.4	m ²	Windo	ow to Wa	all Ratio		78.1	1	m ² Win	dow to Wall R	latio
Total Window	Area		61.73	m ²	=	0.51			23.37		m ²	=	0.	37		8.25	m ²	=		0.18		18.12		n ² =	0.23	į
Heat	Opaque Wall		6.83		<u> </u>	W/m ²			3.8				W/m ²			7.33			W/m ²			8.05			W/m ²	
Conduction	Window		0.56			W/m ²			0.4				W/m ²			0.44			W/m ²			0.26			W/m ²	
Window	Glass Type		Area =	SC		VLT =	%	D. floreting	Area =		SC		VLT =	%	D. florting	Area =	SC		VLT =	%	D. G. etim	Area =	S		VLT =	%
			m ²	=		ER =	%	Reflective	m ²		=		ER =	%	Reflective	m ²	=		ER =	%	Reflective	m ²	=		ER =	%
			Area = 61 m^2	1.73 SC =	L	VLT = 53 ER = 17	%		Area = m ²		SC =	ı,		53 % 17 %		Area = m ²	8.25 SC =	ı.	VLT = ER =	53 % 17 %	Tinted	Area = m ²	18.12 Se			3 % 7 %
		☐ Clear	Area =	SC		VLT =	%	Clear	Area =		SC		VLT =	%	Clear	Area =	SC		VLT =	%	☐ Clear	Area =	S	2	VLT =	%
			m ²	=	L	ER =	%		m ²		=	L	ER =	%		m ²	=	L	ER =	%	-	m ²	=		ER =	%
	Double	Z Yes		No				Z Yes		☐ No					∑ Yes		No				Z Yes		No		1	
	Glazing										•							_								
	External Shading	Overhang	✓ Yes	1 🗆				Overhang	Yes		Z No				Overhang		Z 1				Overhang	Yes] No		
C. I. D. I' d	_	Sidefin	Yes	_ N	NO	2		Sidefin	Yes		Z No)	2		Sidefin	Yes Yes		No	1		Sidefin	☐ Yes] No	2	
Solar Radiation Gazing	Inrougn		8.24			W/m ²			7.1	/4			W/m ²			6.78			W/m ²			3.48	i		W/m ²	
Average Absor	ptivity			0.795							795						0.795						0.7	95		
RTTV _{Wall} at ea	ch Facade		15.62			W/m ²			12.	.10			W/m ²			14.55			W/m ²			11.7	9		W/m ²	
Overall RTTV	Wall												13.66		W/m ²											
Table 3																										
												RT	TTV _{Roof}													
Roof Orientatio			2:16																							
Total Roof Are Units)	a (Residential	4	169.39)	m ²																					
Total Skylight	Area		~~		m ²																					
Heat	Roof		3.55		W/m ²																					
Conduction	Skylight				W/m ²																					
	Glass Type	Reflect	ive Are	ea =					m ²	SC =						VI	_T =				%	ER =				%
		☐ Tinted	Are	ea =					m ²	SC =						VI	_T =				%	ER =				%
		Clear	Arc	ea =						SC =						VI	T =				%	ER =				%
Skylight	Double	☐ Yes		No						l																
. , ,	Glazing																									
	External	Yes		No																						
	Shading																									
Solar Radiation	through Gazing		<u> </u>		W/m ²																					
Average Absor		<i>(</i>	0.8	—																						
Overall RTTV _I		— \	3.55	$\overline{}$	W/m ²																					
L			V.	\mathcal{I}																						

Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 5)

ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance

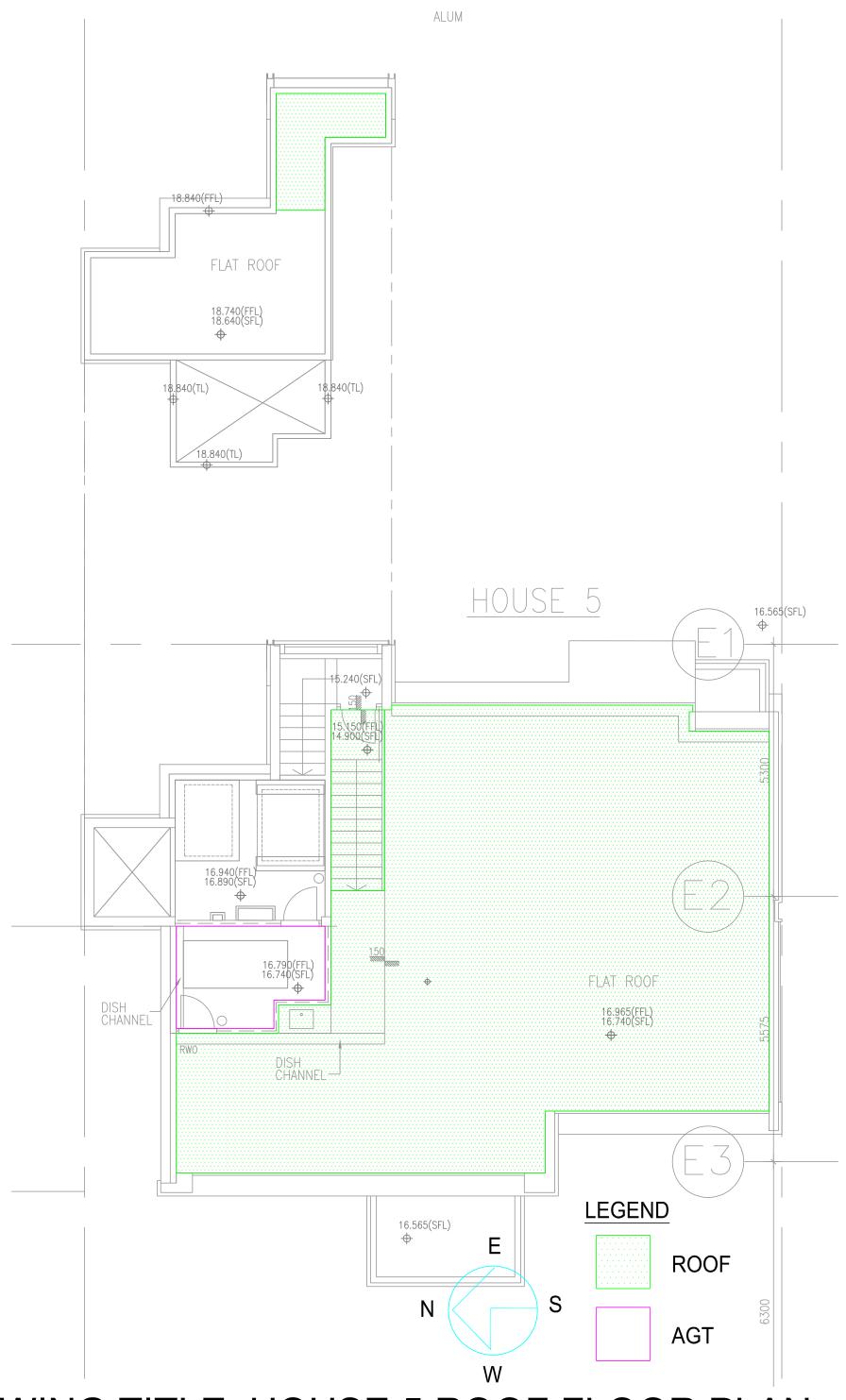


DRAWING TITLE: HOUSE 5 GROUND FLOOR PLAN SCALE: 1:150@A4

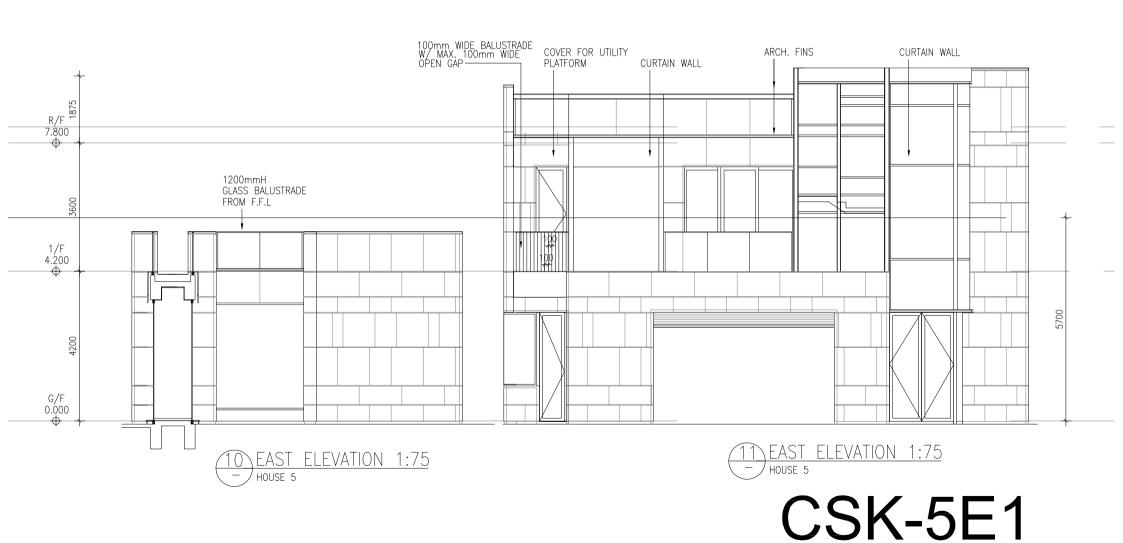


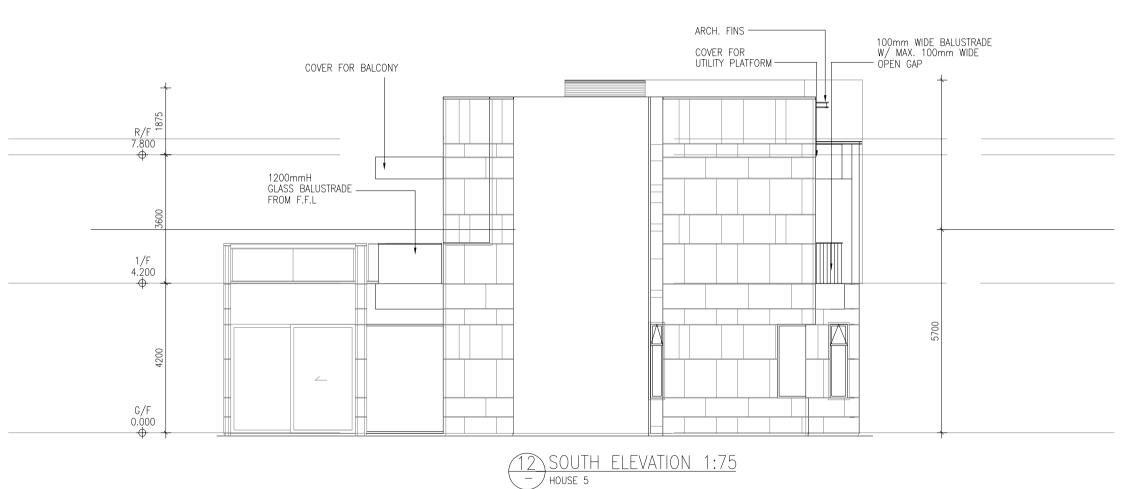
DRAWING TITLE: HOUSE 5 FIRST FLOOR PLAN

SCALE: 1:150@A4

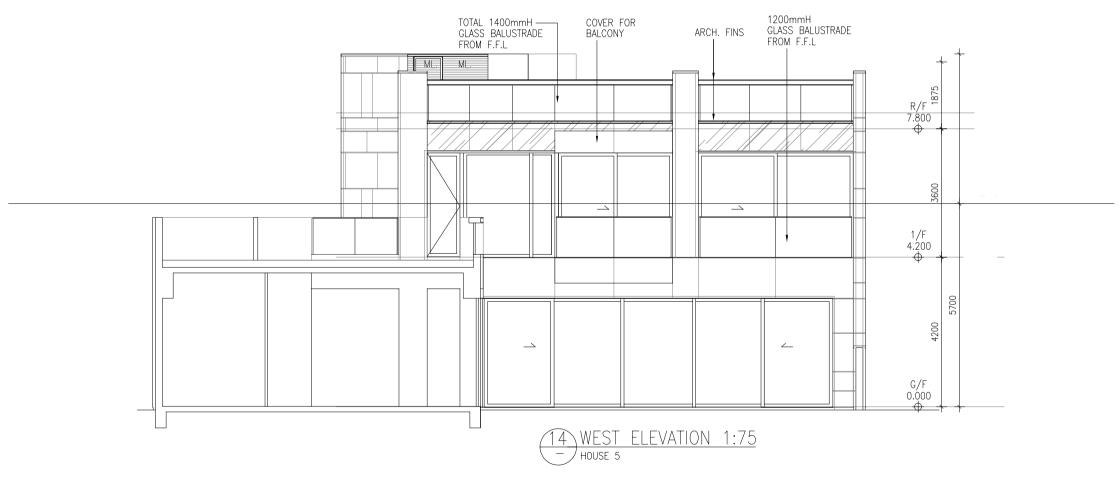


DRAWING TITLE: HOUSE 5 ROOF FLOOR PLAN SCALE: 1:150@A4

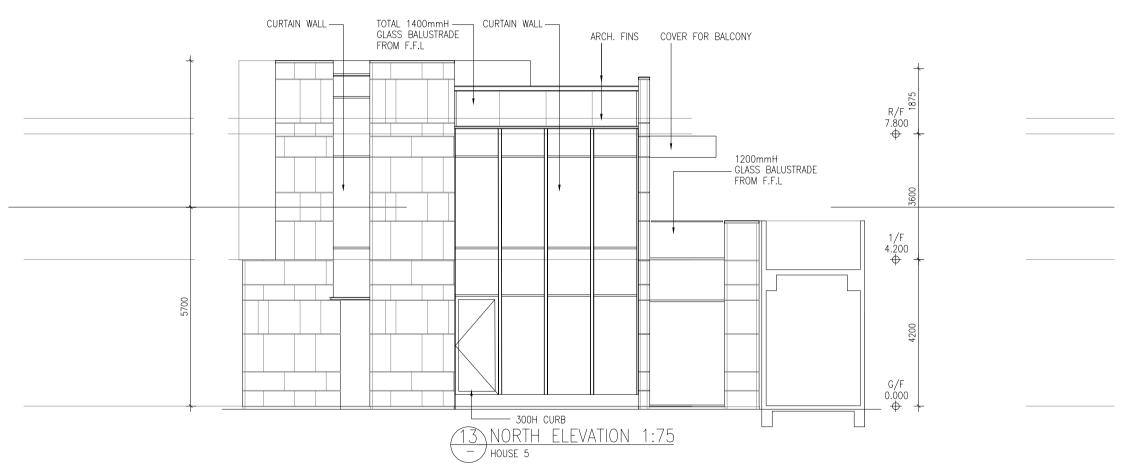




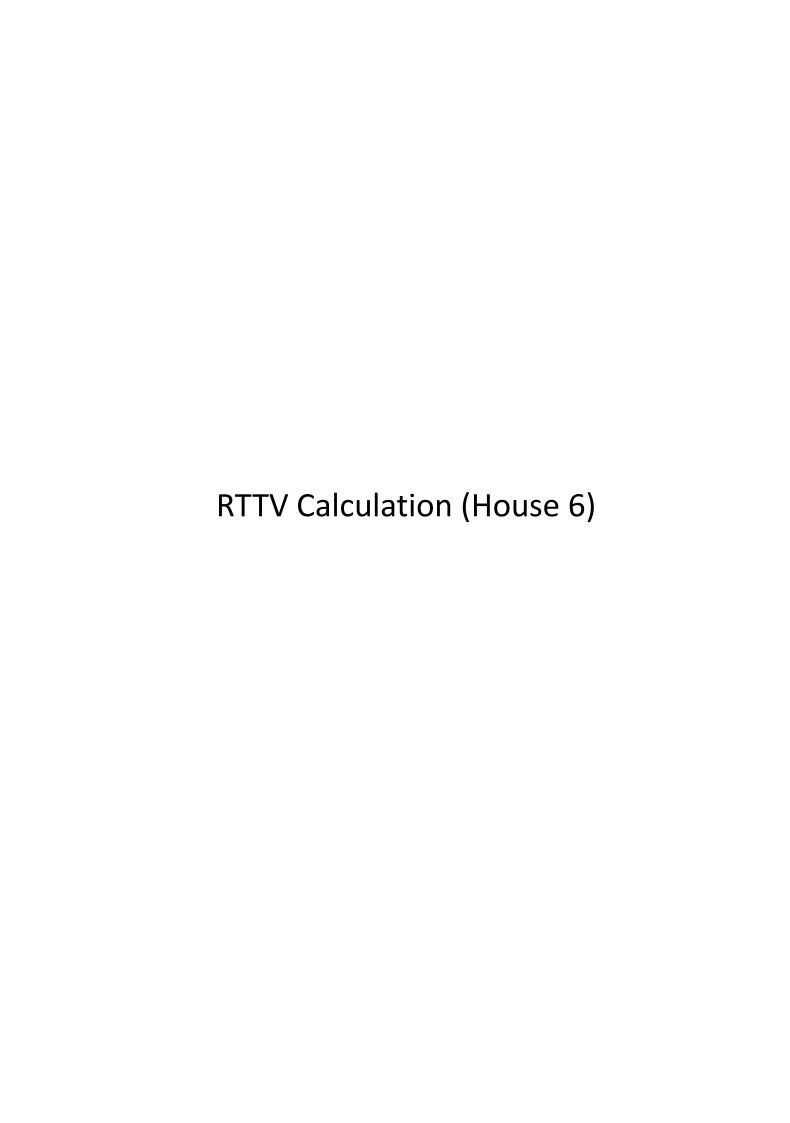
CSK-5E2



CSK-5E3



CSK-5E4



```
Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                                         Sheet no. 1
                                                                                                  Storey heights (Residential Units):
                                                                                                  G/F
                                                                                                                                       4.20 m
                                                                                                                                                  ( 1 storey)
                                                                                                  1/F
                                                                                                                                       3.60 m
                                                                                                                                                 ( 1 storey)
                                                                                                 R/F
                                                                                                                                       1.90 m
                                                                                                                                                 ( 1 storey)
West Elevations (House 6)
                                Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                                                                 )x 4.20 x 1 = 12.00 x 4.20 x 1 =
                                                                                                                                      50.40 m<sup>2</sup>
1/F
                                   12.70
                                                                                 )x 3.60 x 1 = 12.70 x
                                                                                                               3.60 \times 1 =
                                                                                                                                      45.72 m<sup>2</sup>
R/F
                                                                                 )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                      0.00 m<sup>2</sup>
                                                                                                                                      Gross Wall Areas
                                                                                                                                                           96.12 m<sup>2</sup>
North Elevations (House 6) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                   1.50 + 9.50 + 2.60
                                                                                 )x 4.20 x 1 = 13.60 x 4.20 x 1 =
                                                                                                                                      57.12 m<sup>2</sup>
1/F
                                                                                                    9.50 x 3.60 x 1 =
                                   8.60 + 0.90
                                                                                 )x 3.60 x 1 =
                                                                                                                                      34.20 m<sup>2</sup>
R/F
                                                                                 )x 1.90 x 1 =
                                                                                                    0.00 \times 1.90 \times 1 =
                                                                                                                                       0.00 m<sup>2</sup>
                                                                                                                                      Gross Wall Areas
                                                                                                                                                           91.32 m<sup>2</sup>
East Elevations (House 6)
                                Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                   8.20
                                                                                 )x 4.20 x 1 =
                                                                                                    8.20 \times 4.20 \times 1 =
                                                                                                                                      34.44 m<sup>2</sup>
1/F
                                   5.80 + 0.80
                                                                                 )x 3.60 x 1 =
                                                                                                    6.60 x
                                                                                                               3.60 \times 1 =
                                                                                                                                      23.76 m<sup>2</sup>
R/F
                                                                                 )x 1.90 x 1 =
                                                                                                    0.00 \times 1.90 \times 1 =
                                                                                                                                       0.00 m<sup>2</sup>
                                                                                                                                      Gross Wall Areas
                                                                                                                                                            58.20 m<sup>2</sup>
South Elevations (House 6) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                  13.50 + 1.10
                                                                                 )x 4.20 x 1 = 14.60 x
                                                                                                               4.20 \times 1 =
                                                                                                                                      61.32 m<sup>2</sup>
1/F
                                   6.50
                                                                                 )x 3.60 x 1 =
                                                                                                    6.50 x
                                                                                                               3.60 \times 1 =
                                                                                                                                      23.40 m<sup>2</sup>
R/F
                                                                                 )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                       0.00 m<sup>2</sup>
                                                                                                                                      Gross Wall Areas
                                                                                                                                                            84.72 m<sup>2</sup>
```

Total Gross Wall Areas

330.36 m²

```
Total Glazing Area (Window + Balcony) Calculation
                                                                                                                                                                                   Sheet no. 2
                                                                                                                         Glazing heights (Residential Units):
                                                                                                                         G/F (Window GL02) - A
                                                                                                                                                               3.05 m
                                                                                                                                                                                 storey)
                                                                                                                         G/F (Window GL02) - B
                                                                                                                                                       =
                                                                                                                                                               3.15 m
                                                                                                                                                                                 storey)
                                                                                                                         1/F (Window GL02) - C
                                                                                                                                                       =
                                                                                                                                                               2.66 m
                                                                                                                                                                                 storey)
                                                                                                                         1/F (Window GL02) - D
                                                                                                                                                               2.74 m
                                                                                                                                                                              1
                                                                                                                                                                                 storey)
West Elevations (House 6)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   9.90
                                                                                                        )x 3.05 x 1 =
                                                                                                                            9.90 x
                                                                                                                                        3.05 \times 1 =
                                                                                                                                                               30.15 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                        3.15 x
                                                                                                                                                                0.00 m<sup>2</sup>
                                                                                                                                                  1 =
1/F (Window GL02) - C
                                   7.50
                                                                                                        )x 2.66 x 1 =
                                                                                                                            7.50 x
                                                                                                                                        2.66 \times 1 =
                                                                                                                                                               19.91 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                      50.06 m<sup>2</sup>
North Elevations (House 6)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   5.30 + 2.60
                                                                                                        )x 3.05 x 1 =
                                                                                                                            7.90 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                               24.06 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                    2.80 + 5.40
                                                                                                        )x 2.66 x 1 =
                                                                                                                            8.20 x
                                                                                                                                        2.66 \times 1 =
                                                                                                                                                               21.77 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                            0.00 \times 2.74 \times 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                      45.83 m<sup>2</sup>
East Elevations (House 6)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   2.90
                                                                                                        )x 3.05 x 1 =
                                                                                                                            2.90 x
                                                                                                                                        3.05 \times 1 =
                                                                                                                                                                8.83 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
                                                                                                        )x 3.15 x 1 =
G/F (Window GL02)
                                                                                                        )x 0.86 x 1 =
                                                                                                                            0.00 x
                                                                                                                                        0.86 \times 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
1/F (Window GL02)
                                   0.70 + 2.20 + 3.10
                                                                                                        )x 2.64 x 1 =
                                                                                                                            2.90 x
                                                                                                                                        2.64 \times 1 =
                                                                                                                                                                7.66 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                      16.49 m<sup>2</sup>
South Elevations (House 6)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storevs
G/F (Window GL02) - A
                                   0.55 + 3.80
                                                                                                        )x 3.05 x 1 =
                                                                                                                            4.35 x
                                                                                                                                        3.05 \times 1 =
                                                                                                                                                               13.25 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                        3.15 \times 1 =
                                                                                                                                                                0.00 \text{ m}^2
1/F (Window GL02) - C
                                                                                                        )x 2.66 x 1 =
                                                                                                                            0.00 x
                                                                                                                                        2.66 \times 1 =
                                                                                                                                                                0.00 \, m^2
                                                                                                                                                                0.00 \text{ m}^2
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                            0.00 \times 2.74 \times 1 =
```

Gross Glazing Areas

Total Gross Glazing Areas

13.25 m²

125.62 m²

West Elevations (House 6)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	zing Areas) (Ao) at West Elevations (House 6)	=	96.12 m²					
Glazing Areas at	West Elevations (House 6)	=	50.06 m ²					
Breakdown of Glazin Glazing Areas	ng Areas Unshaded (W-F1)	=	28.57 m ²					
	ECS =	1.000						
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) Glazing Area = Length of Glazing \times Glazing Height \times No. of Storeys 3.15 \times 3.05 = 9.61 \times 9.61 m ²	=	9.61 m²					
	OPF 1.90 / 3.05 = 0.62 ECS = 0.666							
Glazing Areas	Shaded by Built-Fin (Projection on Right) (W-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 4.50 x 2.64 = 11.88 m ²	=	11.88 m²					
	SPF 1.60 / 4.28 = 0.37 ECS = 0.989							
Opaque Wall Areas	Opaque Wall Areas at West Elevations (House 6)							
Breakdown of Opaq RC Wall Areas	ue Wall Areas (W-W1)	=	46.06 m ²					

50.06

96.12

0.52

Sheet no. 3

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 6)

External Wall Material (Colour/Finish)	% of wall area	α Absorptivity (Refer to Table 5)
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to **Table 2**)

Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

W-W1	Description:			RC Wall Are	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

w1 = 1 0 293

= 3.42

W/m²K

Sheet No.	4	BD Ref No.	BD 2/9179/15		
Building Address	Lot 2115, D.D. 105	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 6)			
Facade Orientation Facing	West	Gross Wall Area (Ao) =	96.12		
Window to Wall Ratio (WWR)	0.52	Wall Orientation Factor (Gw) =	1.131		

Components / Details		Code No.			
Description	Units	W-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	46.06			
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	5.88			

Heat Conduction through Opaque Walls	5 =	3.57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, r
	=	5.88	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing						
Components / Details	Code No.					
Description	Units	W-F1	W-F2	W-F3		
Glazing Type		Tinted	Tinted	Tinted		
Thickness	m	0.01	0.01	0.01		
Glazing Area (Afi)	m²	50.06	9.61	11.88		
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.66	0.13	0.16		

Heat Conduction through Glazing	= 0.64	4 (Afi/Ao) l	Jfi Gw	where i= 1, 2,, n
	=	0.94	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details	Code No.	Code No.			
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	28.57	9.61	11.88	
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43	
Visible Light Transmittance (VLT)	%	53	53	53	
External Reflectance (ER)	%	17	17	17	
External Shading Miltiplier (ESC)		1.00	0.67	0.99	
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	Cwi)Gw	6.04	1.35	2.48	

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 9.87 W/m²

Summary of RTTV at West Elevations (House 6)

= 5.88 + 0.94 + 9.87 = 16.69 W/m²

North Elevations (House 6)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 6)

Glazing Areas at North Elevations (House 6) = 45.83 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 45.83 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 6) = 45.49 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (N-W1) = 45.49 m²

Window to Wall Ratio (WWR) = 45.83 / 91.32 = **0.50**

Sheet no. 5

(Refer to Table 9)

Wall Orientation Factor Gw = 0.79

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 6)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
_		

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	/	2.9	=	0.010
12mm cement/ sand render	0.012	/	0.72	=	0.017
200mm concrete wall	0.2	/	2.16	=	0.093
10mm AGT Tile	0.01	/	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Tota					0.293

 $Uw1 = \frac{1}{0.293}$ = 3.42 W/m²K

Sheet No.	6	BD Ref No.	BD 2/9179/15	
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 6)			
Facade Orientation Facing	North	Gross Wall Area (Ao) =	91.32	
Window to Wall Ratio (WWR)	0.50	Wall Orientation Factor (Gw) =	0.79	

Components / Details		Code No.			
Description	Units	N-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	45.49			
Heat Conduction = 3.57(Awi/Ao)) Uwi awi Gw	4.27			

Heat Conduction through Opaque Walls	3.57(Awi/Ao) Uwi αι	wi Gw	where i= 1, 2,, n	
	=	4.27	W/m²	

Components / Details	Code No.		
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	45.83	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.44	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw			where i= 1, 2,, n
	=	0.44 W/	m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	N-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	45.83			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	7.12			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 7.12 W/m²

Summary of RTTV at North Elevations (House 6)

East Elevations (House 6)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 6)

Glazing Areas at East Elevations (House 6)

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 16.49 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 6) = 41.71 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (E-W1) = 41.71 m²

Window to Wall Ratio (WWR) = 16.49 / 58.20 = **0.28**

Sheet no. 7

(Refer to Table 9)

Wall Orientation Factor Gw = 1.072

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 6)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

E-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total			•		0.293

Uw1 = ____ = 3.42 W/m²K

Sheet No.	8	BD Ref No. BD	2/9179/15
Building Address	Lot 2115, D.D. 105, N	Igau Tam Mei, Yuen Long (House 6)	
Facade Orientation Facing	East	Gross Wall Area (Ao) =	58.20
Window to Wall Ratio (WWR)	0.28	Wall Orientation Factor (Gw) =	1.072

Components / Details		Code No.			
Description	Units	E-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	41.71			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.34			

Heat Conduction through Opaque Walls	Conduction through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw					
	=	8.34	W/m²			

Components / Details	Code No.		
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	16.49	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.34	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.34 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details	Code No.				
Description	Units	E-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	16.49			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	5.45			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 5.45 W/m^2

Summary of RTTV at East Elevations (House 6)

South Elevations (House 6)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 6)

Glazing Areas at South Elevations (House 6) = 13.25 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 13.25 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 6) = 71.47 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(S-W1) = 71.47 m²

Window to Wall Ratio (WWR) = 13.25 / 84.72 = 0.16

Sheet no. 9

Wall Orientation Factor Gw = 0.975 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 6)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ Ri

Ri Surface film resistance of internal surface (Refer to **Table 2**)

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

S-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total	·				0.293

Uw1 = ____1 = 3.42 W/m²K

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	, Ngau Tam Mei, Yuen Long (House 6)	
	•		
Facade Orientation Facing	South	Gross Wall Area (Ao) =	84.72
Window to Wall Ratio (WWR)	0.16	Wall Orientation Factor (Gw) =	0.975

Components / Details		Code No.			
Description	Units	S-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	71.47			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.93			

Heat Conduction through Opaque Wal	uction through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw				
	=_	8.93	W/m²		

Components / Details		Code No.		
Description	Units	S-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	13.25		
U-value of Glazing (Ufi)	W/m²K	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.17		

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.17 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing				
Components / Details		Code No.		
Description	Units	S-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	13.25		
Shading Coefficient of Glazing (SCf)		0.43		
Visible Light Transmittance (VLT)	%	53		
External Reflectance (ER)	%	17		
External Shading Miltiplier (ESC)		1.00		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw		2.74		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 2.74 W/m²

Summary of RTTV at South Elevations (House 6)

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No. 11 BD Ref No. BD Ref No. BD 2/9179/15

Building Address Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 6)

Overall Gross Wall Area [a] 330.36 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	96.12	5.88	0.94	9.87	16.69	4.86
North	91.32	4.27	0.44	7.12	11.83	3.27
East	58.20	8.34	0.34	5.45	14.13	2.49
South	84.72	8.93	0.17	2.74	11.84	3.04
				·		

Overall RTTVwall = 13.65 W/m²

< 14 W/m²

OK

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•	u		

Upper Roof

Sheet no.	12

Gross Roof Areas (Opaque Walls + Sk	ylight Areas) (Aro) at	F	Roof			=	165.63 m²
Skylight Areas at	Roof					=	0.00 m ²
Breakdown of Skyli	ght Areas						
Skylight Areas	Unshaded	(S1)		=	0.00 m ²
0	D. of						405.002
OpaqueAreas at	Roof					=	165.63 m²
Breakdown of Opac RC Roof Areas	ue Roof Areas	(R1)		=	153.97 m²
1/F Roof				=	25.11 m ² 93.76 m ²		
Upper Roof				=	35.10 m ²		
Breakdown of Opac	ue Roof Areas						
RC Roof Areas 1/F		(R2) =	5.59 m²	=	11.66 m ²
Roof				=	6.07 m ²		

m²

Roof Orientation Factor	
-------------------------	--

Gs = 2.16

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

Roof

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8
_		

Average Absorptivity =

0.896

'U' value of Opaque Roof Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$

where Ri Surface film resistance of internal surface (Refer to Table 2)

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
1	Total				1.858

$$Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$$

_R2	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
Tota	d[1.836

$$Uw1 = \frac{1}{1.836} = 0.54 \text{ W/m}^2\text{K}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. BD 2/9179/15	
Building Address	Lot 2115, D.D. 105, N	gau Tam Mei, Yuen Long (House 6)	
Roof Orientation Facing Skylight to Roof Ratio (SRR) =	Flat 0	Gross Roof Area (Aro) = 165.63 Roof Orientation Factor (Gs) = 2.16	

Components / Details		Code No.		
Description	Units	R1	R2	
External Finish Material		25mm Unglazed Porcelain Tiles	10mm AGT Tile (Brown)	
Conductivity	W/mK	1.10	1.10	
Thickness	m	0.025	0.010	
Average Absorptivity (αwi)	(a)	0.9	0.8	
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed	
Conductivity	W/mK	0.72	0.72	
Thickness	m	0.050	0.050	
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene	
Conductivity	W/mK	0.034	0.034	
Thickness	m	0.05	0.05	
Intermediate component		150mm concrete slab	150mm concrete slab	
Conductivity	W/mK	2.16	2.16	
Thickness	m	0.15	0.15	
Intermediate component				
Conductivity	W/mK			
Thickness	m			
Internal Finish Material				
Conductivity	W/mK	0.38	0.38	
Thickness	m	0.01	0.01	
U-value of the Roof (Uri)	W/m²K	0.53	0.53	
Opaque Roof Area (Ari)	m²	153.97	11.66	
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.32	0.22	

duction = 3.47(Ari/Aro) Uri ari Gs	3.32	0.22	
Heat Conduction through Opaque Roof =	3.47(Ari/Aro) Uri ari	Gs	where i= 1, 2,, n
=	`	W/m²	

Components / Details			Code	No.	
Description	Units	S 1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
U-value of Skylight Glazing (Usi)	W/m²K	-			
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00			

Heat Conduction through Skylight	= 0.40	(Asi/Aro	Usi Gs	where i= 1, 2,, n
	=	0.00	W/m²	

Components / Details		Code No.			
Description	Units	S1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
Shading Coefficient of Skylight Glazing (SCr)		-			
Visible Light Transmittance (VLT)		-			
External Reflectance (ER)		-			
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00			

Solar Radiation through Skylight = 41.10 (Asi/Aro) (SCri) Gs where i= 1, 2, ..., n = 0.00 W/m²

Summary of RTTV at Roof = 3.55 + 0.00 + 0.00 = 3.55 W/m²

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 6)	

Overall Roof Area [a] 165.63 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	165.63	3.55	0.00	0.00	3.55	3.55

Overall RTTVroof =	3.55	W/m²	
<	4	W/m²	Oł

BD Ref. No. BD 2/9179/15

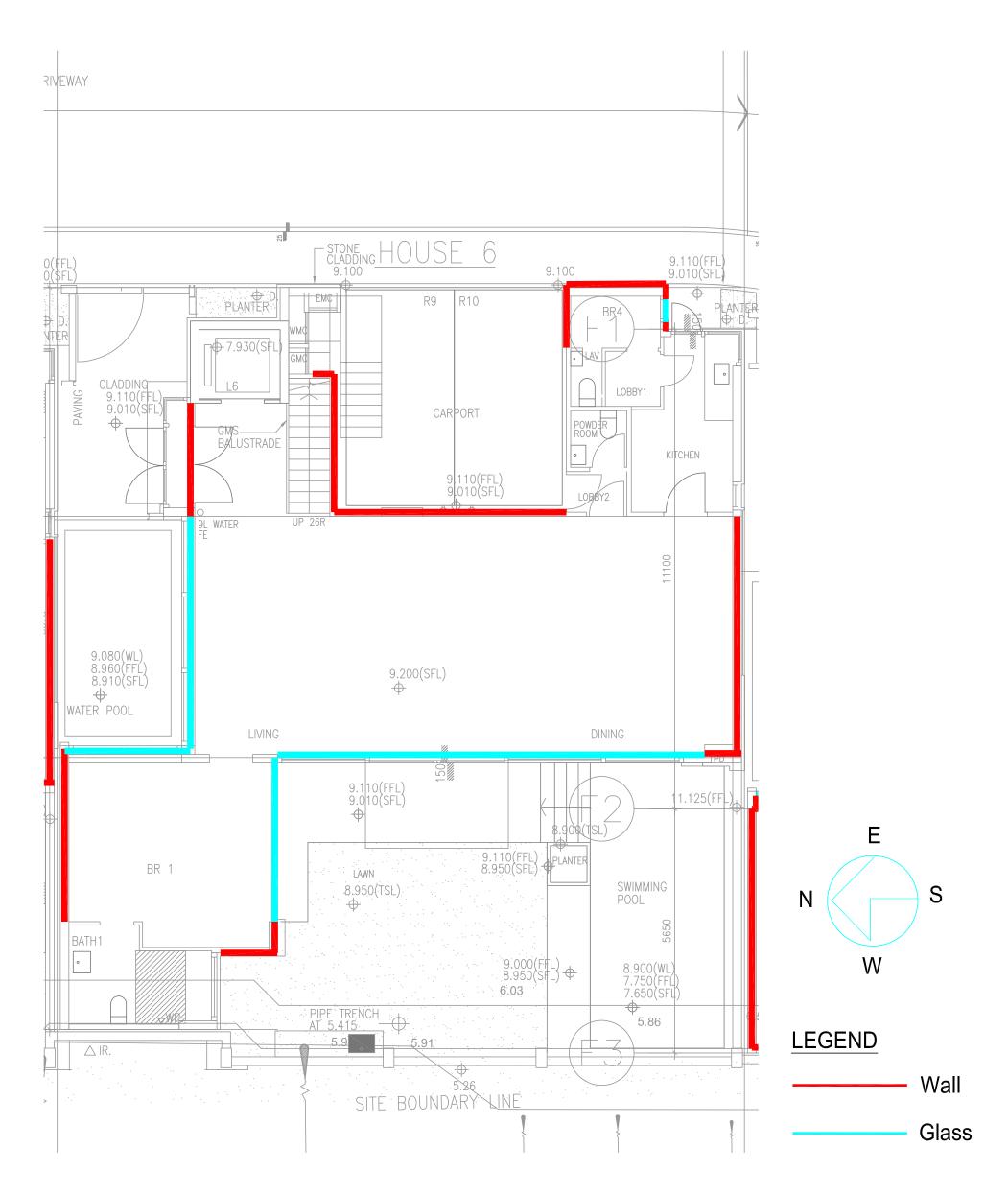
RTTV Summarv Sheet

Building Type:		Residentia	1																			
RTTV Calcula	ted by:	Z 1. R	egistered P	rofessional	,	Thomas Anderson	& Partners	Consulting	Engineers I	.td.												
		2. A	2. Architect																			
		3. O	thers, pleas	se specify:-																		
No. of Storeys		2																				
Residential Ur	nits)																					
Γable 1																						
									Deen	ed to	Satisfy RTTV	Wall										
acade Orienta	tion Facing		West			North		East			South											
Average Absor	ptivity		0.795			0.8		0.8			0.8											
	ow to Wall Ratio		0.51			0.37		0.18			0.23											
Shading Coeffi	cient of Glazing		0.43			0.43		0.43			0.43											
Average Shadii ⁷ acade	ng Coefficient of		0.43			0.43		0.43			0.43											
Visable Light T	Transmittance		53	%		53 %		53	%		53	%			%		%			%		%
External Reflec	ctance		17	%		17 %		17	%		17	%			%		%			%		%
Γable 2															I							
										R	ΓΤV _{Wall}											
acade Orienta	tion Facing	West					North						East					South				
Wall Orientatio	n Factor			1.131					0.79						1.072					0.975		
Total External	Wall Area		120.0	m ²	Windov	w to Wall Ratio		63.1	m ²	Windo	ow to Wall Ra	tio		46.4	m ²	Window to Wa	all Ratio		78.1	m ²	Window to Wall I	Ratio
Residential Ur			(1.72		_			22.27						0.25					10.12			
Total Window			61.73	m ²	=	0.51		23.37	m ²	=	0.37			8.25	m ²		0.18		18.12	m ²	= 0.23	,
Heat Conduction	Opaque Wall		5.8			W/m ²		4.27			W/m ²			8.34		W/m ²			8.93		W/m ²	
	Window		0.9			W/m ²		0.44			W/m ²			0.34	1	W/m ²			0.17	1	W/m ²	
Window	Glass Type		Area = m ²	SC =		VLT = % ER = %	Reflective	Area = m ²	SC =		VLT = ER =	%	Reflective	Area = m ²	SC =	VLT = ER =	%	Reflective	Area = m ²	SC =	VLT = ER =	%
		∠ Tinted	Area = m ²	61.73 SC =		VLT = 53 % ER = 17 %	/ Tinted	Area = m ²	23.37 SC =	0.43	VLT = 53 ER = 17			Area = 8.2: m ²	5 SC =	0.43 VLT = ER =	53 % 17 %	Z Tinted	$Area = 18.1$ m^2	2 SC =	0.43 VLT = 5 ER = 1	3 % 7 %
		Clear	Area =	SC		VLT = %	Clear	Area =	SC		VLT =	%	Clear	Area =	SC	VLT =	%	Clear	Area =	SC	VLT =	%
			m^2	=	_	ER = %		m^2	=		ER =	%		m ²	=	ER =	%	1	m ²	=	ER =	%
	Double Glazing	Z Yes	1	☐ No			☑ Yes		No				✓ Yes	□ No	lo			Z Yes	_ N	lo		
	External Shading	Overhang	Z Yes	_ 1			Overhang	☐ Yes	Z N				Overhang	☐ Yes	☑ No			Overhang	☐ Yes	Z No		
	_	Sidefin	Yes	1 🗆	No		Sidefin	☐ Yes	Z N	0			Sidefin	☐ Yes	Z No			Sidefin	Yes	Z No		
Solar Radiation Gazing	through		9.8	37		W/m ²		7.12	2		W/m ²			5.45		W/m ²			2.74		W/m ²	
Average Absor	ptivity			0.795					0.795						0.795					0.795		
RTTV _{Wall} at ea	ch Facade		16.	69		W/m ²		11.8	3		W/m ²			14.13		W/m ²			11.84		W/m ²	
Overall RTTV	Wall					•					13.65		W/m ²									
Table 3																						
										R	TTV _{Roof}											
Roof Orientatio	on Factor		2.16																			
Total Roof Are Jnits)	a (Residential	7	165.53)	m ²																	
Γotal Skylight	Area		0		m ²																	
Heat	Roof	(3.55	\	W/m ²																	
	Skylight	<u> </u>	The same of the sa	/	W/m ²																	
	Glass Type	Reflec	tive	Area =	******			m ² S	SC =					VLT :				%	ER =			%
	Glass Type	Tinted		Area =					SC =					VLT :				%	ER =			%
														VLT :								
Cl1:-b4	n 11	Clear		Area =				m ² S	SC =					VL1				%	ER =			%
Skylight	Double Glazing	☐ Yes		☐ No																		
	External Shading	☐ Yes		☐ No																		
Solar Radiation	through Gazing	l .			W/m ²																	-
Average Absor		(0.8	<i></i>																		-
Overall RTTV ₁		 }	3.55	-)-	W/m ²																	-
	4.4			/																		

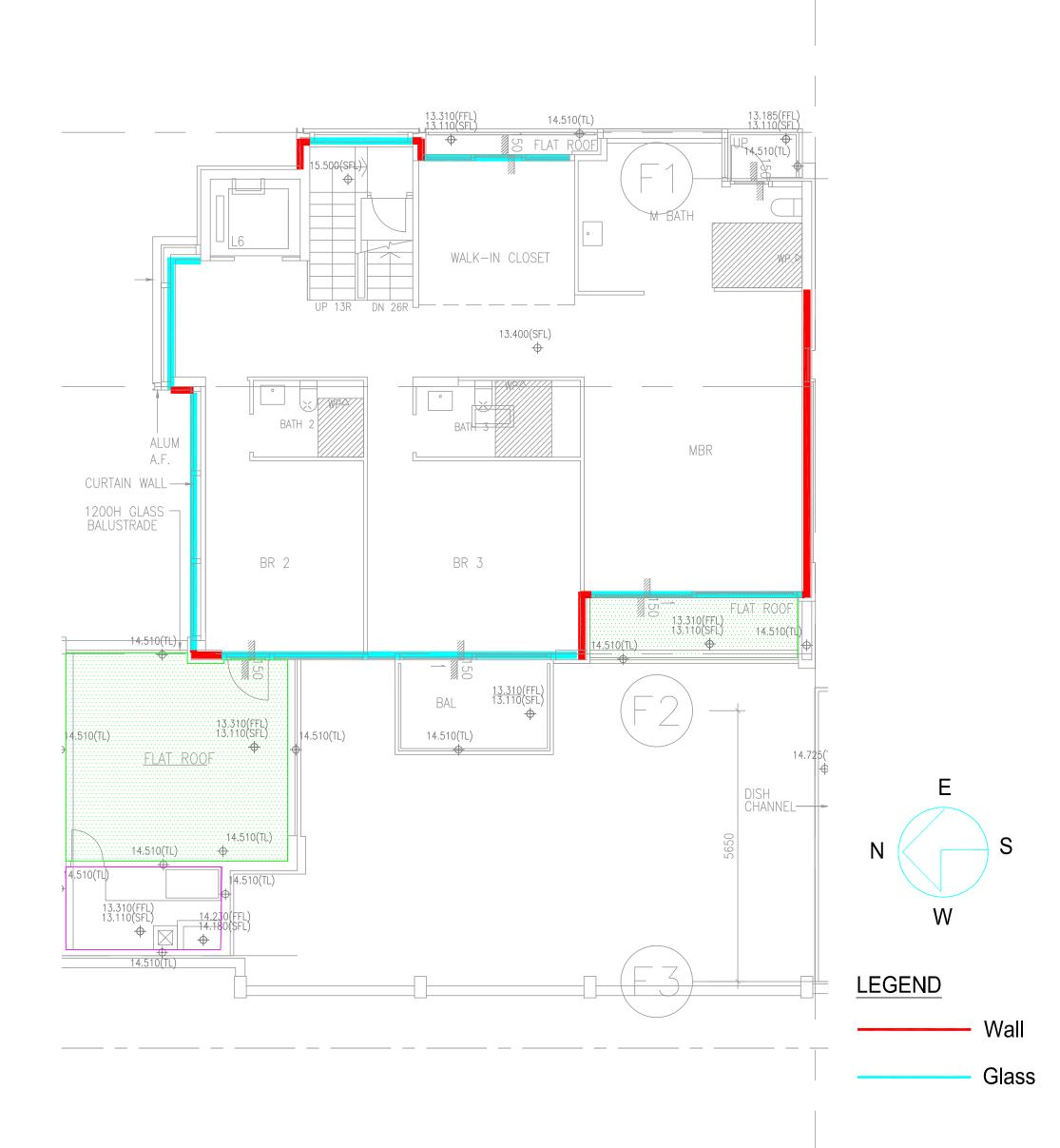
Address:

Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 6)

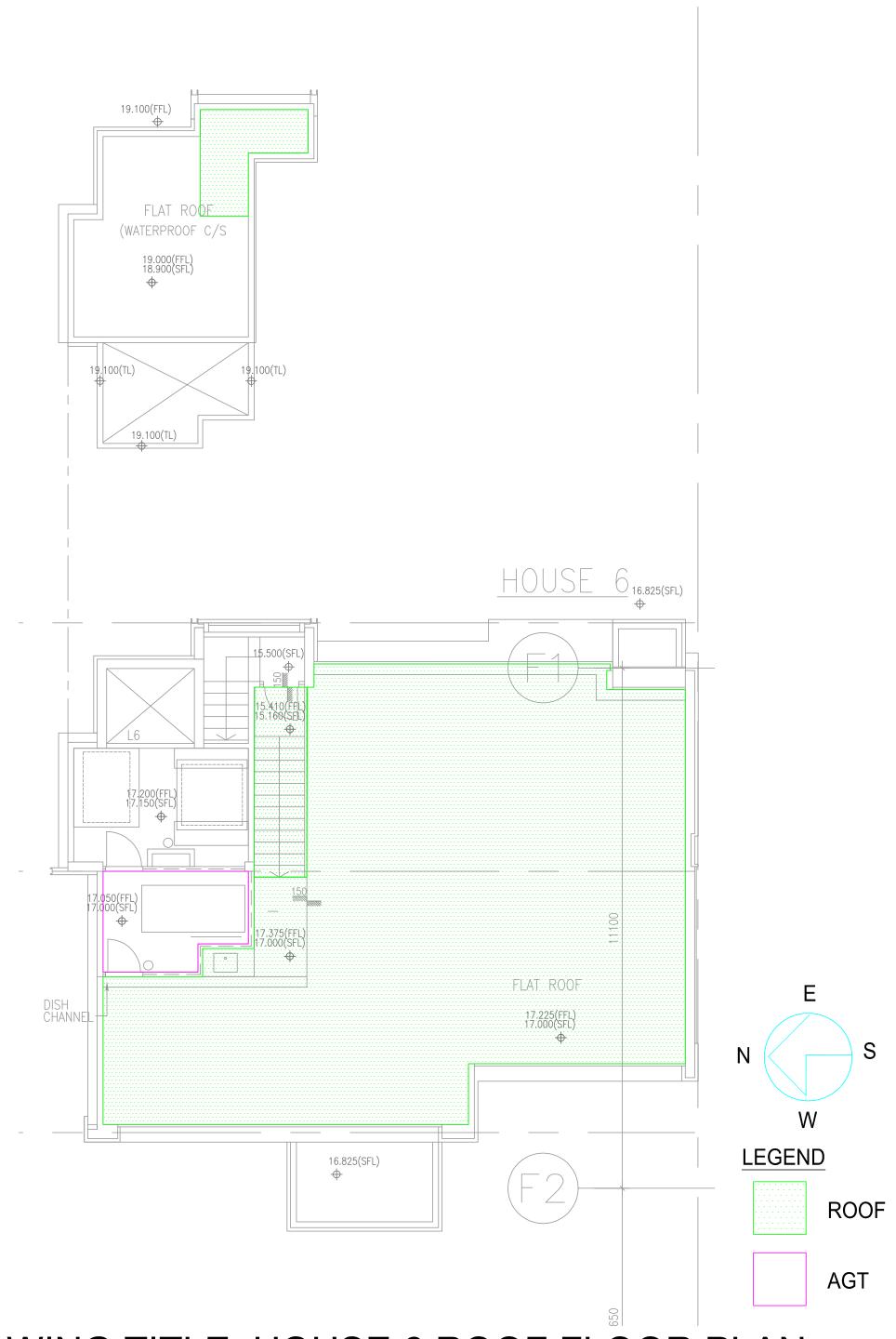
ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance



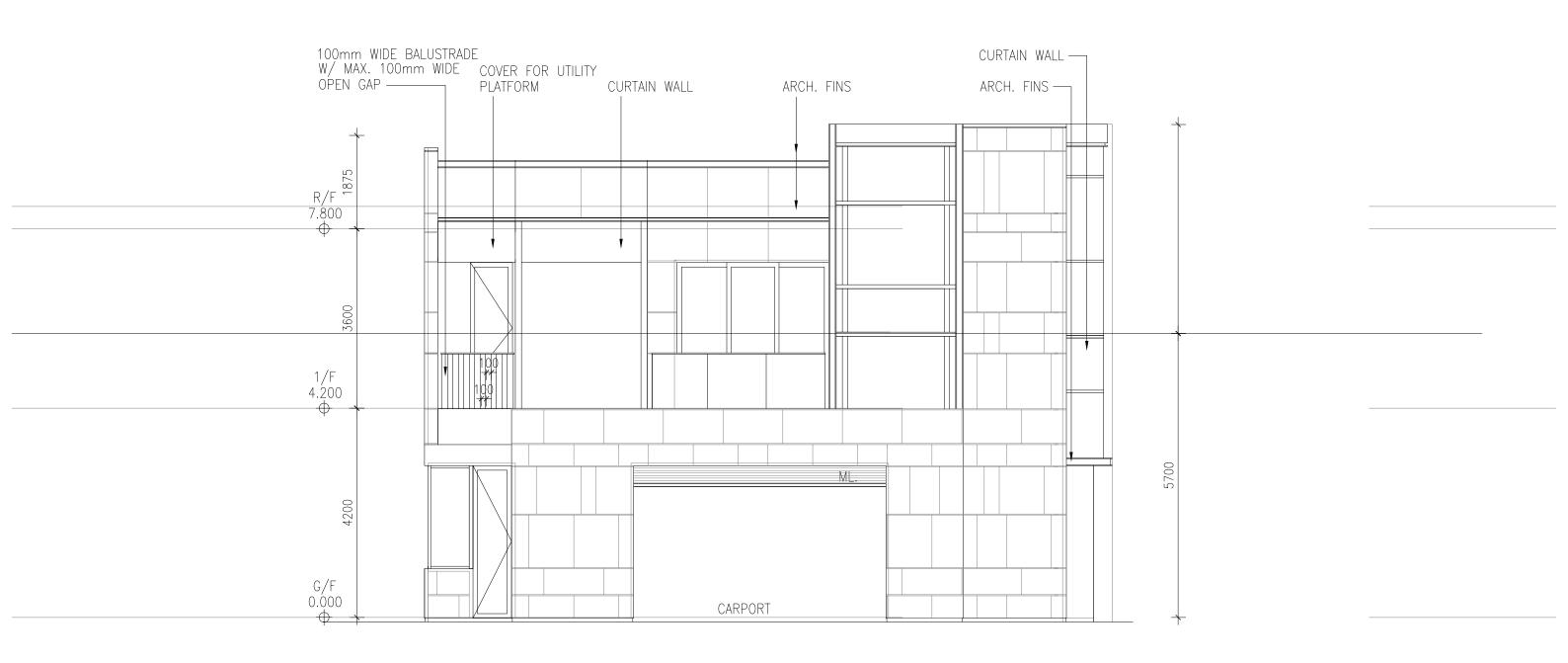
DRAWING TITLE: HOUSE 6 GROUND FLOOR PLAN SCALE: 1:150@A4



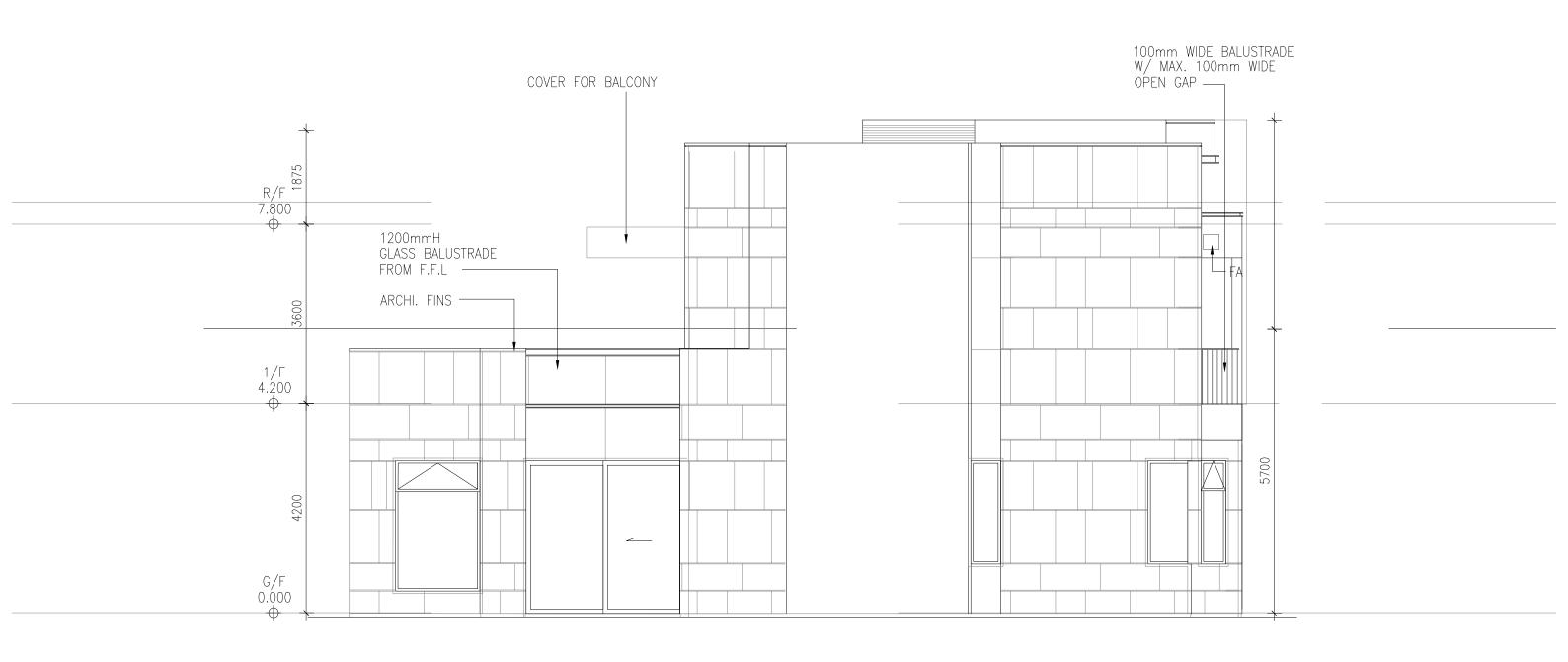
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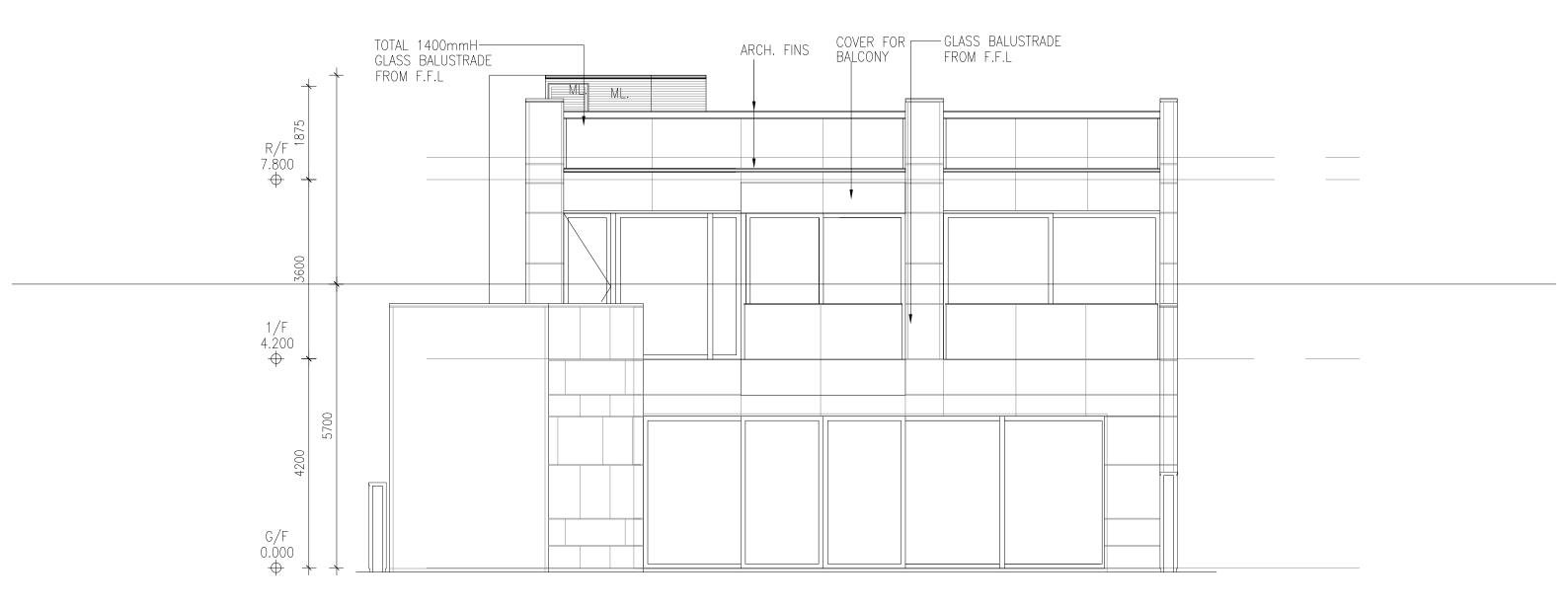
DRAWING TITLE: HOUSE 6 ROOF FLOOR PLAN SCALE: 1:150@A4





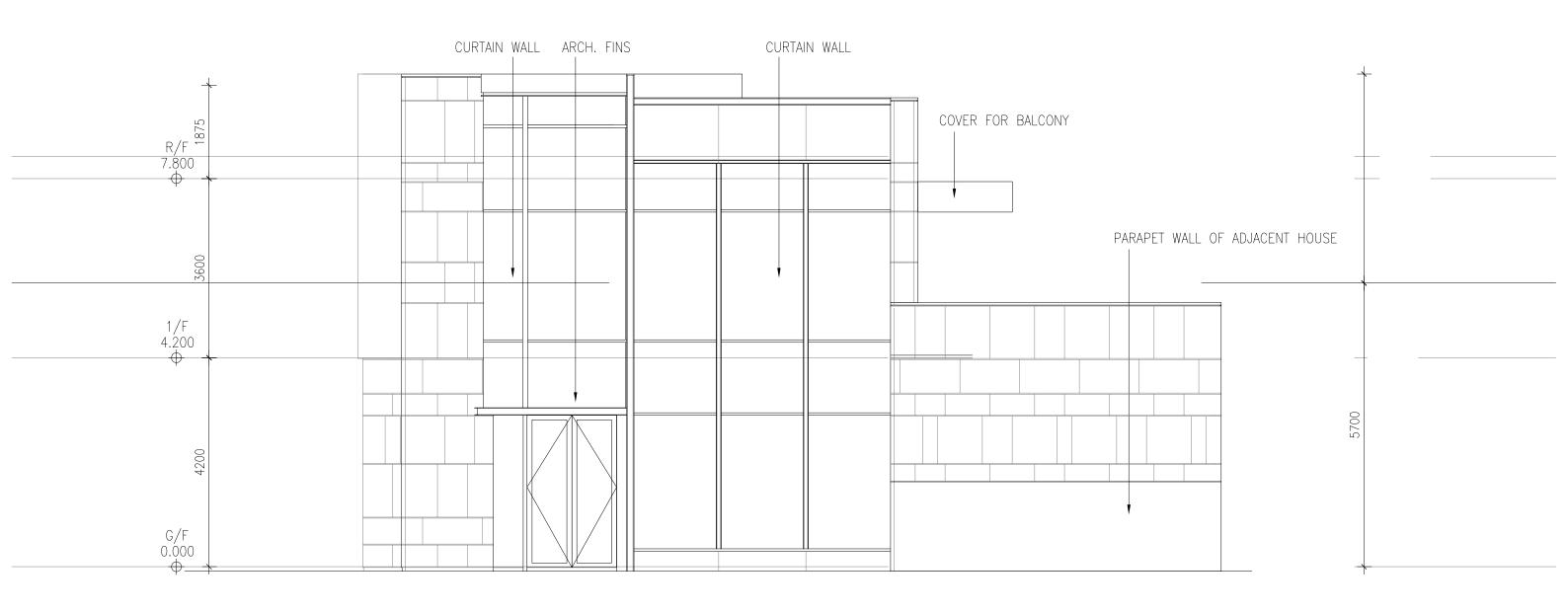




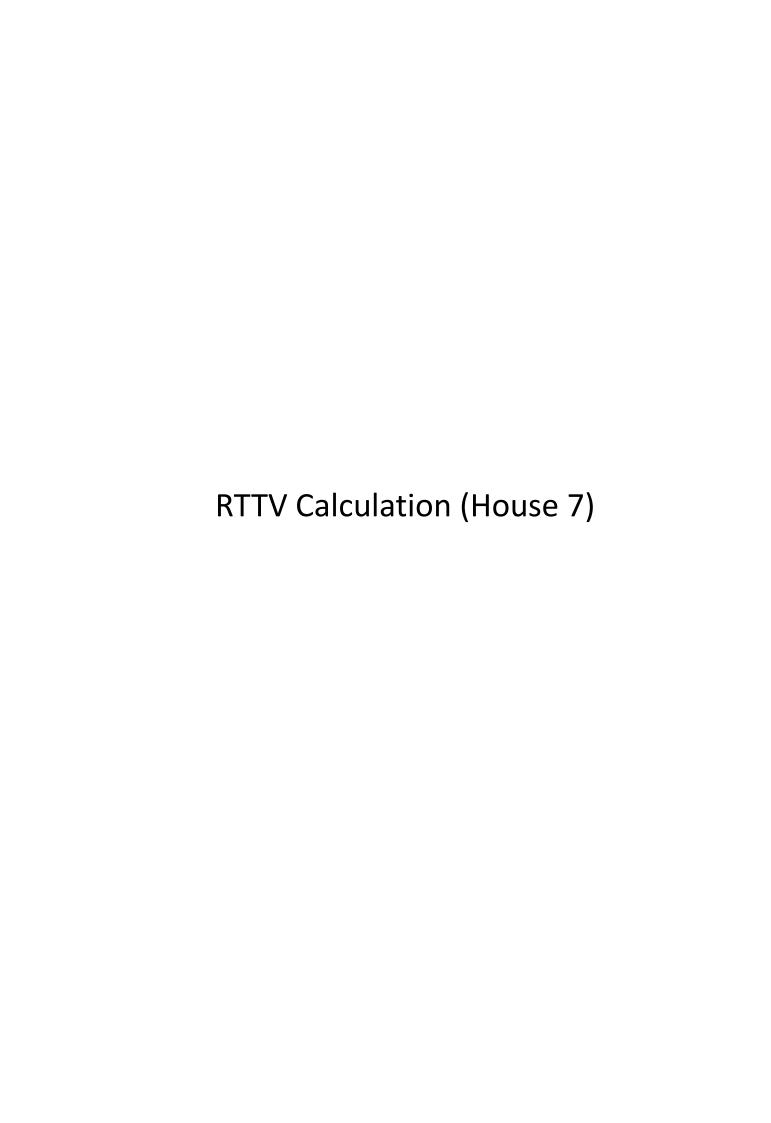


9 WEST ELEVATION 1:75

HOUSE 6



8 NORTH ELEVATION 1:75
HOUSE 6



Total Gross Wall Areas 338.34 m²

```
Total Glazing Area (Window + Balcony) Calculation
                                                                                                                                                                                  Sheet no. 2
                                                                                                                         Glazing heights (Residential Units):
                                                                                                                         G/F (Window GL02) - A
                                                                                                                                                               3.05 m
                                                                                                                                                                                 storey)
                                                                                                                         G/F (Window GL02) - B
                                                                                                                                                      =
                                                                                                                                                               3.15 m
                                                                                                                                                                                 storey)
                                                                                                                         1/F (Window GL02) - C
                                                                                                                                                      =
                                                                                                                                                               2.66 m
                                                                                                                                                                                 storey)
                                                                                                                         1/F (Window GL02) - D
                                                                                                                                                               2.74 m
                                                                                                                                                                             1
                                                                                                                                                                                 storey)
West Elevations (House 7)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                                                                                        )x 3.05 x 1 =
                                                                                                                           10.00 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              30.45 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 x
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                 1 =
1/F (Window GL02) - C
                                   7.50 + 4.50
                                                                                                        )x 2.66 x 1 =
                                                                                                                           12.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              31.86 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 = 0.00 x 2.74 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                     62.31 m<sup>2</sup>
North Elevations (House 7)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   8.00
                                                                                                        )x 3.05 x 1 =
                                                                                                                            8.00 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              24.36 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                    2.80 + 4.40
                                                                                                        )x 2.66 x 1 =
                                                                                                                            7.20 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                               19.12 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                     43.48 m<sup>2</sup>
East Elevations (House 7)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   2.60
                                                                                                        )x 3.05 x 1 =
                                                                                                                            2.60 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                                7.92 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
                                                                                                        )x 3.15 x 1 =
G/F (Window GL02)
                                                                                                        )x 0.86 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       0.86 \times 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
1/F (Window GL02)
                                   0.70 + 2.20 + 3.10
                                                                                                        )x 2.64 x 1 =
                                                                                                                            2.90 x
                                                                                                                                       2.64 \times 1 =
                                                                                                                                                               7.66 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                     15.57 m<sup>2</sup>
South Elevations (House 7) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
                                   0.50 + 2.80
G/F (Window GL02) - A
                                                                                                        )x 3.05 x 1 =
                                                                                                                            3.30 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                               10.05 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                                0.00 \text{ m}^2
1/F (Window GL02) - C
                                                                                                        )x 2.66 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
                                                                                                                                                                0.00 \text{ m}^2
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                            0.00 \times 2.74 \times 1 =
```

Gross Glazing Areas 10.05 m²

Total Gross Glazing Areas 131.41 m²

West Elevations (House 7)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gl	azing Areas) (Ao) at West Elevations (House 7)	=	96.12 m²
Glazing Areas at	West Elevations (House 7)	=	62.31 m²
Breakdown of Glaz Glazing Areas	Unshaded (W-F1)	= 1.000	40.82 m²
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.15 x 3.05 = 9.61 m ²	=	9.61 m²
Glazing Areas	OPF 1.90 / 3.05 = 0.62 ECS = 0.666 Shaded by Built-Fin (Projection on Right) (W-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 4.50 x 2.64 = 11.88 m^2	=	11.88 m²
	SPF 1.60 / 4.28 = 0.37 ECS = 0.989		
Opaque Wall Areas	at West Elevations (House 7)	=	33.81 m²
Breakdown of Opac RC Wall Areas	que Wall Areas (W-W1)	=	33.81 m²

62.31

96.12

0.65

Sheet no.	

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 7)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
		_

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

3.42

W/m²K

W-W1	Description:			RC Wall Are	as	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	4	BD Ref No. BD 2	2/9179/15
Building Address	Lot 2115, D.D. 105, N	Igau Tam Mei, Yuen Long (House 7)	
Facade Orientation Facing	West	Gross Wall Area (Ao) =	96.12
Window to Wall Ratio (WWR)	0.65	Wall Orientation Factor (Gw) =	1.131

Components / Details		Code No.					
Description	Units	W-W1					
External Finish Material		30mm Stone cladding					
Conductivity	W/mK	2.90					
Thickness	m	0.030					
Average Absorptivity (awi)	(a)	0.89					
Intermediate component		12mm cement/ sand render					
Conductivity	W/mK	0.72					
Thickness	m	0.01					
Intermediate component		200mm concrete wall					
Conductivity	W/mK	2.16					
Thickness	m	0.20					
Intermediate component							
Conductivity							
Thickness							
Intermediate component							
Conductivity							
Thickness							
Internal Finish Material		10mm AGT Tile					
Conductivity	W/mK	1.10					
Thickness	m	0.01					
U-value of Opaque Area (Uwi)	W/m²K	3.42					
Opaque Wall Area (Awi)	m²	33.81					
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	4.32					

Heat Conduction through Opaque Walls	= ;	3.57(Awi/Ao) Uwi a\	wi Gw	where i= 1, 2,, n
	=_	4.32	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing							
Components / Details		Code No.					
Description	Units	W-F1	W-F2	W-F3			
Glazing Type		Tinted	Tinted	Tinted			
Thickness	m	0.01	0.01	0.01			
Glazing Area (Afi)	m²	62.31	9.61	11.88			
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74			
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.82	0.13	0.16			

Components / Details		Code No.		
Description	Units	W-F1	W-F2	W-F3
Glazing Type		Tinted	Tinted	Tinted
Thickness	m	0.01	0.01	0.01
Glazing Area (Afi)	m²	40.82	9.61	11.88
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43
Visible Light Transmittance (VLT)	%	53	53	53
External Reflectance (ER)	%	17	17	17
External Shading Miltiplier (ESC)		1.00	0.67	0.99
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	SCwi)Gw	8.62	1.35	2.48

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 12.46 W/m^2

Summary of RTTV at West Elevations (House 7)

North Elevations (House 7)

Gross Wall Areas 98.04 m² (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 7) Glazing Areas at North Elevations (House 7) 43.48 m² **Breakdown of Glazing Areas Glazing Areas** Unshaded (N-F1) 43.48 m² ECS = 1.000

North Elevations (House 7) **Opaque Wall Areas at** 54.56 m²

Breakdown of Opaque Wall Areas RC Wall Areas (N-W1) 54.56 m²

43.48 98.04 Window to Wall Ratio (WWR) = 0.44 Sheet no. 5

Wall Orientation Factor (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 7)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

> Air space resistance (Refer to Table 3) Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

RC Wall Areas N-W1 Description:

	D 000011ptio111				000	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	6	BD Ref No. ^B	3D 2/9179/15
Building Address	Lot 2115, D.D. 105, No	gau Tam Mei, Yuen Long (House 7)	
	•		
Facade Orientation Facing	North	Gross Wall Area (Ao) = _	98.04
Window to Wall Ratio (WWR)	0.44	Wall Orientation Factor (Gw) =	0.79

Components / Details		Cod	le No.
Description	Units	N-W1	
External Finish Material		30mm Stone cladding	
Conductivity	W/mK	2.90	
Thickness	m	0.030	
Average Absorptivity (awi)	(a)	0.89	
Intermediate component		12mm cement/ sand render	
Conductivity	W/mK	0.72	
Thickness	m	0.01	
Intermediate component		200mm concrete wall	
Conductivity	W/mK	2.16	
Thickness	m	0.20	
Intermediate component			
Conductivity			
Thickness			
Intermediate component			
Conductivity			
Thickness			
Internal Finish Material		10mm AGT Tile	
Conductivity	W/mK	1.10	
Thickness	m	0.01	
U-value of Opaque Area (Uwi)	W/m²K	3.42	
Opaque Wall Area (Awi)	m²	54.56	
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	4.77	

Heat Conduction through Opaque Wa	ction through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw			
	=	4.77	W/m ²	

Components / Details		Code No.	
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	43.48	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.39	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.39 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	N-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	43.48			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	6.29			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 6.29 W/m^2 Summary of RTTV at North Elevations (House 7)

East Elevations (House 7)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 7)

Glazing Areas at East Elevations (House 7) = 15.57 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 15.57 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 7) = 43.89 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (E-W1) = 43.89 m²

Window to Wall Ratio (WWR) = 15.57 / 59.46 = 0.26

Sheet no. 7

Wall Orientation Factor Gw = 1.072 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

East Elevations (House 7)

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ Ri Surface film resistance of internal surface (Refer to **Table 2**) Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

E-W1	Description:			RC Wall Are	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

 $Uw1 = \frac{1}{0.293} = 3.42 \quad W/m^2K$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	8 BD Ref No. BD 2/9179/15			
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 7)			
Facade Orientation Facing	East	Gross Wall Area (Ao) =	59.46	
Window to Wall Ratio (WWR)	0.26	Wall Orientation Factor (Gw) =	1.072	

Components / Details	omponents / Details		Code No.			
Description	Units	E-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	43.89				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.59				

Heat Conduction through Opaque Wall	l s = 3	.57(Awi/Ao) U	wi αwi Gw	where i= 1, 2,, n
	=	8.59	W/m ²	

Components / Details		Code No.		
Description	Units	E-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	15.57		
U-value of Glazing (Ufi)	W/m²K	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.31		

Heat Conduction through Glazing	=	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n
	=	0.31 W	/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	E-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	15.57			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	Cwi)Gw	5.04			

Solar Radiation through Glazing	= 41.7	75 (Afi/Ao)	(SCfi)(ESCwi)Gw	where i= 1, 2,, n
	=	5.04	_W/m²	
Summary of RTTV	at Eas	t Elevatio	ons (House 7)	

South Elevations (House 7)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 7)

Glazing Areas at South Elevations (House 7) = 10.05 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 10.05 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 7) = 74.67 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(S-W1) = 74.67 m²

Window to Wall Ratio (WWR) = 10.05 / 84.72 = 0.12

Sheet no. 9

Wall Orientation Factor Gw = 0.975 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 7)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

S-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
To	otal				0.293

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTVwall of Each Facade

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
	•		
Facade Orientation Facing	South	Gross Wall Area (Ao) =	84.72
Window to Wall Ratio (WWR)	0.12	Wall Orientation Factor (Gw) =	0.975

Components / Details			Code No.	
Description	Units	S-W1		
External Finish Material		30mm Stone cladding		
Conductivity	W/mK	2.90		
Thickness	m	0.030		
Average Absorptivity (awi)	(a)	0.89		
Intermediate component		12mm cement/ sand render		
Conductivity	W/mK	0.72		
Thickness	m	0.01		
Intermediate component		200mm concrete wall		
Conductivity	W/mK	2.16		
Thickness	m	0.20		
Intermediate component				
Conductivity				
Thickness				
Intermediate component				
Conductivity				
Thickness				
Internal Finish Material		10mm AGT Tile		
Conductivity	W/mK	1.10		
Thickness	m	0.01		
U-value of Opaque Area (Uwi)	W/m²K	3.42		
Opaque Wall Area (Awi)	m²	74.67		
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	9.33		

Heat Conduction through Opaque Walls =	3.57(Awi/Ao)	Uwi awi Gw	where i= 1, 2,, n
=	9.33	W/m²	

Components / Details		Code No.	
Description	Units	S-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	10.05	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.13	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi G	S w	where i= 1, 2,, n
	=	0.13 W	/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	S-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	10.05			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	Cwi)Gw	2.08			

Solar Radiation through Glazing	= 41	.75 (Afi/Ao)(SCfi)(ESCwi)Gw	where i= 1, 2,	, n	
	=_	2.08	W/m²			
Summary of RTTV	at Sc	outh Eleva	tions (House 7)			
	=	9.33	+	0.13	+	2.0
	=	11.53	W/m²			

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No. 11 BD Ref No. BD 2/9179/15

Building Address Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 7)

Overall Gross Wall Area [a] 338.34 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	96.12	4.32	1.10	12.46	17.87	5.08
North	98.04	4.77	0.39	6.29	11.45	3.32
East	59.46	8.59	0.31	5.04	13.94	2.45
South	84.72	9.33	0.13	2.08	11.53	2.89

Overall RTTVwall = 13.73 W/m²

< 14 W/m²

OK

_	_	_	ı
к	a	Ю	1

Roof

Upper Roof

Sheet no.	12

0.54 W/m²K

1.836

Gross Roof Areas (Opaque Walls + S	kylight Areas) (Aro) at	Roof	=	165.06 m²
Skylight Areas at	Roof		=	0.00 m ²
Breakdown of Sky	ight Areas			
Skylight Areas	Unshaded	(S1)	=	0.00 m ²

OpaqueAreas at	Roof		=	165.06 m ²
----------------	------	--	---	------------------------------

Breakdown of Opaque Roof Areas						
RC Roof Areas	(R1)		=	154.38 m ²
1/F			=	35.50 m ²		
Roof			=	92.78 m ²		
Upper Roof			=	26.10 m ²		

Breakdown of Opaque Roof Areas			
RC Roof Areas	(R2)	=	10.68 m ²
1/F	=	4.66 m ²	

6.02 m²

m²

Roof Orientation Factor Gs = 2.16 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

Roof

xternal Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
nglazed Porcelain Tiles (Grey)	96%	0.9
GT Tile (Brown)	4%	0.8

0.896 Average Absorptivity =

1.858

Ri

'U' value of Opaque Roof Areas

Internal surface film resistance

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2) Air space resistance (Refer to Table 3) Thickness of building materials Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
To	otal				1.858

R2 Description: Roof Area Roof Material External surface film resistance Ro = 0.055 Ra 0 Air space resistanace 50mm cement/ sand screed 0.05 / 0.72 0.069 / 0.034 50mm expanded polystyrene 0.05 1.471 150mm concrete slab 0.15 / 2.16 0.069 0.009 10mm AGT Tile (Brown) 0.01 / 1.1 0.162

Total

Uw1 =
$$\frac{1}{1.836}$$
 = 0.54 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. BD 2/9179/15				
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 7)					
Roof Orientation Facing	Flat	Gross Roof Area (Aro) = 165.06				
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) = 2.16				
		· · · · · · · · · · · · · · · · · · ·				

Components / Details		Code No.		
Description	Units	R1	R2	
External Finish Material		25mm Unglazed Porcelain Tiles	10mm AGT Tile (Brown)	
Conductivity	W/mK	1.10	1.10	
Thickness	m	0.025	0.010	
Average Absorptivity (awi)	(a)	0.9	0.8	
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed	
Conductivity	W/mK	0.72	0.72	
Thickness	m	0.050	0.050	
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene	
Conductivity	W/mK	0.034	0.034	
Thickness	m	0.05	0.05	
Intermediate component		150mm concrete slab	150mm concrete slab	
Conductivity	W/mK	2.16	2.16	
Thickness	m	0.15	0.15	
Intermediate component				
Conductivity	W/mK			
Thickness	m			
Internal Finish Material				
Conductivity	W/mK	0.38	0.38	
Thickness	m	0.01	0.01	
U-value of the Roof (Uri)	W/m²K	0.53	0.53	
Opaque Roof Area (Ari)	m²	154.38	10.68	
Heat Conduction = 3.47(Ari/Ar	o) Uri αri Gs	3.34	0.21	

iess	m	0.025	0.010	
ge Absorptivity (awi)	(a)	0.9	0.8	
nediate component		50mm cement/ sand screed	50mm cement/ sand screed	
ıctivity	W/mK	0.72	0.72	
iess	m	0.050	0.050	
nediate component		50mm expanded polystyrene	50mm expanded polystyrene	
ıctivity	W/mK	0.034	0.034	
iess	m	0.05	0.05	
nediate component		150mm concrete slab	150mm concrete slab	
ıctivity	W/mK	2.16	2.16	
iess	m	0.15	0.15	
nediate component				
ıctivity	W/mK			
iess	m			
al Finish Material				
ıctivity	W/mK	0.38	0.38	
iess	m	0.01	0.01	
e of the Roof (Uri)	W/m²K	0.53	0.53	
ie Roof Area (Ari)	m²	154.38	10.68	
Conduction = 3.47(Ari/Are	o) Uri ari Gs	3.34	0.21	
		6 0 47/4 :/4) ! ! : :	•	

Roof (Uri)	VV/m²K	0.53	0.53		Solar Radiation throug	jh Skylight	= 41.10) (Asi/Aro)	(SCri) Gs	where $i=1, 2,$,, n
Area (Ari)	m²	154.38	10.68				=(0.00	W/m²		
tion = 3.47(Ari/Aro) U	ri αri Gs	3.34	0.21								
					Summary of RTTV at 1	Roof					
at Conduction throug	h Opaque Roof =	3.47(Ari/Aro) Uri ari	Gs	where i= 1, 2,, n	=	3.55		+	0.00	+	0.00
	=	3.55	W/m²		=_	3.55	W/m²	!			

Components / Details		Code No.			
Description	Units	S1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
U-value of Skylight Glazing (Usi)	W/m²K	-			
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00			

Heat Conduction through Skylight) Usi Gs	where i= 1, 2,, n		
	=	0.00	W/m²	

Components / Details		Code No.			
Description	Units	S1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
Shading Coefficient of Skylight Glazing (SCr)		-			
Visible Light Transmittance (VLT)		-			
External Reflectance (ER)		-			
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00			

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 7)	

Overall Roof Area [a] 165.06 m²

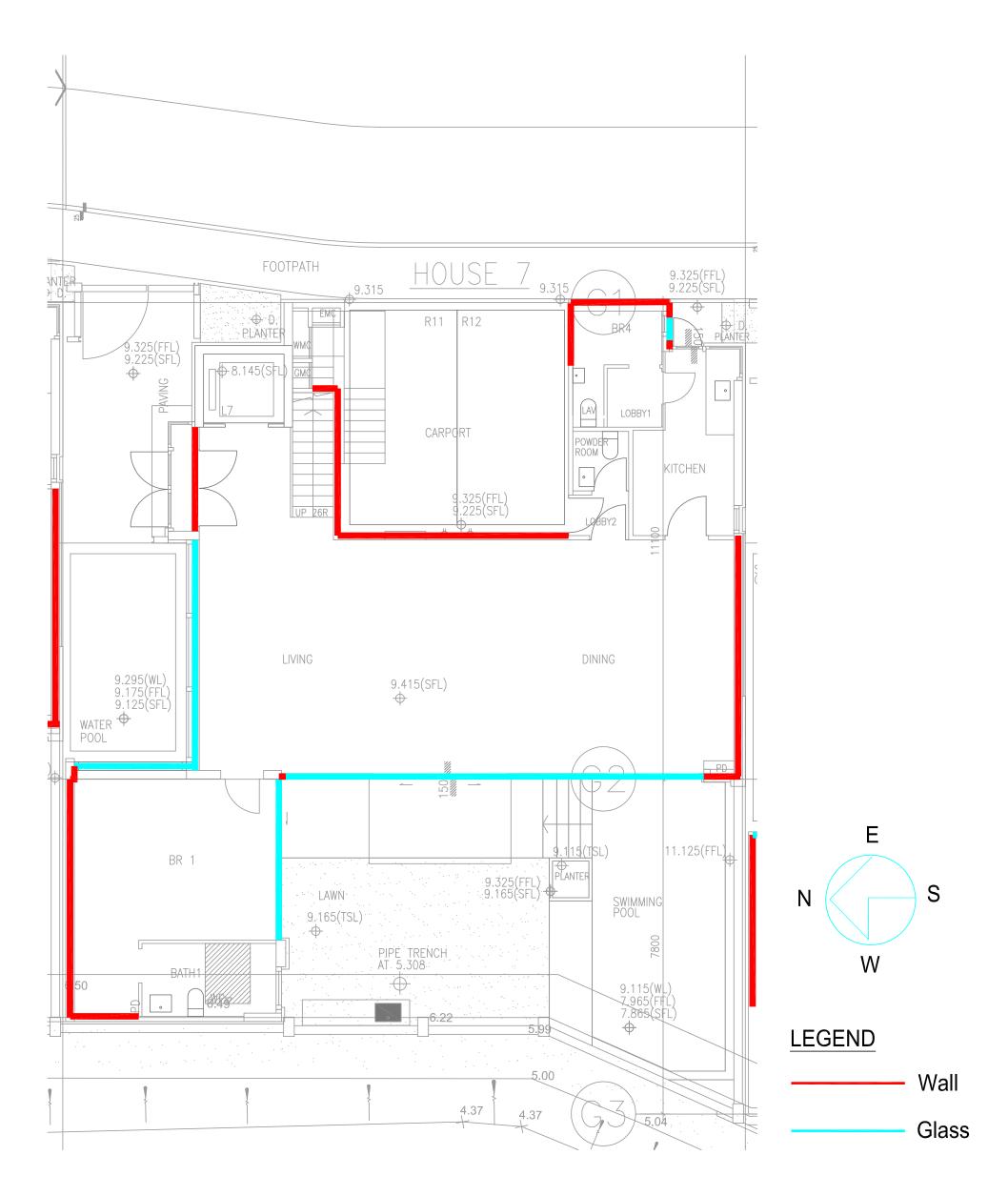
Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	165.06	3.55	0.00	0.00	3.55	3.55

Overall RTTVroof =	3.55	W/m²	
<	4	W/m²	OK

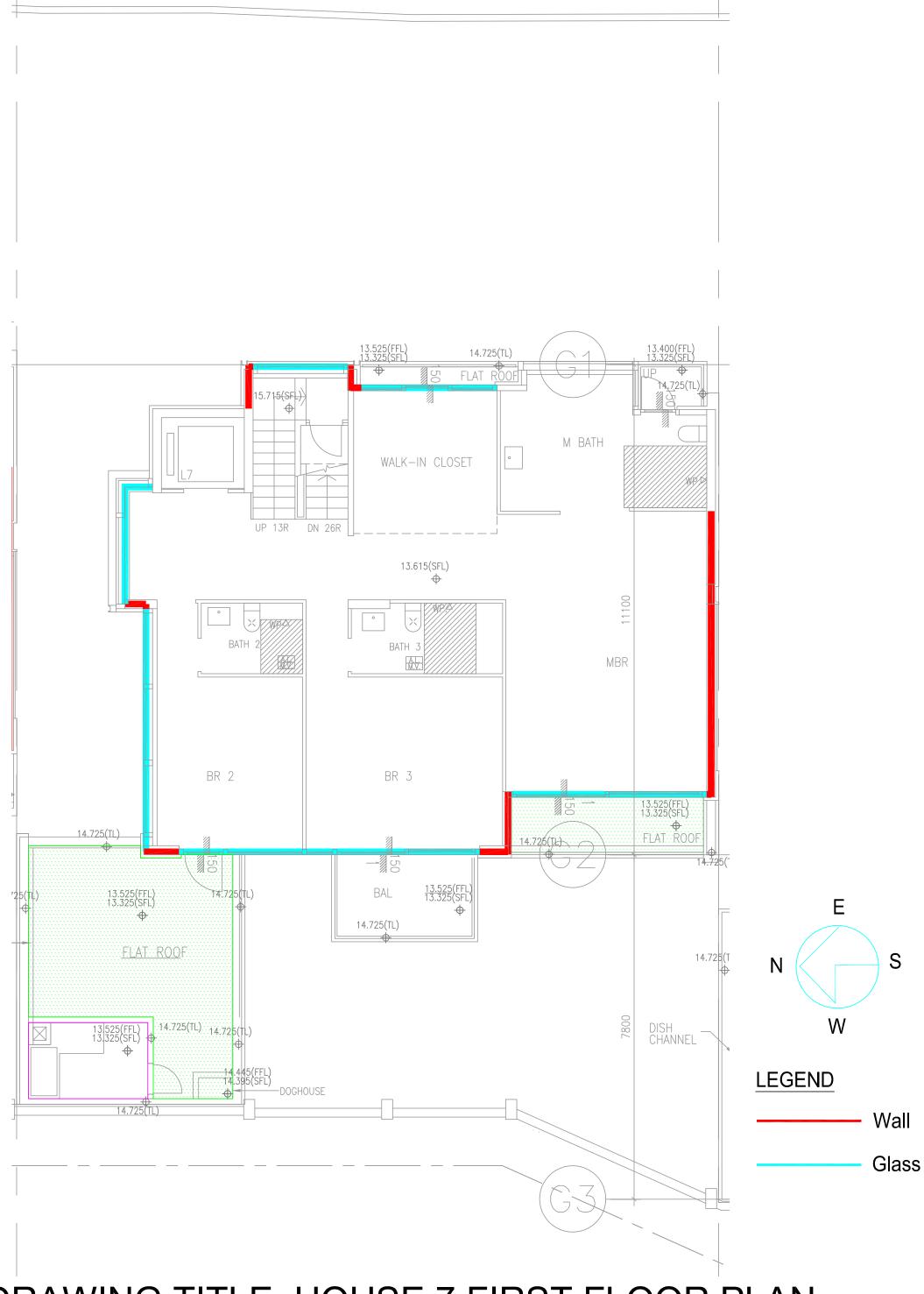
RTTV Summary Sheet

Address:	Lot 2115, D.D. 1	05, Ngau Ta	am Mei, Yuen I	ong (House	e 7)															BD Ref. No. BD 2/9179/15	
Duilding Trues		Residential	1																	BD 2/91/9/15	\dashv
Building Type: RTTV Calculated by:			egistered Profes	oional	Thomas An	daman	fr Dortmore	Consulting	Engineers I	t-d											\dashv
			rchitect	& Partners Consulting Engineers Ltd.														-			
			thers, please spe	oif.																	4
N CC+		3.01	mers, piease spe	city																	_
No. of Storeys Residential Un	iits)																				
Γable 1																					
								East	Deem	ed to S	Satisfy RTTV _{Wall}	•					•				
Facade Orientation Facing		West			North			South													
Average Absorptivity		0.795			0.8		0.8														
Average Window to Wall Ratio		0.51			0.37		0.18		0.23												
Shading Coefficient of Glazing		0.43			0.43		0.43			0.43											
Average Shading Coefficient of Facade			0.43		0.43			0.43			0.43										
Visable Light Transmittance			53	%	53	%		53	%		53 %			%		%			%	9	6
External Reflectance			17	%	17	%		17	%		17 %			%		%			%	9	6
Γable 2						-								L							_
										R	TTV _{Wall}										
Facade Orienta	tion Facing	West				North							East			South					\neg
Wall Orientation Factor		1.131				0.79					1.072		1.072			0.975				\neg	
Total External Wall Area Residential Units)			120.0	m ² Wi	indow to Wall Ra	atio		63.1	m ²	Windo	ow to Wall Ratio		46.4	m ²	Window to Wa	ll Ratio		78.1	m ²	Window to Wall Ratio	
Γotal Window Area			61.73	m ² =	0.51			23.37	m ²	=	0.37		8.25	m ²	= 0	.18		18.12	m ²	= 0.23	
Heat	Opaque Wall		4.32		W/m ²			4.77			W/m ²		8.59	III	W/m ²			9.33	ш	W/m ²	-
Conduction	Window		1.10		W/m ²			0.39			W/m W/m ²		0.31		W/m ²			0.13		W/m W/m ²	\dashv
Window	Glass Type		Area =	SC	VLT =	%		Area =	SC		VLT = %		Area =	SC	VLT =	%		Area =	SC	VLT = %	_
willdow	Glass Type	D 0 0	m ²	=	ER =	%	Reflective		=		ER = %	Reflective		=	ER =	%	Reflective	m ²	=		
		Z Tinted		2 00 0			Z Tinted		22.27.60	0.42		□ Ti		25 00			☑ 1 Timed		12 00		
		∠ Tinted	Area = 61./ m ²	3 SC 0.			Z Tinted	Area = 2 m^2	23.37 SC =	0.43	VLT = 53 %	✓ Tinted	Area = 8.2 m^2	25 SC =		53 %	Z Tinted	$Area = 18.1$ m^2	12 SC =	0.43 VLT = 53 %	_
						%					ER = 17 %				ER =	17 %				ER = 17 %	_
		Clear	Area = m ²	SC -	VLT =	%	Clear	Area = m ²	SC _		VLT = %	☐ Clear	Area = m ²	SC _	VLT =	%	Clear	Area = m ²	SC -	VLT = %	
					ER =	%	.				ER = %				ER =	%	-			ER = 9	6
	Double Glazing	Yes No					Yes No									☑ Yes ☐ No					
	External	Overhang	Z Yes	☐ No			Overhang	☐ Yes	Z N	o		Overhang	☐ Yes	Z No	1		Overhang	☐ Yes	Z N	0	
	Shading	Sidefin	Z Yes	No			Sidefin	☐ Yes	Z N	o		Sidefin	☐ Yes	Z No	1		Sidefin	☐ Yes	Z N	0	
Solar Radiation	through		12.46		W/m ²			6.29)		W/m ²		5.04		W/m ²			2.08		W/m ²	
Gazing																					
Average Absorptivity			0.795				0.795							0.795					0.795		
RTTV _{Wall} at ea	ch Facade	17.87 W/m ²					11.45 W/m ²					13.94 W/m ²						11.53 W/m ²			
Overall RTTV _v	Vall										13.73	W/m ²					•				
Γable 3																					
										R	TTV _{Roof}										
Roof Orientation Factor			2.16																		
Γotal Roof Area (Residential		(165.06	n	n ²																
Units)																					
Fotal Skylight	Area		0	n	n ²																
Heat	Roof	(3.55	W	m ²																
Conduction	Skylight	_		W	m ²																T
	Glass Type	Reflective Area =			m ² SC =					VLT =				% ER = %				%			
		☐ Tinted Area =				m^2 SC =					VLT =			% ER = %							
		Clear	Area						C =				VLT					ER =			%
Skylight	Double	Yes	□ N					III S					, L1					ш			-
onjugin	Glazing																				
	External Shading	Yes	□ N	lo																	
3.1. 15. 17. 17			_ ^		. 1																_
	through Gazing		7°	W	/m²																_
Average Absorptivity (Roof)			0.8		2																_
overali RTTV.	toof	. /	3.55	33. 7.	/m ²																

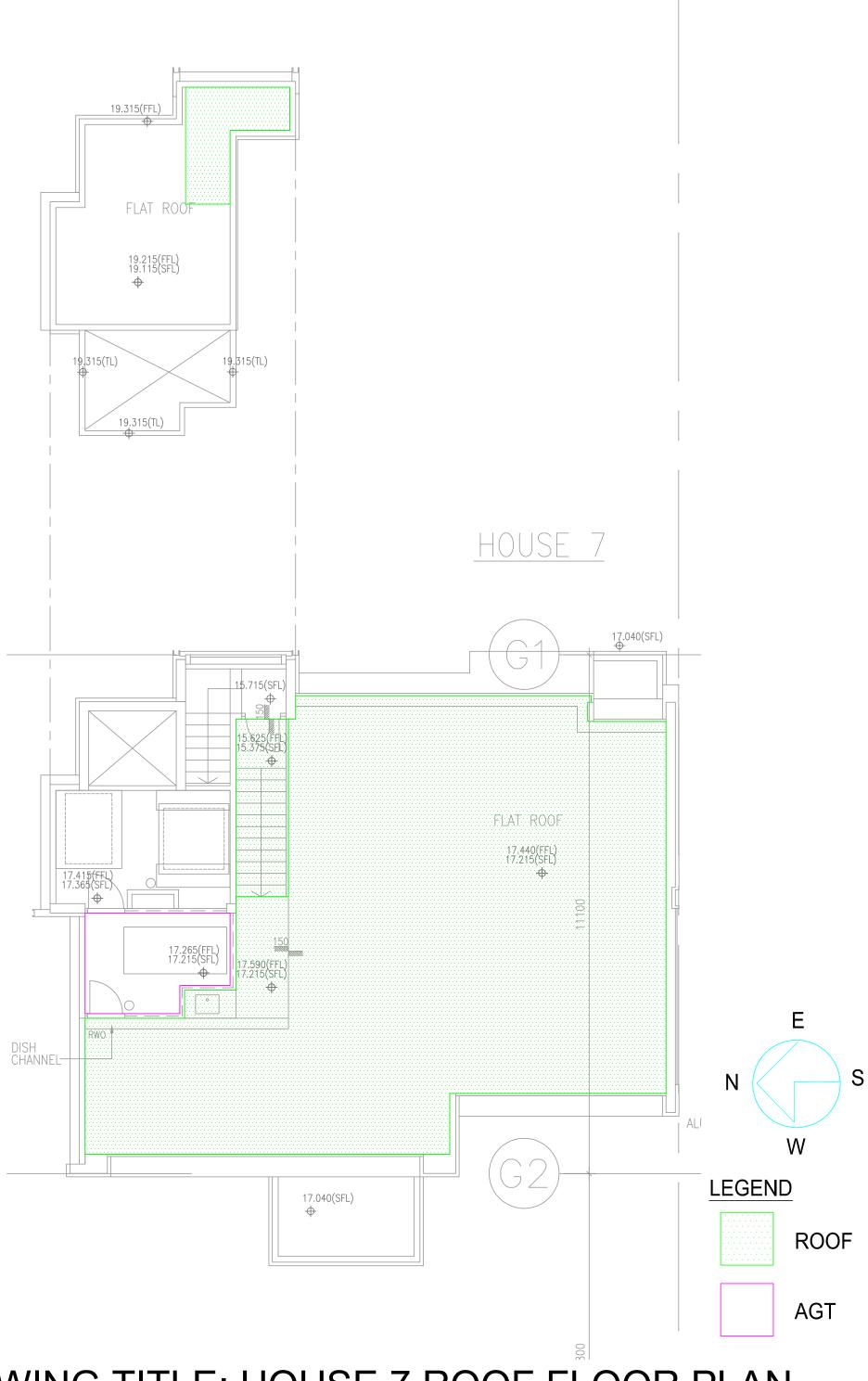
ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance



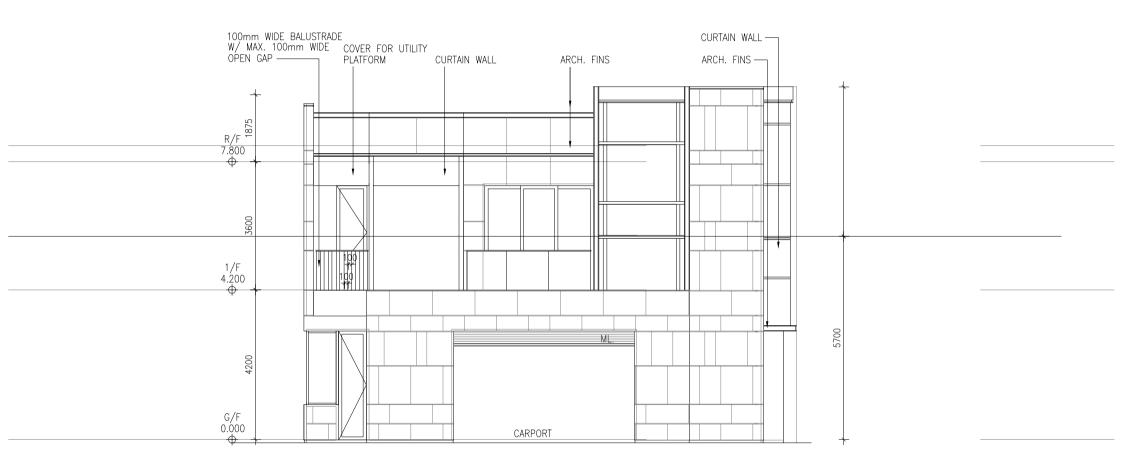
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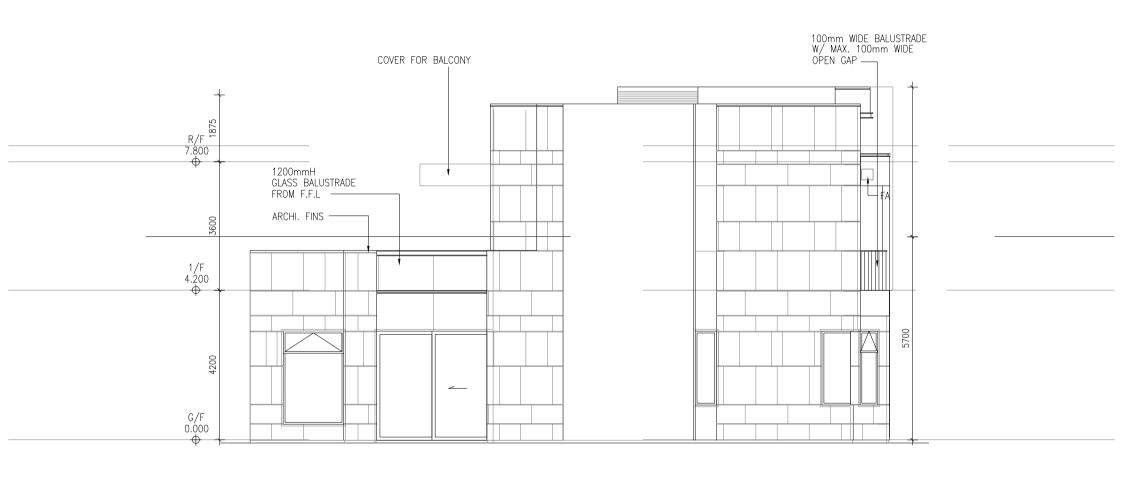
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DRAWING TITLE: HOUSE 7 ROOF FLOOR PLAN SCALE: 1:150@A4

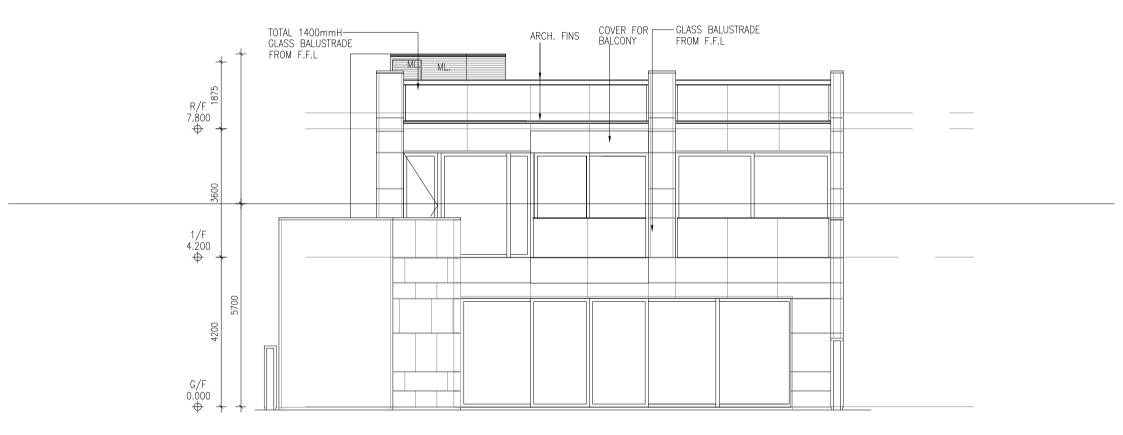


1 EAST ELEVATION 1:75
HOUSE 6

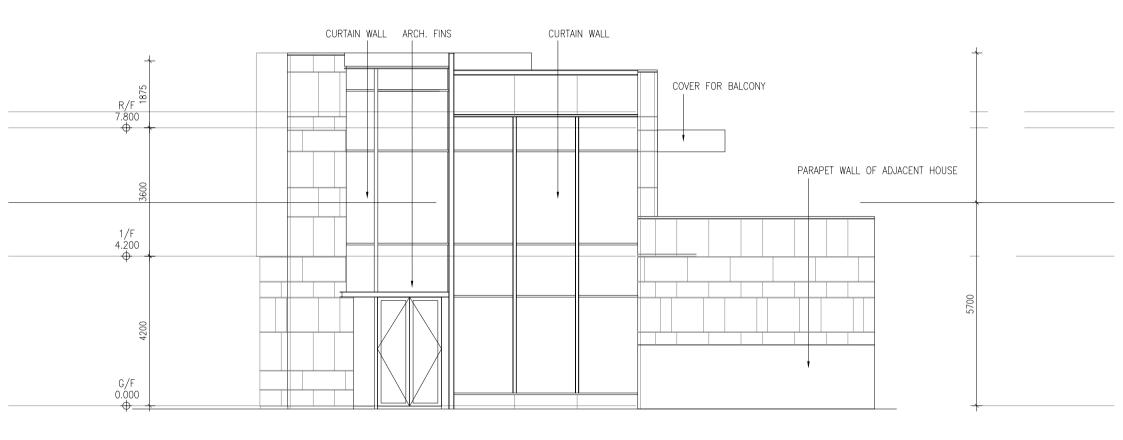


7 SOUTH ELEVATION 1:75

HOUSE 6

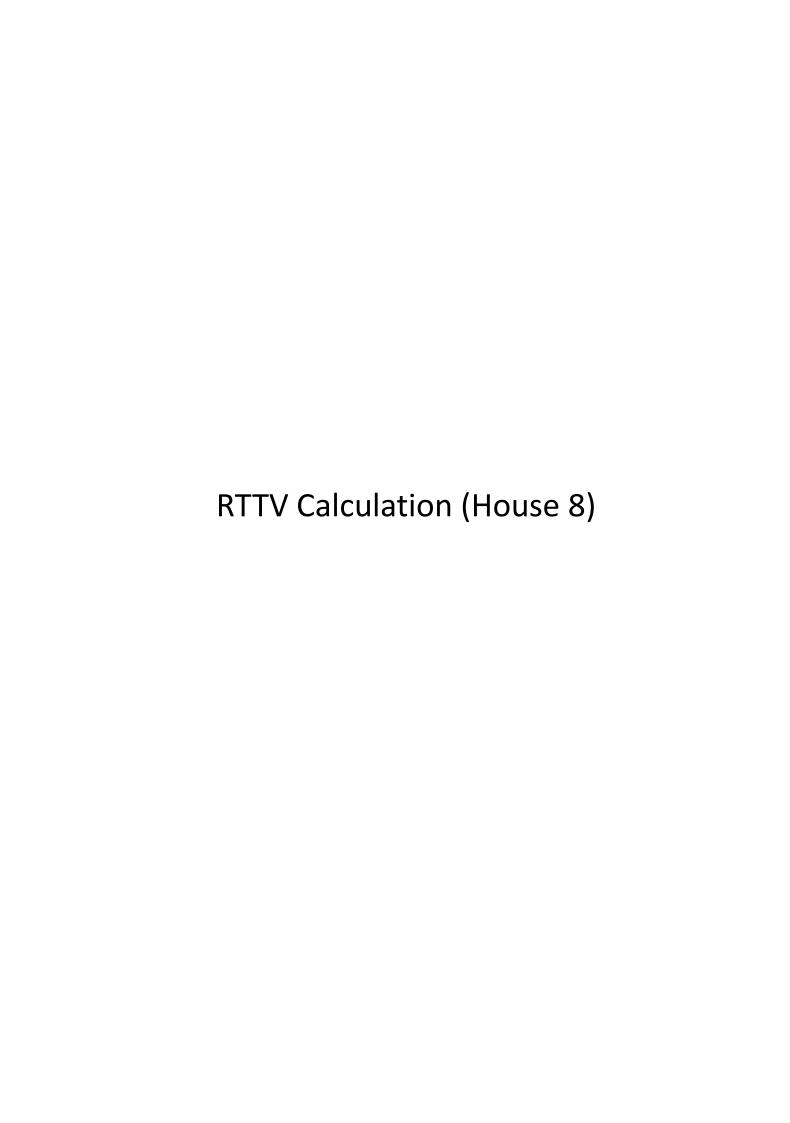


9 WEST ELEVATION 1:75
HOUSE 6



8 NORTH ELEVATION 1:75

HOUSE 6



Total Gross Wall Areas 343.80 m²

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Total Glazing Area (Window + Balcony) Calculation
                                                                                                                                                                                  Sheet no. 2
                                                                                                                         Glazing heights (Residential Units):
                                                                                                                         G/F (Window GL02) - A
                                                                                                                                                               3.05 m
                                                                                                                                                                                 storey)
                                                                                                                         G/F (Window GL02) - B
                                                                                                                                                      =
                                                                                                                                                               3.15 m
                                                                                                                                                                                 storey)
                                                                                                                         1/F (Window GL02) - C
                                                                                                                                                      =
                                                                                                                                                               2.66 m
                                                                                                                                                                                 storey)
                                                                                                                         1/F (Window GL02) - D
                                                                                                                                                               2.74 m
                                                                                                                                                                             1
                                                                                                                                                                                storey)
West Elevations (House 8)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   7.90
                                                                                                        )x 3.05 x 1 =
                                                                                                                           7.90 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              24.06 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                   7.50 + 3.50
                                                                                                        )x 2.66 x 1 =
                                                                                                                          11.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              29.21 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 = 0.00 x 2.74 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     53.26 m<sup>2</sup>
North Elevations (House 8)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   8.20
                                            1.30
                                                                                                        )x 3.05 x 1 =
                                                                                                                            9.50 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              28.93 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                    2.80 + 4.40
                                                                                                        )x 2.66 x 1 =
                                                                                                                           7.20 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              19.12 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     48.04 m<sup>2</sup>
East Elevations (House 8)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   2.70
                                                                                                        )x 3.05 x 1 =
                                                                                                                            2.70 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                               8.22 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                        )x 3.15 x 1 =
G/F (Window GL02)
                                                                                                        )x 0.86 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       0.86 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02)
                                   0.70 + 2.20 + 3.10
                                                                                                        )x 2.64 x 1 =
                                                                                                                           2.90 x
                                                                                                                                       2.64 \times 1 =
                                                                                                                                                               7.66 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     15.88 m<sup>2</sup>
South Elevations (House 8) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   0.50
                                             1.30 3.80
                                                                                                        )x 3.05 x 1 =
                                                                                                                            5.60 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              17.05 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 \text{ m}^2
1/F (Window GL02) - C
                                                                                                        )x 2.66 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                               0.00 \, m^2
                                                                                                                                                               0.00 \text{ m}^2
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
```

Gross Glazing Areas

Total Gross Glazing Areas

17.05 m²

134.23 m²

West Elevations (House 8)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	=	100.32 m²	
Glazing Areas at	West Elevations (House 8)	=	53.26 m²
Breakdown of Glazin Glazing Areas	ng Areas Unshaded (W-F1)	=	31.77 m²
	ECS =	1.000	
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.15 x 3.05 = 9.61 m^2	=	9.61 m²
	OPF 1.90 / 3.05 = 0.62 ECS = 0.666		
Glazing Areas	Shaded by Built-Fin (Projection on Right) (W-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 4.50 x 2.64 = 11.88 m^2	=	11.88 m²
	SPF 1.60 / 4.28 = 0.37 ECS = 0.989		
Opaque Wall Areas a	at West Elevations (House 8)	=	47.06 m²
Breakdown of Opaqu RC Wall Areas	ue Wall Areas (W-W1)	=	47.06 m ²

53.26

100.32

0.53

	_
Sheet no.	

(Refer to Table 9)

Wall Orientation Factor Gw = 1.131

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 8)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

U = 1/(Ri+x₁/k₁+x₂/k₂+...+x_n/k_n+Ra+Ro) where
Ri Surface film resistance of internal surface (Refer to **Table 2**)
Ro Surface film resistance of external surface (Refer to **Table 2**)
Ra Air space resistance (Refer to **Table 3**)
X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

W-W1 Description: RC Wall Areas
Wall Material

vvali iviatoriai					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	/	2.9	=	0.010
12mm cement/ sand render	0.012	/	0.72	=	0.017
200mm concrete wall	0.2	/	2.16	=	0.093
10mm AGT Tile	0.01	/	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Tot	tal				0.293

 $Uw1 = \frac{1}{0.000} = 3.42 \text{ W/m}^2\text{K}$

Sheet No.	4	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
	•		_
Facade Orientation Facing	West	Gross Wall Area (Ao) =	100.32
Window to Wall Ratio (WWR)	0.53	Wall Orientation Factor (Gw) =	1.131

Components / Details			Code No.			
Description	Units	W-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	47.06				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	5.76				

Heat Conduction through Opaque Wal	Opaque Walls = 3.57(Awi/Ao) Uwi αwi			where i= 1, 2,, r
	=	5.76	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing							
Components / Details		Code No.					
Description	Units	W-F1	W-F2	W-F3			
Glazing Type		Tinted	Tinted	Tinted			
Thickness	m	0.01	0.01	0.01			
Glazing Area (Afi)	m²	53.26	9.61	11.88			
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74			
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.67	0.12	0.15			

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n	
	=	0.94	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details		Code No.				
Description	Units	W-F1	W-F2	W-F3		
Glazing Type		Tinted	Tinted	Tinted		
Thickness	m	0.01	0.01	0.01		
Glazing Area (Afi)	m²	31.77	9.61	11.88		
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43		
Visible Light Transmittance (VLT)	%	53	53	53		
External Reflectance (ER)	%	17	17	17		
External Shading Miltiplier (ESC)		1.00	0.67	0.99		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	6.43	1.30	2.38		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 10.10 W/m²

Summary of RTTV at West Elevations (House 8)

= 5.76 + 0.94 + 10.10 = **16.80 W/m²**

North Elevations (House 8)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 8)

Glazing Areas at North Elevations (House 8) = 48.04 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 48.04 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 8) = 49.58 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(N-W1) = 49.58 m²

Window to Wall Ratio (WWR) = 48.04 / 97.62 = **0.49**

Sheet no. 5

Wall Orientation Factor Gw = 0.79 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 8)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
_		

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total	<u> </u>				0.293

 $Uw1 = \frac{1}{0.203}$ = 3.42 W/m²K

Sheet No.	6	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	5, Ngau Tam Mei, Yuen Long (House 8)	
Facade Orientation Facing	North	Gross Wall Area (Ao) =	97.62
Window to Wall Ratio (WWR)	0.49	Wall Orientation Factor (Gw) =	0.79

Components / Details		Code No.			
Description	Units	N-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	49.58			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	4.36			

Heat Conduction through Opaque Walls =	3.57(Awi/Ao)	Uwi awi Gw	where i= 1, 2,, r
=	4.36	W/m²	

Components / Details		Code No.	_
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	48.04	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.43	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.43 W/m	2

Part 3 - Calculation of Solar Radiation thro	ough Glazing			
Components / Details		Code No.		
Description	Units	N-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	48.04		
Shading Coefficient of Glazing (SCf)		0.43		
Visible Light Transmittance (VLT)	%	53		
External Reflectance (ER)	%	17		
External Shading Miltiplier (ESC)		1.00		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	6.98		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n

= 6.98 W/m²

Summary of RTTV at North Elevations (House 8)

= 4.36 + 0.43 + 6.98 = 11.77 W/m²

East Elevations (House 8)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 8) = 59.46 m²

Glazing Areas at East Elevations (House 8) = 15.88 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 15.88 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 8) = 43.58 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (E-W1) = 43.58 m²

Window to Wall Ratio (WWR) = 15.88 / 59.46 = 0.27

Sheet no. 7

Wall Orientation Factor Gw = 1.072 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 8)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = \frac{1}{(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)}$ where $Ri \qquad \text{Surface film resistance of internal surface (Refer to Table 2)}$

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

E-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

 $Uw1 = \frac{1}{0.293}$ = 3.42 W/m²K

Sheet No.	8	BD Ref No. I	BD 2/9179/15
Building Address	Lot 2115, D.D. 105, I	Ngau Tam Mei, Yuen Long (House 8)	
Facade Orientation Facing	East	Gross Wall Area (Ao) = _	59.46
Window to Wall Ratio (WWR)	0.27	Wall Orientation Factor (Gw) =	1.072

Components / Details		Code No.			
Description	Units	E-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	43.58			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.53			

Heat Conduction through Opaque Wall	s =	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	8.53	W/m²	

Components / Details		Code No.		
Description	Units	E-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	15.88		
U-value of Glazing (Ufi)	W/m²K	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.32		

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.32 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	E-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	15.88			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	5.14			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 5.14 W/m²

Summary of RTTV at East Elevations (House 8)

South Elevations (House 8)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 8)

Glazing Areas at South Elevations (House 8) = 17.05 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 17.05 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 8) = 69.35 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(S-W1) = 69.35 m²

Window to Wall Ratio (WWR) = 17.05 / 86.40 = 0.20

Sheet no. 9

Wall Orientation Factor Gw = 0.975 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 8)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
_		

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

S-W1 Description: RC Wall Areas

Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

 $Uw1 = \frac{1}{0.293}$ = 3.42 W/m²K

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
	•		
Facade Orientation Facing	South	Gross Wall Area (Ao) =	86.40
Window to Wall Ratio (WWR)	0.20	Wall Orientation Factor (Gw) =	0.975

Components / Details		Code No.			
Description	Units	S-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	69.35			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.50			

Heat Conduction through Opaque Walls =	hrough Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw			
=	8.50	W/m²		

Components / Details		Code No.	
Description	Units	S-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	17.05	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.21	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n	
	=	0.21 W/	m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	S-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	17.05			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	SCwi)Gw	3.45			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 3.45 W/m^2

Summary of RTTV at South Elevations (House 8)

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 8)	

Overall Gross Wall Area [a] 343.80 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	100.32	5.76	0.94	10.10	16.80	4.90
North	97.62	4.36	0.43	6.98	11.77	3.34
East	59.46	8.53	0.32	5.14	13.99	2.42
South	86.40	8.50	0.21	3.45	12.16	3.06

Overall RTTVwall = 13.72 W/m²

< 14 W/m²

OK

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Sheet no.	12

(Refer to Table 9)

Gross Roof Areas (Opaque Walls + Sk	cylight Areas) (Aro) at	Ro	of	=	169.76 m²
Skylight Areas at	Roof			=	0.00 m ²
Breakdown of Skyl	ight Areas				
Skylight Areas	Unshaded	(S1)	=	0.00 m ²

OnanueAreas at	Roof			=	169 76 m ²

Breakdown of Opaque Roof Areas	,	D4	,			450.40 2
RC Roof Areas	(R1)		=	158.18 m ²
1/F			=	26.84 m ²		
Roof			=	93.94 m ²		
Upper Roof			=	37.40 m ²		

Breakdown of Opaque Roof Areas			
RC Roof Areas	(R2)	=	11.58 m ²
1/F	· =	5.56 m ²	
Roof	=	6.02 m ²	
Upper Roof	=	m²	

Roof Orientation Factor	Gs	=	2.16

Average Absorptivity (a) of the External Opaque Wall at

Roof

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Roof Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + \ldots + x_n/k_n + Ra + Ro) \\ Where Ri Surface film resistance of internal surface (Refer to$ **Table 2** $) \\ Ro Surface film resistance of external surface (Refer to$ **Table 2** $) \\ Ra Air space resistance (Refer to$ **Table 3** $) \\ X Thickness of building materials$

k Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area			
Roof Material						
External surface film resistance			Ro	=	0.055	
Air space resistanace			Ra	=	0	
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023	
50mm cement/ sand screed	0.05	1	0.72	=	0.069	
50mm expanded polystyrene	0.05	1	0.034	=	1.471	
150mm concrete slab	0.15	1	2.16	=	0.069	
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009	
Internal surface film resistance			Ri	=	0.162	-
Tota	al				1.858	
	Uv	v1 =	1 050	=	0.54	W/m²K

R2	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
To	otal				1.836

Uw1 =
$$\frac{1}{1.836}$$
 = 0.54 W/m²l

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. BD 2/9179/15	
Building Address	Lot 2115, D.D. 105,	Ngau Tam Mei, Yuen Long (House 8)	
Roof Orientation Facing	Flat	Gross Roof Area (Aro) = 169.76	
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) = 2.16	
		· · · · · · · · · · · · · · · · · · ·	_

Components / Details			Code No.
Description	Units	R1	R2
External Finish Material		25mm Unglazed Porcelain Tiles	10mm AGT Tile (Brown)
Conductivity	W/mK	1.10	1.10
Thickness	m	0.025	0.010
Average Absorptivity (awi)	(a)	0.9	0.8
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed
Conductivity	W/mK	0.72	0.72
Thickness	m	0.050	0.050
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene
Conductivity	W/mK	0.034	0.034
Thickness	m	0.05	0.05
Intermediate component		150mm concrete slab	150mm concrete slab
Conductivity	W/mK	2.16	2.16
Thickness	m	0.15	0.15
Intermediate component			
Conductivity	W/mK		
Thickness	m		
Internal Finish Material			
Conductivity	W/mK	0.38	0.38
Thickness	m	0.01	0.01
U-value of the Roof (Uri)	W/m²K	0.53	0.53
Opaque Roof Area (Ari)	m²	158.18	11.58
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.33	0.22

vity	vv/mK	0.38	0.38	
S	m	0.01	0.01	
of the Roof (Uri)	W/m²K	0.53	0.53	
Roof Area (Ari)	m²	158.18	11.58	
nduction = 3.47(Ari/Aro) U	ri αri Gs	3.33	0.22	
Heat Conduction throug	yh Opaque Roof = = _	3.47(Ari/Aro) Uri αri 3.55	Gs W/m²	where i= 1, 2,, n

Components / Details		Code No.				
Description	Units	S 1				
Skylight Glazing Type		-				
Thickness	m	-				
Skylight Area (Asi)	m²	0.00				
U-value of Skylight Glazing (Usi)	W/m²K	-				
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00				

Heat Conduction through Skyligh	t = 0.4	0 (Asi/Ard) Usi Gs	where i= 1, 2,, n
	=	0.00	W/m²	

Part 3 - Calculation of Solar Radiation through Skylight							
Components / Details		Code No.					
Description	Units	S 1					
Skylight Glazing Type		-					
Thickness	m	-					
Skylight Area (Asi)	m²	0.00					
Shading Coefficient of Skylight Glazing (SCr)		-					
Visible Light Transmittance (VLT)		-					
External Reflectance (ER)		-					
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00					

Solar Radiation th	rough \$	Skylight	= 41.10) (Asi/Aro) (SCri) Gs	where i= 1, 2,, n	
			=	0.00	W/m²		
Summary of RTTV	at Roo	of					
	=	3.55		+	0.00	+	0.00
	=	3.55	W/m	2			

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 8)	
	-	

Overall Roof Area [a] 169.76 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	169.76	3.55	0.00	0.00	3.55	3.55

Overall RTTVroof =	3.55	W/m²	
<	4	W/m²	OK

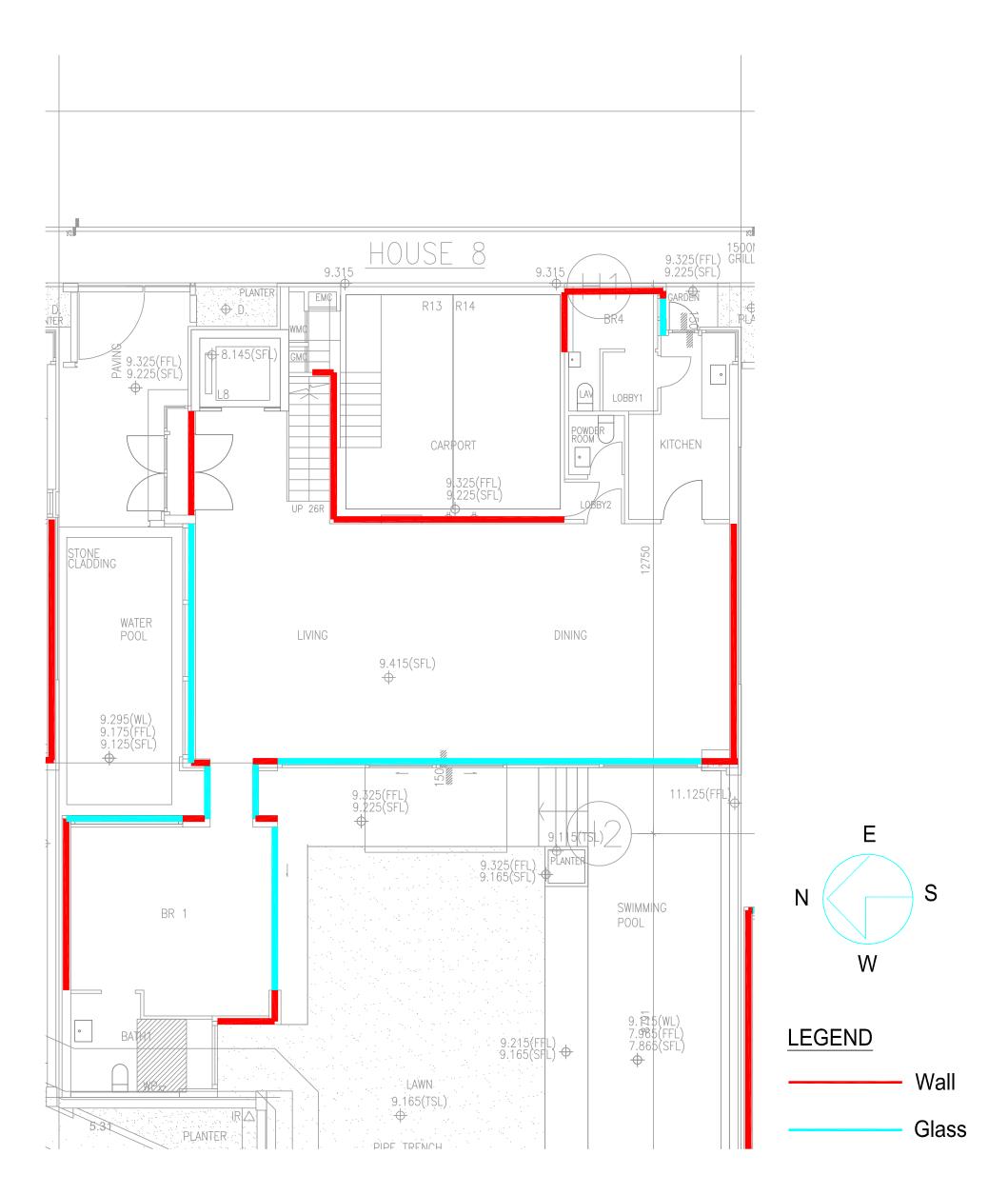
BD Ref. No. BD 2/9179/15

RTTV Summary Sheet

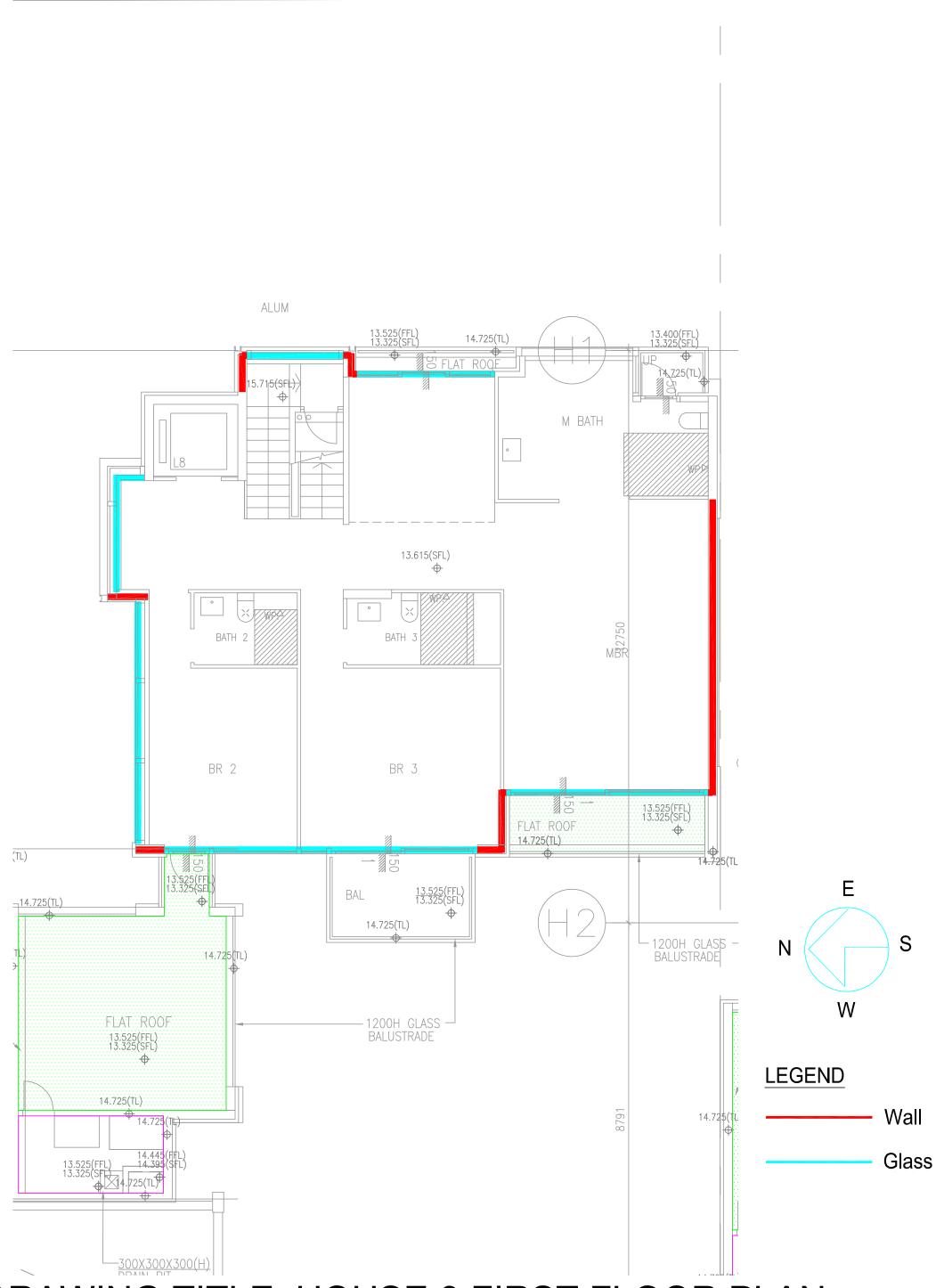
Building Type:		Residential																						
RTTV Calcula	ted by:	✓ 1. Re	egistered P	rofessional		Thomas Ai	nderson	& Partners	Consulting l	Engineers I	.td.													
		2. Ar	chitect																					
		3. Ot	hers, pleas	e specify:-																				
No. of Storeys		2																						
(Residential Ur	nits)																							
Table 1																								
										Deen	ed to	Satisfy RT	ΓV_{Wall}											
Facade Orienta	tion Facing		West			North			East	,		South												
Average Absor	ptivity		0.795			0.8			0.8			0.8												
Average Windo	ow to Wall Ratio		0.51			0.37			0.18			0.23												
Shading Coeffi	cient of Glazing		0.43			0.43			0.43			0.43												
Average Shadii Facade	ng Coefficient of		0.43			0.43			0.43			0.43												
Visable Light T	ransmittance		53	%		53	%		53	%		53	%			%		%			%			%
External Reflec			17	%		17	%		17	%		17	%			%		%			%			%
Table 2	ctanice			70		17	70					17	70			70		/0			/0			70
Table 2											D.	DODX 7												
											К	FTV _{Wall}												
Facade Orienta		West						North						East					South					
Wall Orientation				1.131						0.79						1.072					0.975			
Total External (Residential Ur			120.0	m ²	Windo	w to Wall R	atio		63.1	m ²	Winde	ow to Wall F	Ratio		46.4	m ²	Window to W	all Ratio		78.1	m ²	Window t	o Wall R	atio
Total Window	Area		61.73	m ²	=	0.51			23.37	m ²	=	0.37	7		8.25	m ²	=	0.18		18.12	m ²	=	0.23	
Heat	Opaque Wall		5.7	6		W/m ²			4.36			W/m ²			8.53	•	W/m²			8.50		W	//m ²	
Conduction	Window		0.9	4		W/m ²			0.43			W/m ²			0.32		W/m ²			0.21		W	//m ²	
Window	Glass Type		Area =	SC	,	VLT =	%		Area =	SC		VLT =	%		Area =	SC	VLT =	%		Area =	SC	VL	T =	%
			m ²	=	L	ER =	%	Reflective		=		ER =	%	Reflective	m ²	=	ER =	%	Reflective	m ²	=	ER		%
		Z Tinted	Area =	61.73 SC			3 %	Z Tinted	Area = 2	23 37 SC	0.43	VLT = 5		Z Tinted	Area = 8.2	5 SC	0.43 VLT =		Z Tinted	Area = 18.	12 SC		T = 53	
			m ²	=	L		7 %	Z 1 mice	m ²	=	0.15		7 %	7 111100	m ²	=	ER =	17 %		m ²	=	ER		7 %
		☐ Clear	A	SC		VLT =		□ <i>c</i> l		SC		VLT =		□ cl		SC	VLT =		□ <i>C</i> l		SC		T =	
		Clear	Area = m ²	=	L		%	☐ Clear	Area = m ²	=			%	☐ Clear	Area = m ²	=		%	Clear	Area = m ²	=			%
		_			l l	ER =	%					ER =	%				ER =	%	_			ER	=	%
	Double Glazing	☑ Yes	I	No				✓ Yes	L] No				Z Yes	□ N	Ю			✓ Yes		No			
	Giazing																							
	External	Overhang	✓ Yes		No			Overhang	☐ Yes	ΔN	lo			Overhang	Yes	Z N)		Overhang	☐ Yes	Z N	0		
	Shading	Sidefin	∠ Yes		No			Sidefin	☐ Yes	∠ N	Ю			Sidefin	☐ Yes	Z N)		Sidefin	☐ Yes	Z N	0		
Solar Radiation	through		10.1	10		W/m ²			6.98			W/m ²			5.14		W/m ²			3.45		W	//m ²	
Gazing																								
Average Absor	ptivity			0.795	;					0.795						0.795					0.795			
RTTV _{Wall} at ea	ch Facade		16.8	30		W/m ²			11.77	7		W/m ²			13.99		W/m ²			12.16		W	//m ²	
Overall RTTV	Wall											13.72		W/m ²										
Table 3	***************************************																							
Tuble C											D'	TTV _{Roof}												_
Roof Orientatio	on Easter		216									I V Roof												
Total Roof Are		-	169.76	_	2																			
Units)	a (Residential		109.70	`)	m ²																			
			جيا	<u> </u>	2																			
Total Skylight			0	$\overline{}$	m ²																			
Heat Conduction	Roof		3.55	<u>) </u>	W/m ²																			
Conduction	Skylight		•		W/m^2																			
	Glass Type	Reflect	ive	Area =					m ² SO	C =					VLT	=			%	ER =				%
		☐ Tinted		Area =					m ² SO	C =					VLT	=			%	ER =				%
		Clear	,	Area =						C =					VLT	=			%	ER =				%
Skylight	Double	Yes		No																ļ				
, 	Glazing																							
	External Shading	☐ Yes	[☐ No																				
Solar Radiation	through Gazing		~		W/m ²																			
Average Absor	ptivity (Roof)	Y	0.8																					
Overall PTTV			2.55	,	xx7/ 2																			$\overline{}$

Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 8)

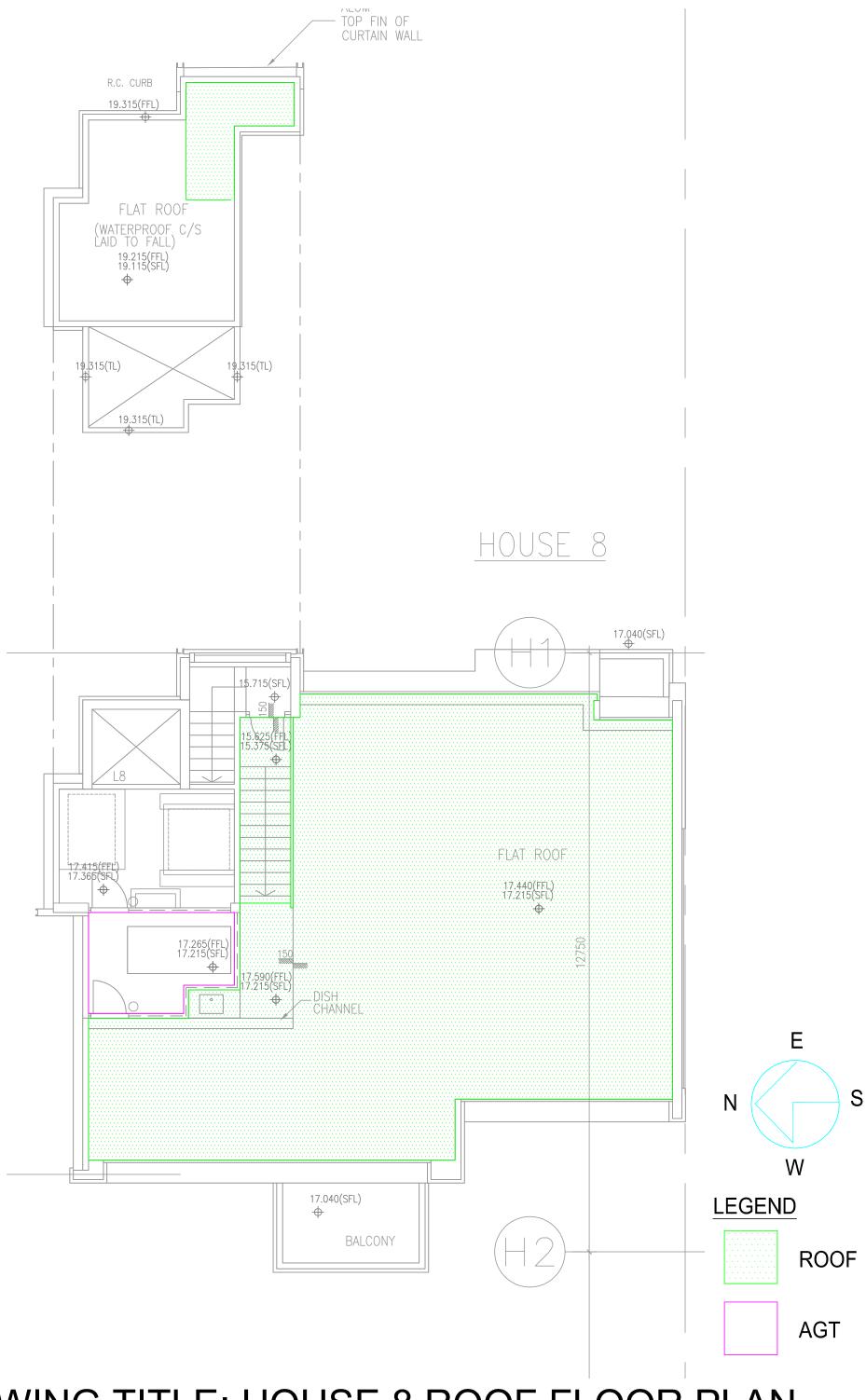
ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance



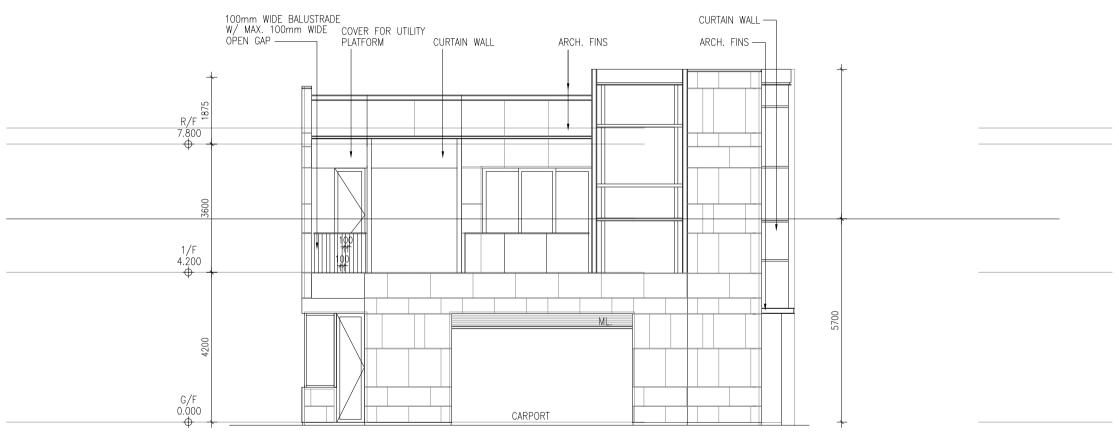
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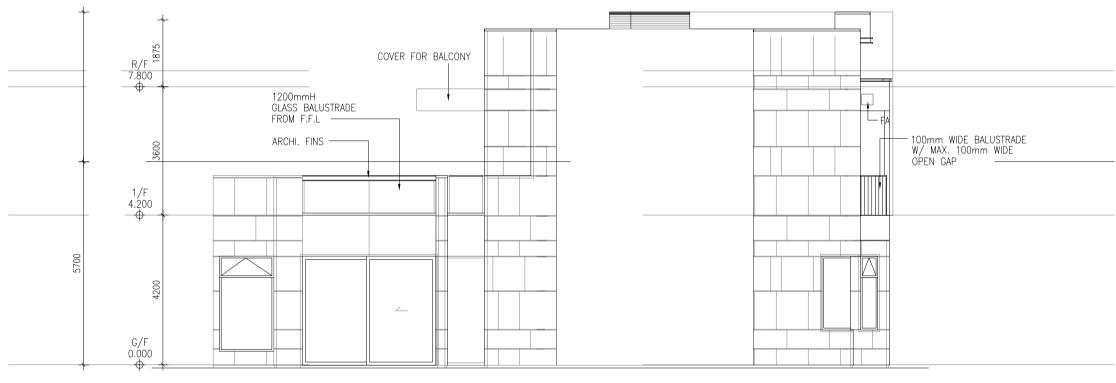
DRAWING TITLE: HOUSE 8 FIRST FLOOR PLAN SCALE: 1:150@A4



DRAWING TITLE: HOUSE 8 ROOF FLOOR PLAN SCALE: 1:150@A4

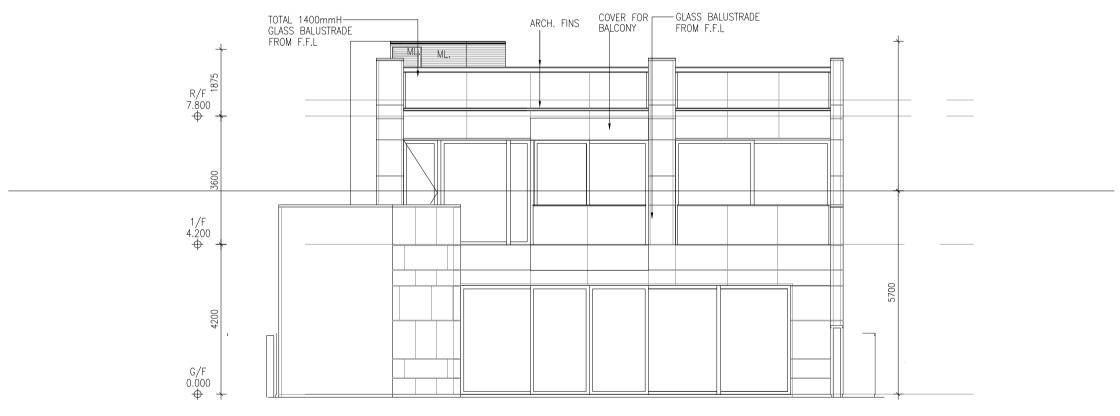


1 EAST ELEVATION 1:75 - HOUSE 8

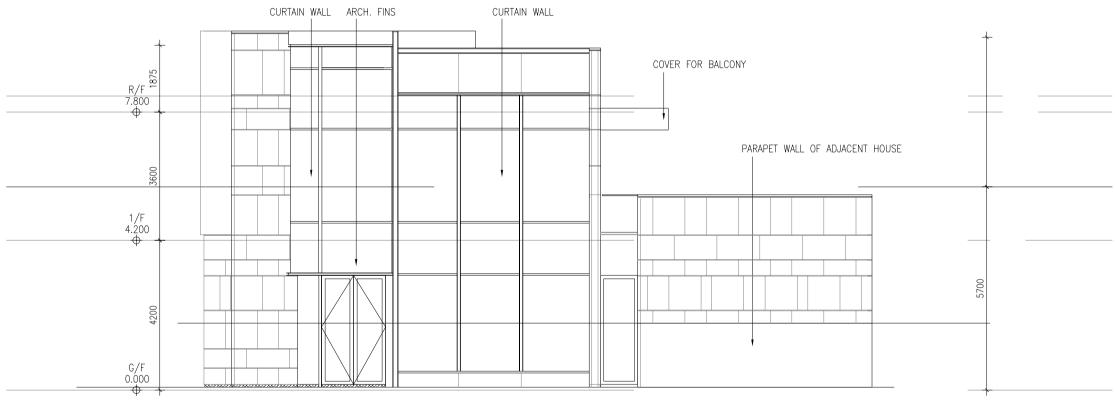


7 SOUTH ELEVATION 1:75

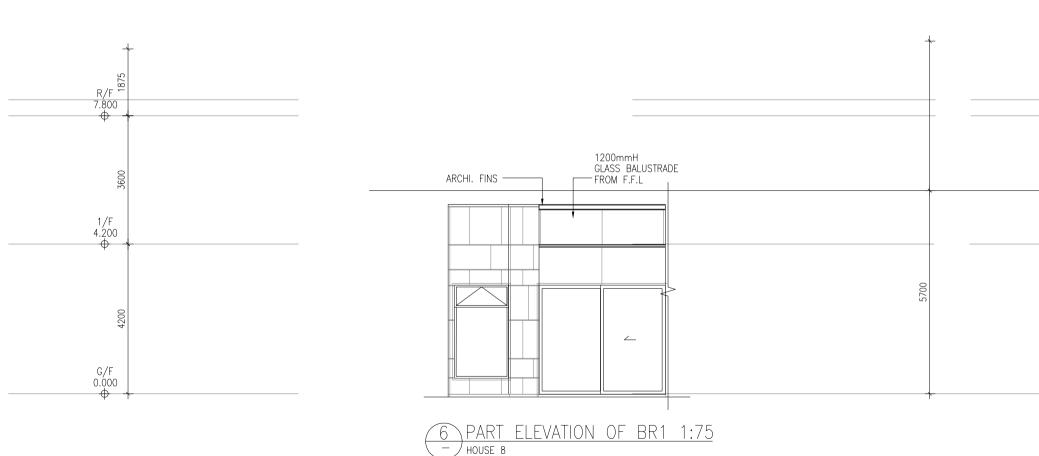
- HOUSE 8



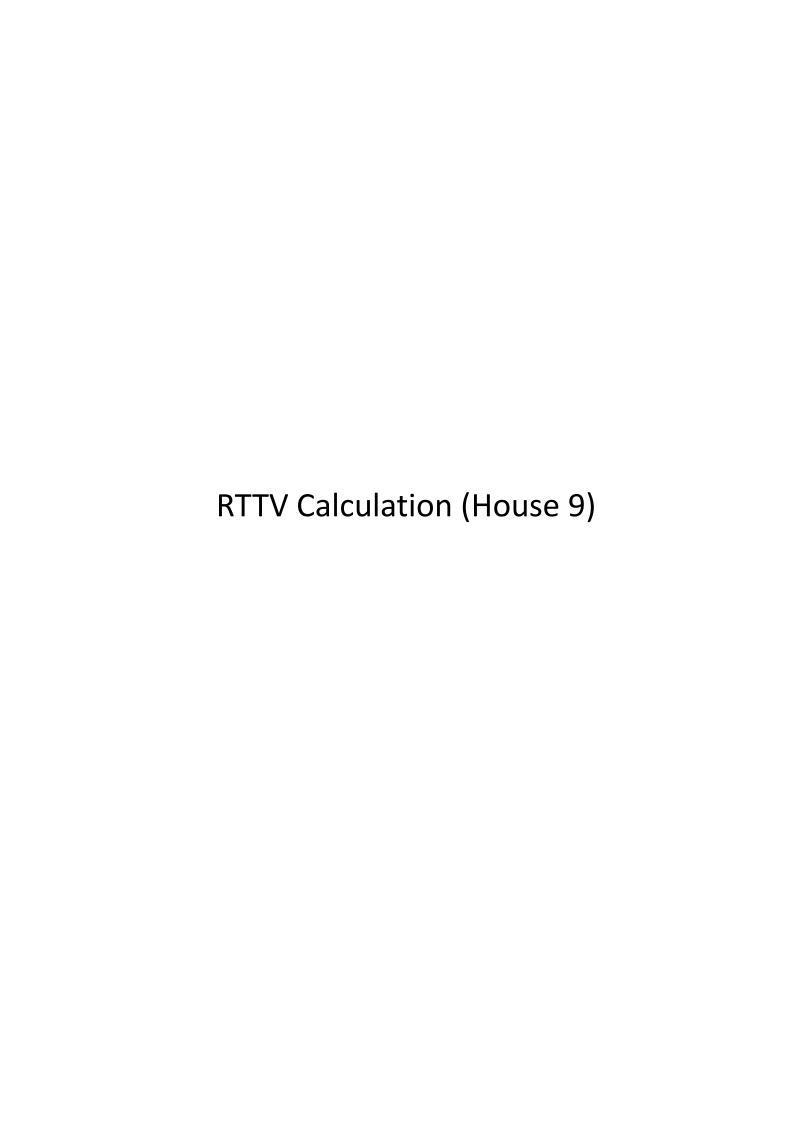
9 WEST ELEVATION 1:75 - HOUSE 8



8 NORTH ELEVATION 1:75
- HOUSE 8



CSK-8E5



Total Gross Wall Areas 333.36 m²

)x 2.74 x 1 =

0.00 x

 $2.74 \times 1 =$

1/F (Window GL02) - D

Gross Glazing Areas 14.01 m²

Total Gross Glazing Areas 129.66 m²

0.00 m²

West Elevations (House 9)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	azing Areas) (Ao) at West Elevations (House 9)	=	94.44 m²
Glazing Areas at	West Elevations (House 9)	=	52.87 m ²
Breakdown of Glazing Areas	ng Areas Unshaded (W-F1)	=	31.98 m²
	ECS =	1.000	
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys $3.15 \times 3.05 = 9.61 \text{ m}^2$	=	9.61 m²
	OPF 1.90 / 3.05 = 0.62 ECS = 0.666		
Glazing Areas	Shaded by Built-Fin (Projection on Right) (W-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 4.28 x 2.64 = 11.29 m²	=	11.29 m²
	SPF 1.60 / 4.28 = 0.37 ECS = 0.989		
Opaque Wall Areas	at West Elevations (House 9)	=	41.57 m²
Breakdown of Opaq RC Wall Areas	ue Wall Areas (W-W1)	=	41.57 m ²

52.87

94.44

0.56

Sheet no.	

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 9)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (Refer \ to \ Table \ 5)$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3) Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

W-W1	Description:			RC Wall Are	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	/	2.9	=	0.010
12mm cement/ sand render		0.012	/	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	/	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

3.42

W/m²K

Sheet No.	4	BD Ref No	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	5, Ngau Tam Mei, Yuen Long (House 9)	
	•		
Facade Orientation Facing	West	Gross Wall Area (Ao) =	94.44
Window to Wall Ratio (WWR)	0.56	Wall Orientation Factor (Gw) =	1.131

Components / Details		Code No.			
Description	Units	W-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	41.57			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	5.40			

Heat Conduction through Opaque Walls	3 =	3.57(Awi/Ao) Uwi αι	wi Gw	where i= 1, 2,, n
	=	5.40	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing					
Components / Details	Code No.				
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	52.87	9.61	11.29	
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.71	0.13	0.15	

Heat Conduction through Glazing	= 0.64	(Afi/Ao) l	Jfi Gw	where i= 1, 2,, n
	=	0.98	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details	Code No.	Code No.			
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	31.98	9.61	11.29	
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43	
Visible Light Transmittance (VLT)	%	53	53	53	
External Reflectance (ER)	%	17	17	17	
External Shading Miltiplier (ESC)		1.00	0.67	0.99	
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	Cwi)Gw	6.87	1.38	2.40	

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 10.65 W/m²

Summary of RTTV at West Elevations (House 9)

= 5.40 + 0.98 + 10.65 = 17.04 W/m²

North Elevations (House 9)

Gross Wall Areas 98.46 m² (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 9) Glazing Areas at North Elevations (House 9) 39.14 m² **Breakdown of Glazing Areas Glazing Areas** Unshaded (N-F1) 39.14 m²

ECS = 1.000

North Elevations (House 9) **Opaque Wall Areas at** 59.33 m²

Breakdown of Opaque Wall Areas RC Wall Areas (N-W1) 59.33 m²

Window to Wall Ratio (WWR) = 39.14 98.46 0.40 Sheet no. 5

Wall Orientation Factor Gw = (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 9)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

> Air space resistance (Refer to Table 3) Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total	<u> </u>				0.293

3.42 W/m²K

Sheet No.	6	BD Ref No	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	, Ngau Tam Mei, Yuen Long (House 9)	
	•		
Facade Orientation Facing	North	Gross Wall Area (Ao) =	98.46
Window to Wall Ratio (WWR)	0.40	Wall Orientation Factor (Gw) =	0.79

Components / Details		Code No.			
Description	Units	N-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	59.33			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	5.17			

Heat Conduction through Opaque Wall	luction through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw				
	=	5.17	W/m ²		

Components / Details	Code No.		
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	39.14	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.35	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw			where i= 1, 2,, n
	=	0.35	W/m²	

Part 3 - Calculation of Solar Radiation tl	rough Glazing			
Components / Details		Code No.		
Description Units		N-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	39.14		
Shading Coefficient of Glazing (SCf)		0.43		
Visible Light Transmittance (VLT)	%	53		
External Reflectance (ER)	%	17		
External Shading Miltiplier (ESC)		1.00		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	Cwi)Gw	5.64		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2,, n								
	=_	5.64	_W/m²					
Summary of RTTV at North Elevations (House 9)								

East Elevations (House 9)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 9)

Glazing Areas at East Elevations (House 9)

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 23.64 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 9) = 32.22 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(E-W1) = 32.22 m²

Window to Wall Ratio (WWR) = 23.64 / 55.86 = 0.42

Sheet no. 7

Wall Orientation Factor Gw = 1.072 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 9)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

E-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

 $Uw1 = \frac{1}{0.202} = 3.42 \text{ W/m}^2\text{K}$

Sheet No.	8	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
Facade Orientation Facing	East	Gross Wall Area (Ao) = _	55.86
Window to Wall Ratio (WWR)	0.42	Wall Orientation Factor (Gw) =	1.072

Components / Details		Code No.			
Description	Units	E-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	32.22			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	6.71			

Heat Conduction through Opaque Wall	eat Conduction through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw					
	=	6.71	W/m²			

Components / Details	Code No.		
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	23.64	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.51	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw			where i= 1, 2,, n
	=	0.51 W/	m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	E-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	23.64			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw		8.15			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 8.15 W/m²

Summary of RTTV at East Elevations (House 9)

South Elevations (House 9)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 9)

Glazing Areas at South Elevations (House 9) = 14.01 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 14.01 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 9) = 70.59 m²

Breakdown of Opaque Wall Areas
RC Wall Areas (S-W1) =

Window to Wall Ratio (WWR) = 14.01 / 84.60 = 0.17

Sheet no. 9

Wall Orientation Factor Gw = 0.975 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 9)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

70.59 m²

 $U = \frac{1}{(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)}$ where $Ri \qquad \text{Surface film resistance of internal surface (Refer to Table 2)}$

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)

χ Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

S-W1 Description: RC Wall Areas

Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

Uw1 = ____ = 3.42 W/m²K

Sheet No.	10	BD Ref No	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	, Ngau Tam Mei, Yuen Long (House 9)	
Facade Orientation Facing	South	Gross Wall Area (Ao) =	84.60
Window to Wall Ratio (WWR)	0.17	Wall Orientation Factor (Gw) =	0.975

Components / Details		Code No.		
Description	Units	S-W1		
External Finish Material		30mm Stone cladding		
Conductivity	W/mK	2.90		
Thickness	m	0.030		
Average Absorptivity (awi)	(a)	0.89		
Intermediate component		12mm cement/ sand render		
Conductivity	W/mK	0.72		
Thickness	m	0.01		
Intermediate component		200mm concrete wall		
Conductivity	W/mK	2.16		
Thickness	m	0.20		
Intermediate component				
Conductivity				
Thickness				
Intermediate component				
Conductivity				
Thickness				
Internal Finish Material		10mm AGT Tile		
Conductivity	W/mK	1.10		
Thickness	m	0.01		
U-value of Opaque Area (Uwi)	W/m²K	3.42		
Opaque Wall Area (Awi)	m²	70.59		
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	8.83		

Heat Conduction through Opaque Walls =	: 3.57(Awi/Ao) Uwi awi Gw	where i= 1, 2,, n
=	8.83	W/m²	

Components / Details	•	Code No.		
Description	Units	S-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	14.01		
U-value of Glazing (Ufi)	W/m²K	1.73		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.18		

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw			where i= 1, 2,, n
	=	0.18 W/m	2	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	S-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	14.01			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	2.90			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n

= 2.90 W/m²

Summary of RTTV at South Elevations (House 9)
= 8.83 + 0.18 +

2.90

= 11.91 W/m²

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 9)		

Overall Gross Wall Area [a] 333.36 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	94.44	5.40	0.98	10.65	17.04	4.83
North	98.46	5.17	0.35	5.64	11.15	3.29
East	55.86	6.71	0.51	8.15	15.36	2.57
South	84.60	8.83	0.18	2.90	11.91	3.02
				·	·	

Overall RTTVwall = 13.72 W/m²

< 14 W/m² OK

_	_	_	ı
к	a	Ю	1

Sheet no.	12

Gross Roof Areas (Opaque Walls + Sk	cylight Areas) (Aro) at	Roof	=	167.62 m²
Skylight Areas at	Roof		=	0.00 m ²
Breakdown of Skyl	ight Areas			
Skylight Areas	Unshaded	(S1)) =	0.00 m ²

OpaqueAreas at	Roof	=	167.62 m²

Breakdown of Opaque Roof Areas		
RC Roof Areas	(F	R1)
	•	,

1/F	. =	34.60 m ²
Roof	=	95.57 m ²
Upper Roof	=	24.40 m ²

Breakdown of Opaque Roof Areas

Dicarachii ci opaque iteci iticae				
RC Roof Areas	(R2)		=	13.05 m ²
1/F		= 7.14	m²	
Roof	:	= 5.91	m²	
Upper Roof	:	=	m²	

Poof	Orion	tation	Factor	
KOOI	Orien	tation	ractor	

Gs = 2.16

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at	Average A	bsorptivity	(a) of the	External O	paque Wall at
---	-----------	-------------	------------	------------	---------------

external Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Inglazed Porcelain Tiles (Grey)	90%	0.9
GT Tile (Brown)	10%	0.8
_		

Average Absorptivity = 0.89

'U' value of Opaque Roof Areas

= **154.57** m²

 $U = 1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$

where Ri Surface film resistance of internal surface (Refer to Table 2)

Ro Surface film resistance of external surface (Refer to Table 2)

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
•	Total				1.858

 $Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$

R2	Description:	Roof Area		
Roof Material				
External surface film resistance		Ro	=	0.055
Air space resistanace		Ra	=	0
50mm cement/ sand screed	0.05 /	0.72	=	0.069
50mm expanded polystyrene	0.05 /	0.034	=	1.471
150mm concrete slab	0.15 /	2.16	=	0.069
10mm AGT Tile (Brown)	0.01 /	1.1	=	0.009
Internal surface film resistance		Ri	=	0.162
То	tal			1.836

Uw1 =
$$\frac{1}{1.836}$$
 = 0.54 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	, Ngau Tam Mei, Yuen Long (House 9)	
Roof Orientation Facing	Flat	Gross Roof Area (Aro) =	167.62
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) =	2.16

Components / Details		Code No.					
Description	Units	R1	R2				
External Finish Material		25mm Unglazed	10mm				
Conductivity	W/mK	1.10	1.10				
Thickness	m	0.025	0.010				
Average Absorptivity (awi)	(a)	0.9	0.8				
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed				
Conductivity	W/mK	0.72	0.72				
Thickness	m	0.050	0.050				
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene				
Conductivity	W/mK	0.034	0.034				
Thickness	m	0.05	0.05				
Intermediate component		150mm concrete slab	150mm concrete slab				
Conductivity	W/mK	2.16	2.16				
Thickness	m	0.15	0.15				
Intermediate component							
Conductivity	W/mK						
Thickness	m						
Internal Finish Material							
Conductivity	W/mK	0.38	0.38				
Thickness	m	0.01	0.01				
U-value of the Roof (Uri)	W/m²K	0.53	0.53				
Opaque Roof Area (Ari)	m²	154.57	13.05				
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.30	0.25				

Heat Conduction through Opaque Roo	f = 3.47(A)	Ari/Aro) Uri o	ıri Gs	where i= 1, 2,, n
	=	3.54	W/m²	

Components / Details			Code No.				
Description	Units	S1					
Skylight Glazing Type		-					
Thickness	m	-					
Skylight Area (Asi)	m²	0.00					
U-value of Skylight Glazing (Usi)	W/m²K	-					
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00					

Heat Conduction through Skylight	t = 0.40	(Asi/Aro)	Usi Gs	where i= 1, 2,, n
	=	0.00	W/m²	

Part 3 - Calculation of Solar Radiation through Skylight						
Components / Details			Code No	0.		
Description	Units	S 1				
Skylight Glazing Type		-				
Thickness	m	-				
Skylight Area (Asi)	m²	0.00				
Shading Coefficient of Skylight Glazing (SCr))	-				
Visible Light Transmittance (VLT)		-				
External Reflectance (ER)		-				
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00				

Solar Radiation thr	ough	Skylight	= 41.10 (A = 0.0	, , ,	where i= '	1, 2,, n
Summary of RTTV	at Ro	oof				
	=	3.54	+	0.00	+	0.00
	=	3.54	W/m²			

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 9)	_	
	-		

Overall Roof Area [a] 167.62 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	167.62	3.54	0.00	0.00	3.54	3.54

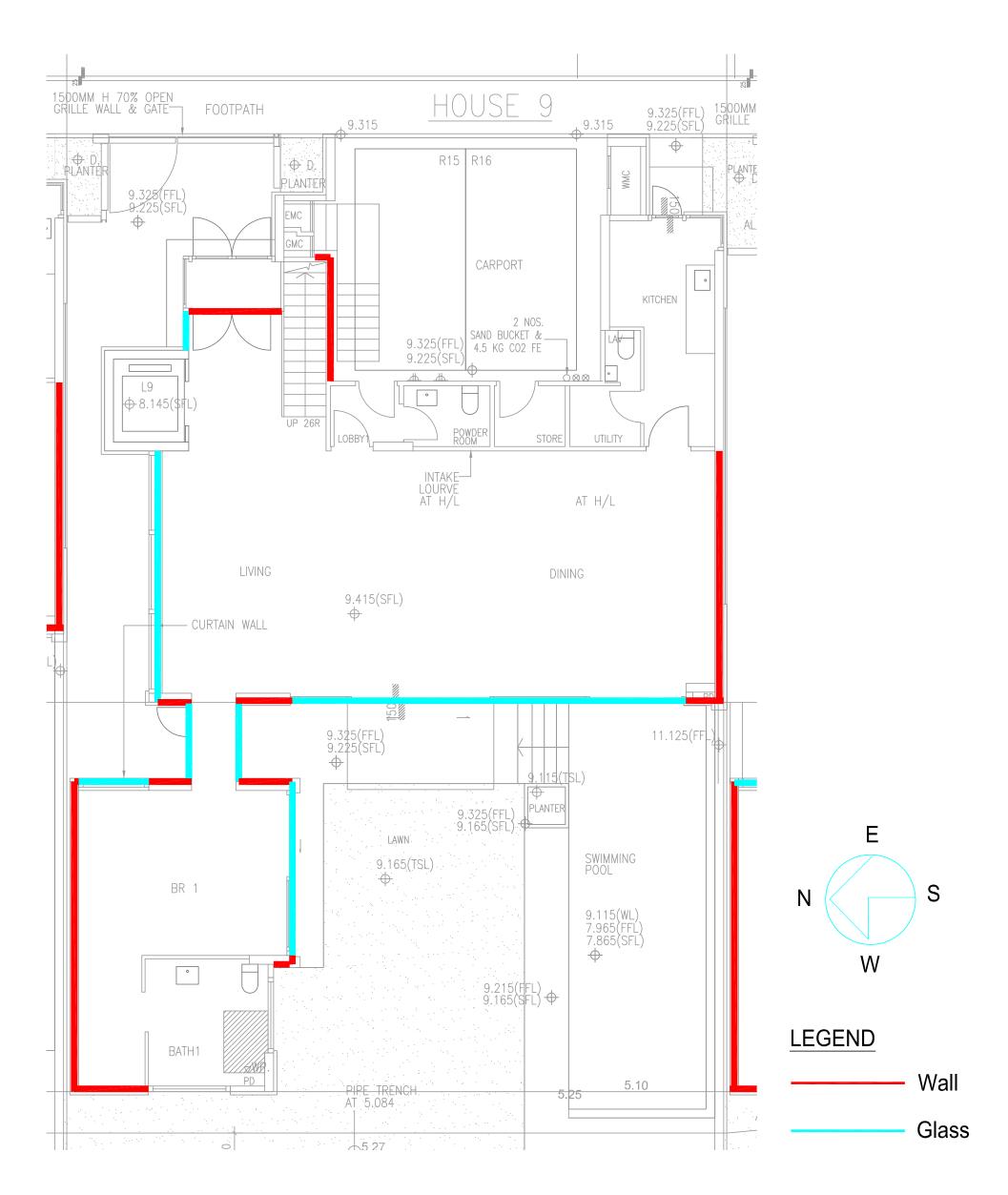
Overall RTTVroof =	3.54	W/m²	
<	4	W/m²	OK

RTTV Summary Sheet

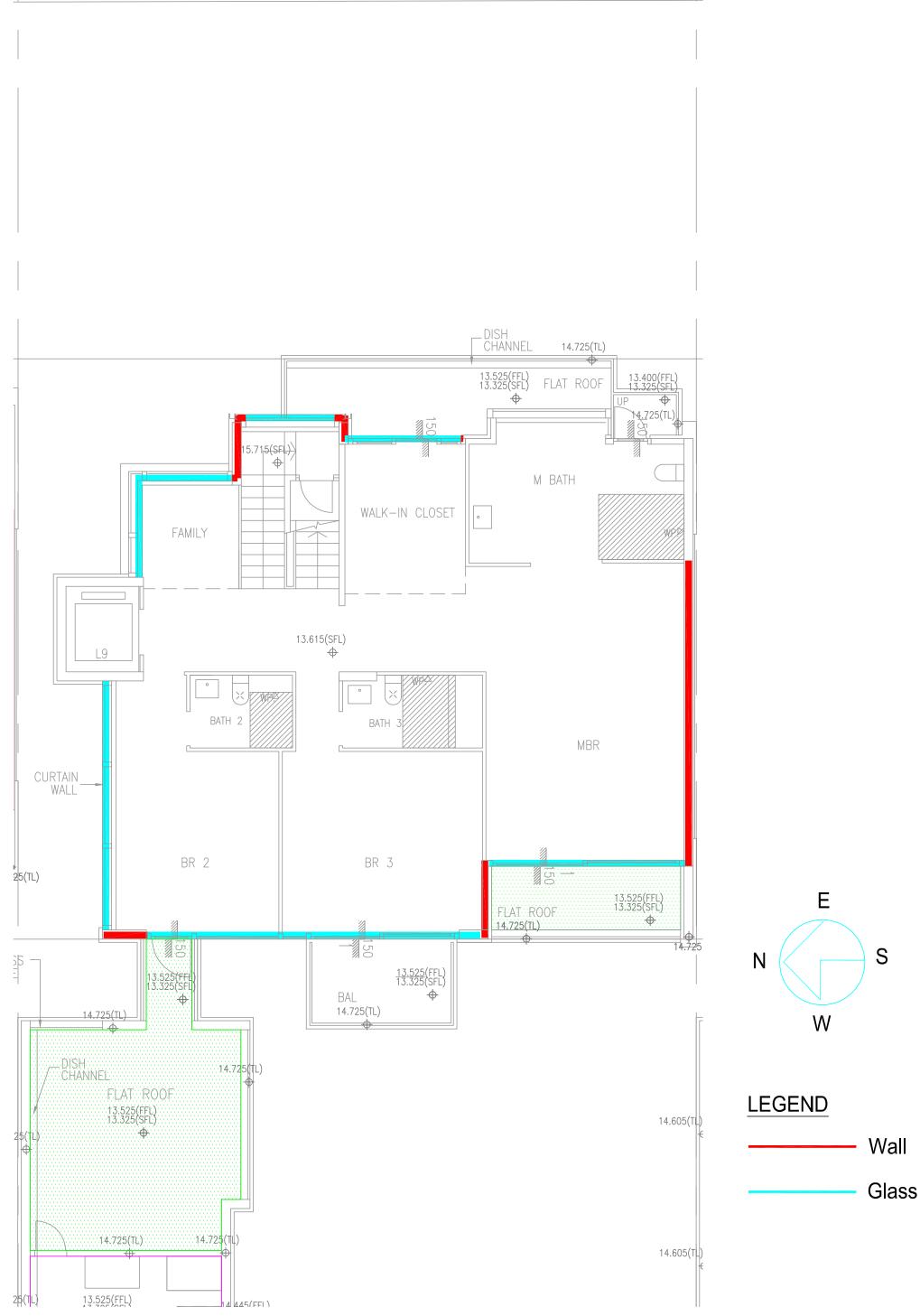
Address:	Lot 2115, D.D. 1	05, Ngau T	am Mei, Yuen	Long (Ho	ouse 9)																BD Ref. No.	
																					BD 2/9179/15	
Building Type:		Residentia																				
RTTV Calcula	ited by:		egistered Profe	essional	Thomas	Anderso	n & Partners	Consulting E	ngineers l	Ltd.												
			. Architect . Others, please specify-																			
		3.0	thers, please s	pecify:-																		
No. of Storeys (Residential U		2																				
Table 1		•																				
									Deen	ned to S	Satisfy RTT	V _{Wall}										
Facade Orienta			West		North			East			South											
Average Absor			0.795		0.795			0.795			0.795											
	ow to Wall Ratio		0.59		0.33			0.19			0.73											
	ng Coefficient of		0.43		0.43			0.43			0.43											
Facade	ing Coefficient of		0.43		0.43			0.43			0.43											
Visable Light 7	Γransmittance		53	%	53	%		53	%		53	%			%		%			%		%
External Refle			17	%	17	%		17	%		17	%			%		%			%		%
Table 2				ı						1			l									
										R	TTV _{Wall}											
Facade Orienta	tion Facing	West					North						East					South				
Wall Orientation				1.131					0.79						1.072					0.975		
Total External (Residential U			101.7	m ²	Window to Wall	Ratio		90.93	m ²	Windo	w to Wall R	atio		35.2	m ²	Window to V	Vall Ratio		15.8	m ²	Window to Wa	all Ratio
Total Window	Area		59.81	m ²	= 0.	59		29.63	m ²	=	0.33			6.80	m ²	=	0.19		11.42	m ²	= 0).73
Heat	Opaque Wall		5.40		W/m ²			5.17		1	W/m ²			6.71		W/m	2		8.83		W/m ²	
Conduction	Window		0.98		W/m ²			0.35			W/m ²			0.51		W/m	2		0.18		W/m ²	
Window	Glass Type		Area =	SC	VLT =	%		Area =	SC		VLT =	%		Area =	SC	VLT =	- %		Area =	SC	VLT =	%
			m ²	=	ER =	%	Reflective	m ²	=		ER =	%	Reflective	m ²	=	ER =	%	Reflective	m ²	=	ER =	%
		Tinted		.81 SC	0.43 VLT =	53 %	Tinted		9.63 SC	0.43	VLT = 53	%			6.8 SC	0.43 VLT =	53 %	Tinted		2 SC	0.43 VLT =	53 %
			m ²	=	ER =	17 %		m ²	=		ER = 17	%		m ²	=	ER =	17 %		m ²	=	ER =	17 %
		☐ Clear	Area = m ²	SC -	VLT =	%	Clear	Area = m ²	SC =		VLT =	%	☐ Clear	Area = m ²	SC =	VLT =		Clear	Area = m ²	SC -	VLT =	%
	Double	□ v		N-	ER =	%	₽ v				ER =	%	77 V			ER =	%	D v		T-	ER =	%
	Double Glazing	✓ Yes		NO			☑ Yes	Ш	No				∠ Yes		NO			✓ Yes	_ N	10		
	External	Overhang	Z Yes	□ No	0		Overhang	☐ Yes	es 🛮 No		Overhang Yes No		Overhang	ang Yes N)						
	Shading	Sidefin	Z Yes	□ No			Sidefin	☐ Yes	Z				Sidefin	Yes	Z N			Sidefin	☐ Yes	Z N		
Solar Radiation	n through		10.65		W/m ²			5.64			W/m ²			8.15		W/m	2		2.90		W/m ²	
Gazing																						
Average Absor				0.795					0.795				0.795						0.795			
RTTV _{Wall} at ea			17.04		W/m ²			11.15			W/m ²			15.36		W/m	2		11.91		W/m ²	
Overall RTTV	Wall										13.72		W/m ²									
Table 3										Da	TTV _{Roof}											
Roof Orientation	on Factor		216							K	I V Roof											
Total Roof Are			167.62	$\overline{}$	m ²																	
Units)		4	۷ >	ノ																		
Total Skylight	Area		0		m ²																	
Heat	Roof		3.54)	W/m ²																	
Conduction	Skylight				W/m ²																	
	Glass Type	Reflect	tive Are	a =				m ² SC	=					VL	T =			%	ER =			%
		☐ Tinted	Are	a =				m ² SC	=					VL	T =			%	ER =			%
		☐ Clear	Are	a =				m ² SC	=					VL	T =			%	ER =			%
Skylight	Double Glazing	Yes		No															•			
	External	☐ Yes		No																		
	Shading																					
	through Gazing		~^		W/m ²																	
Average Absor		<u> </u>	0.8	\	2																	
Overall RTTV	Roof	. (3.54	,	W/m ²																	

Address:

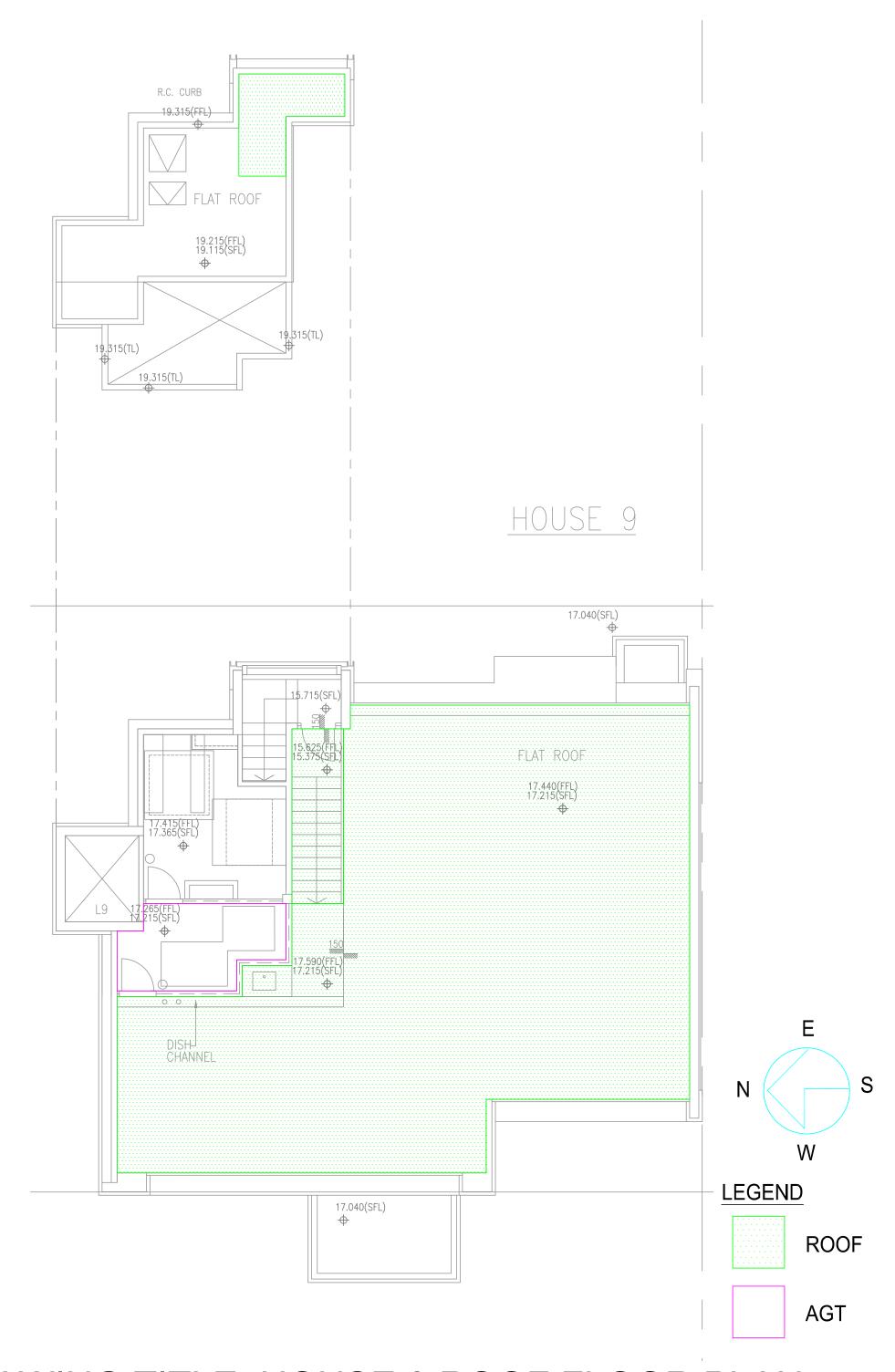
ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance

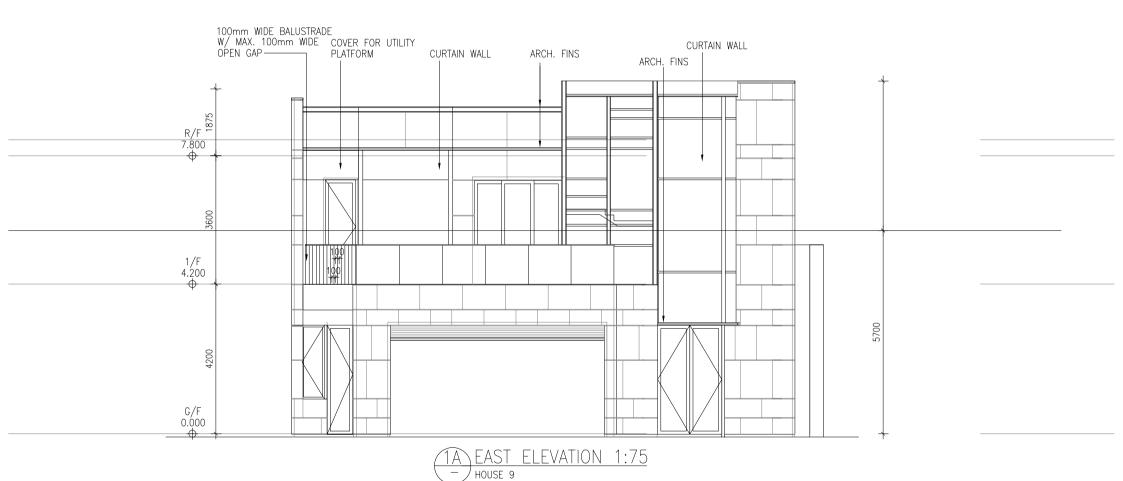


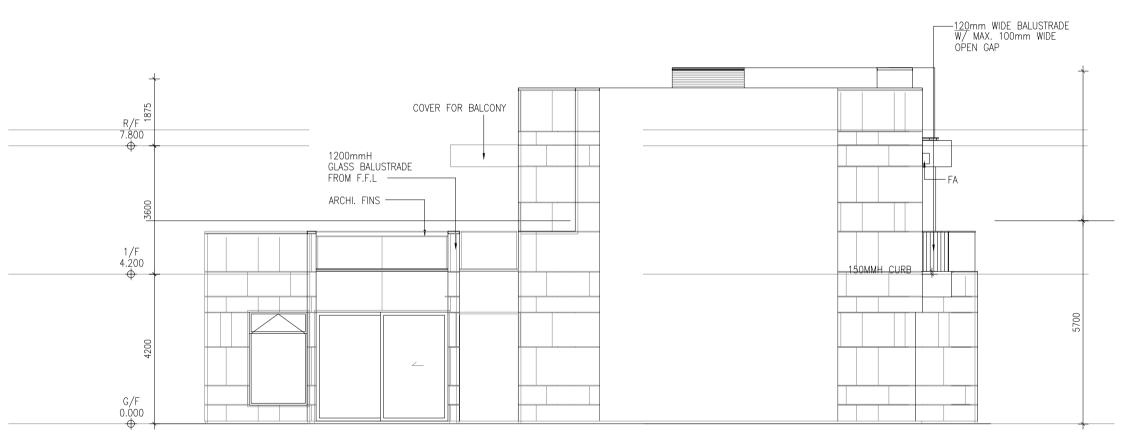
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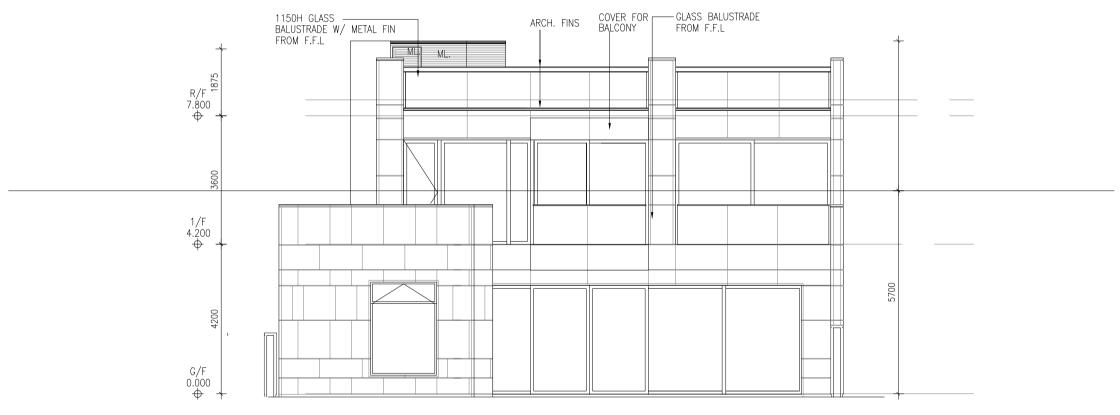
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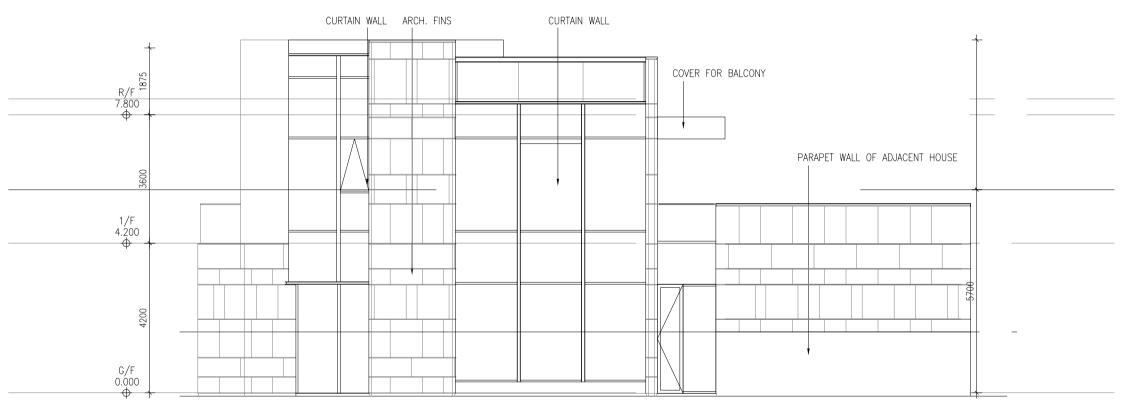




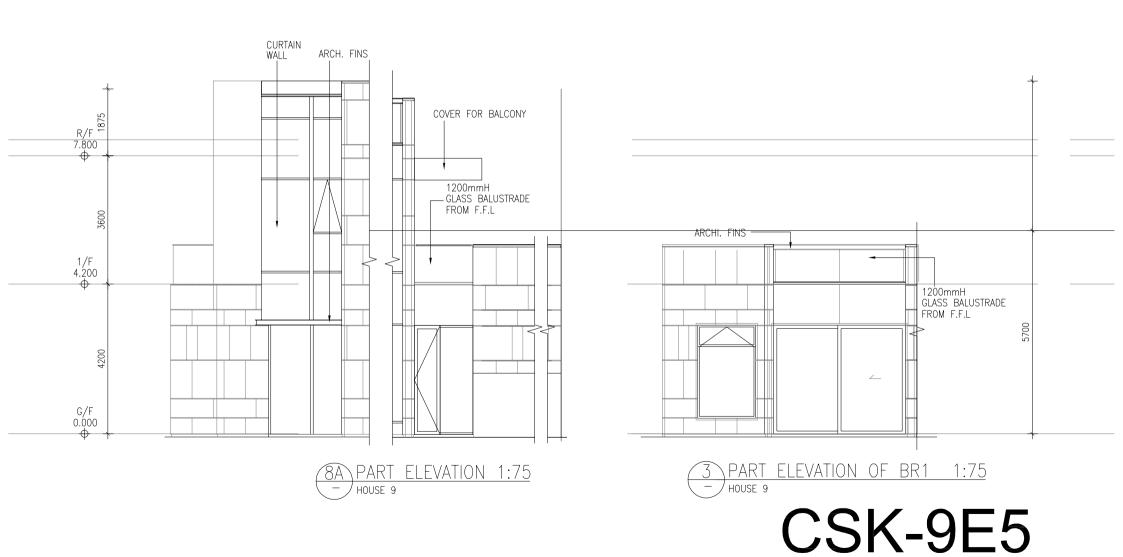
7 SOUTH ELEVATION 1:75
HOUSE 9

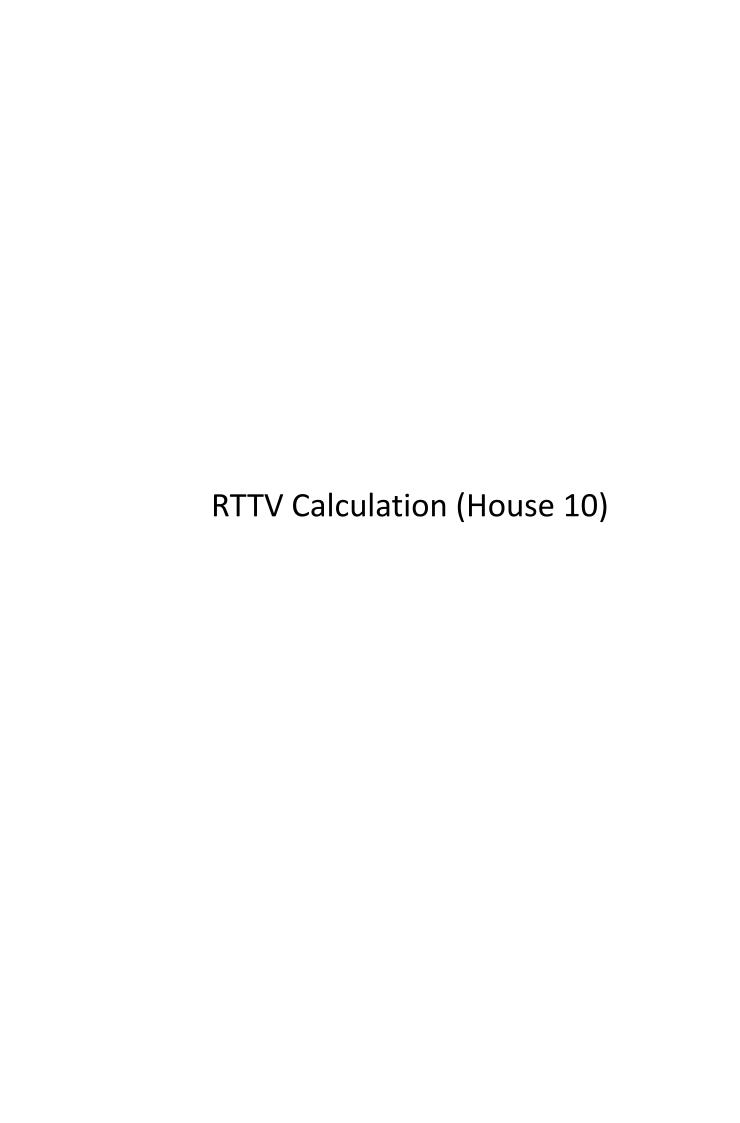


9 WEST ELEVATION 1:75
- HOUSE 9



8 NORTH ELEVATION 1:75
HOUSE 9





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Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                                       Sheet no. 1
                                                                                                 Storey heights (Residential Units):
                                                                                                 G/F
                                                                                                                                      4.20 m
                                                                                                                                                ( 1 storey)
                                                                                                 1/F
                                                                                                                                      3.60 m
                                                                                                                                                      storey)
                                                                                                 R/F
                                                                                                                                      1.90 m
                                                                                                                                                ( 1 storey)
West Elevations (House 10) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                   12.00 + 2.00
                                                                                 )x 4.20 x 1 = 14.00 x 4.20 x 1 =
                                                                                                                                     58.80 m<sup>2</sup>
1/F
                                   12.70
                                                                                 )x 3.60 x 1 = 12.70 x 3.60 x 1 =
                                                                                                                                     45.72 m<sup>2</sup>
R/F
                                                                                 )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                     0.00 \text{ m}^2
                                                                                                                                     Gross Wall Areas
                                                                                                                                                        104.52 m<sup>2</sup>
North Elevations (House 10) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                   14.50 + 0.90
                                                                                 )x 4.20 x 1 = 15.40 x 4.20 x 1 =
                                                                                                                                     64.68 m<sup>2</sup>
1/F
                                    3.60 + 5.90
                                                                                 )x 3.60 x 1 =
                                                                                                    9.50 x 3.60 x 1 =
                                                                                                                                     34.20 m<sup>2</sup>
R/F
                                                                                 )x 1.90 x 1 =
                                                                                                    0.00 \times 1.90 \times 1 =
                                                                                                                                     0.00 \text{ m}^2
                                                                                                                                     Gross Wall Areas
                                                                                                                                                          98.88 m<sup>2</sup>
East Elevations (House 10) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                    2.80 + 3.60
                                                                                 )x 4.20 x 1 =
                                                                                                    6.40 \times 4.20 \times 1 =
                                                                                                                                     26.88 m<sup>2</sup>
1/F
                                                                                                    8.05 x 3.60 x 1 =
                                    8.05
                                                                                 )x 3.60 x 1 =
                                                                                                                                     28.98 m<sup>2</sup>
R/F
                                                                                 )x 1.90 x 1 =
                                                                                                    0.00 \times 1.90 \times 1 =
                                                                                                                                     0.00 \text{ m}^2
                                                                                                                                    Gross Wall Areas
                                                                                                                                                          55.86 m<sup>2</sup>
South Elevations (House 10) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                   11.60 + 2.60
                                                                                 )x 4.20 x 1 = 14.20 x 4.20 x 1 =
                                                                                                                                     59.64 m<sup>2</sup>
1/F
                                                                                 )x 3.60 x 1 =
                                                                                                    6.70 \times 3.60 \times 1 =
                                                                                                                                     24.12 m<sup>2</sup>
                                    6.70
R/F
                                                                                 )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                     0.00 m<sup>2</sup>
                                                                                                                                    Gross Wall Areas
                                                                                                                                                          83.76 m<sup>2</sup>
```

Total Gross Wall Areas 343.02 m²

)x 2.74 x 1 =

 $0.00 \times 2.74 \times 1 =$

1/F (Window GL02) - D

Gross Glazing Areas 16.75 m²

Total Gross Glazing Areas 134.16 m²

0.00 m²

West Elevations (House 10)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	zing Areas) (Ao) at West Elevations (House 10)	=	104.52 m²
Glazing Areas at	West Elevations (House 10)	=	55.92 m²
Breakdown of Glazin Glazing Areas	ng Areas Unshaded (W-F1) ECS =	= 1.000	35.02 m ²
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.15 x 3.05 = 9.61 m²	=	9.61 m²
Glazing Areas	OPF 1.90 / 3.05 = 0.62 ECS = 0.666 Shaded by Built-Fin (Projection on Right) (W-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 4.28 x 2.64 = 11.29 m²	=	11.29 m²
Opaque Wall Areas	SPF 1.60 / 4.28 = 0.37 ECS = 0.989 at West Elevations (House 10)	=	48.60 m²
Breakdown of Opaq RC Wall Areas	ue Wall Areas (W-W1)	=	48.60 m²

55.92

104.52

0.53

Sheet no. 3

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 10)

External Wall Material (Colour/Finish)	% of wall area	α Absorptivity (Refer to Table 5)
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
<u> </u>		

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to Table 2) Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

W-W1	Description:			RC Wall Are	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
Tota	al					0.293

3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	4	BD Ref No	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
	•		
Facade Orientation Facing	West	Gross Wall Area (Ao) =	104.52
Window to Wall Ratio (WWR)	0.53	Wall Orientation Factor (Gw) =	1.131

Components / Details		Code No.			
Description	Units	W-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	48.60	_		
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	5.71			

Heat Conduction through Opaque Walls	=	3.57(Awi/Ao) Uwi αι	wi Gw	where i= 1, 2,, n
	=	5.71	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing						
Components / Details	Code No.					
Description	Units	W-F1	W-F2	W-F3		
Glazing Type		Tinted	Tinted	Tinted		
Thickness	m	0.01	0.01	0.01		
Glazing Area (Afi)	m²	55.92	9.61	11.29		
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.67	0.12	0.14		

Heat Conduction through Glazing	= 0.64	4 (Afi/Ao)	Ufi Gw	where i= 1, 2,, n
	=	0.93	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details	Code No.	Code No.				
Description	Units	W-F1	W-F2	W-F3		
Glazing Type		Tinted	Tinted	Tinted		
Thickness	m	0.01	0.01	0.01		
Glazing Area (Afi)	m²	35.02	9.61	11.29		
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43		
Visible Light Transmittance (VLT)	%	53	53	53		
External Reflectance (ER)	%	17	17	17		
External Shading Miltiplier (ESC)		1.00	0.67	0.99		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	6.80	1.24	2.17		

Summary of RTTV at West Elevations (House 10)

North Elevations (House 10)

Gross Wall Areas 98.88 m² (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 10) Glazing Areas at North Elevations (House 10) 38.00 m² **Breakdown of Glazing Areas Glazing Areas** Unshaded (N-F1) 38.00 m² ECS = 1.000

North Elevations (House 10) **Opaque Wall Areas at** 60.88 m²

Breakdown of Opaque Wall Areas RC Wall Areas (N-W1) 60.88 m²

38.00 98.88 Window to Wall Ratio (WWR) = 0.38 Sheet no. 5

Wall Orientation Factor

Gw = 0.79 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 10)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3) Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	6	BD Ref No	BD 2/9179/15		
Building Address	lress Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 10)				
	•				
Facade Orientation Facing	North	Gross Wall Area (Ao) =	98.88		
Window to Wall Ratio (WWR)	0.38	Wall Orientation Factor (Gw) =	0.79		

Components / Details		Code No.				
Description	Units	N-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	60.88				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	5.28				

Heat Conduction through Opaque Wa	IIs = 3.5	where i= 1, 2,, n		
	=	5.28	W/m ²	

Components / Details	Code No.		
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	38.00	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.34	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw			where i= 1, 2,, n
	=	0.34	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details	Code No.				
Description	Units	N-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	38.00			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	5.45				

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n= 5.45 W/m²

Summary of RTTV at North Elevations (House 10)

East Elevations (House 10)

Gross Wall Areas 55.86 m² (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 10) Glazing Areas at East Elevations (House 10) 23.49 m² **Breakdown of Glazing Areas Glazing Areas** Unshaded (E-F1) 23.49 m²

ECS = 1.000

East Elevations (House 10) **Opaque Wall Areas at** 32.37 m²

Breakdown of Opaque Wall Areas RC Wall Areas (E-W1) 32.37 m²

Window to Wall Ratio (WWR) = 23.49 55.86 0.42 Sheet no. 7

Wall Orientation Factor

Gw = 1.072

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 10)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

E-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTVwall of Each Facade

Sheet No.	8	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	, Ngau Tam Mei, Yuen Long (House 10)	
	•		
Facade Orientation Facing	East	Gross Wall Area (Ao) =	55.86
Window to Wall Ratio (WWR)	0.42	Wall Orientation Factor (Gw) =	1.072

Components / Details		Code No.			
Description	Units	E-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	32.37			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	6.74			

Heat Conduction through Opaque Wal	where i= 1, 2,, r			
	=_	6.74	W/m²	

Components / Details	Code No.		
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	23.49	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.50	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.50 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	E-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	23.49			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	Cwi)Gw	8.09			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2,, n							
	=	8.09	W/m²				
Summary of RTTV at East Elevations (House 10)							
Outlinary of Killy	at La	ot Lievati	ons (nouse ro)				

South Elevations (House 10)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 10)

Glazing Areas at South Elevations (House 10) = 16.75 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 16.75 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 10) = 67.01 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(S-W1) = 67.01 m²

Window to Wall Ratio (WWR) = 16.75 / 83.76 = 0.20

Sheet no. 9

(Refer to Table 9)

Wall Orientation Factor Gw = 0.975

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 10)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

S-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

Uw1 = ____ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	s, Ngau Tam Mei, Yuen Long (House 10)	
Facade Orientation Facing	South	Gross Wall Area (Ao) =	83.76
Window to Wall Ratio (WWR)	0.20	Wall Orientation Factor (Gw) =	0.975

Components / Details		Code No.		
Description	Units	S-W1		
External Finish Material		30mm Stone cladding		
Conductivity	W/mK	2.90		
Thickness	m	0.030		
Average Absorptivity (awi)	(a)	0.89		
Intermediate component		12mm cement/ sand render		
Conductivity	W/mK	0.72		
Thickness	m	0.01		
Intermediate component		200mm concrete wall		
Conductivity	W/mK	2.16		
Thickness	m	0.20		
Intermediate component				
Conductivity				
Thickness				
Intermediate component				
Conductivity				
Thickness				
Internal Finish Material		10mm AGT Tile		
Conductivity	W/mK	1.10		
Thickness	m	0.01		
U-value of Opaque Area (Uwi)	W/m²K	3.42		
Opaque Wall Area (Awi)	m²	67.01		
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.47		

Heat Conduction through Opaque Walls =	= 3.57	'(Awi/Ao) Uwi	awi Gw	where i= 1, 2,, n
:	=	8.47	W/m²	

Components / Details		Code No.		
Description	Units	S-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	16.75		
U-value of Glazing (Ufi)	W/m²K	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.22		

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i	= 1, 2,, n
	=	0.22 W/m	2	

Part 3 - Calculation of Solar Radiation through Glazing				
Components / Details		Code No.		
Description	Units	S-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	16.75		
Shading Coefficient of Glazing (SCf)		0.43		
Visible Light Transmittance (VLT)	%	53		
External Reflectance (ER)	%	17		
External Shading Miltiplier (ESC)		1.00		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	3.50		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 3.50 W/m²

Summary of RTTV at South Elevations (House 10)

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 10)		

Overall Gross Wall Area [a] 343.02 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	104.52	5.71	0.93	10.21	16.85	5.13
North	98.88	5.28	0.34	5.45	11.07	3.19
East	55.86	6.74	0.50	8.09	15.34	2.50
South	83.76	8.47	0.22	3.50	12.18	2.98
				·		

Overall RTTVwall = 13.80 W/m²

< 14 W/m² OK

Sheet no	12

Gross Roof Areas (Opaque Walls + Sky	light Areas) (Aro) at		Roof			=	168.05 m ²
Skylight Areas at	Roof					=	0.00 m ²
Breakdown of Skylig	<u>ht Areas</u>						
Skylight Areas	Unshaded	(S1)		=	0.00 m ²
OpaqueAreas at	Roof					=	168.05 m²
Breakdown of Opaque RC Roof Areas 1/F Roof Upper Roof	e Roof Areas	(R1) = = =	34.60 m² 95.87 m² 24.40 m²	=	154.87 m²
Breakdown of Opaqu RC Roof Areas 1/F Roof Upper Roof	e Roof Areas	(R2) = = =	7.27 m² 5.91 m² m²	=	13.18 m²

Roof Orientation Factor Gs = 2.16 (Refer to Table 9)
--

Average Absorptivity (a) of the External Opaque Wall at

n	_	_	£

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8

Average Absorptivity =

0.896

'U' value of Opaque Roof Areas

U = $1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$

where Ri Surface film resistance of internal surface (Refer to Table 2)

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
			·		
	otal				1.858

$$Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$$

_R2	Description:			Roof Area		
Roof Material						
External surface film resistance				Ro	=	0.055
Air space resistanace				Ra	=	0
50mm cement/ sand screed	0.0	5	/	0.72	=	0.069
50mm expanded polystyrene	0.0	5	1	0.034	=	1.471
150mm concrete slab	0.1	5	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.0	1	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.162
	Total					1.836

$$Uw1 = \frac{1}{1.836} = 0.54 \text{ W/m}^2\text{K}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105, No	gau Tam Mei, Yuen Long (House 10)	
Roof Orientation Facing	Flat	Gross Roof Area (Aro) =	168.05
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) =	2.16
		_	

Components / Details		Code No.				
Description	Units	R1	R2			
External Finish Material		25mm Unglazed Porcelain Tiles (Grey)	10mm AGT Tile (Brown)			
Conductivity	W/mK	1.10	1.10			
Thickness	m	0.025	0.010			
Average Absorptivity (awi)	(a)	0.9	0.8			
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed			
Conductivity	W/mK	0.72	0.72			
Thickness	m	0.050	0.050			
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene			
Conductivity	W/mK	0.034	0.034			
Thickness	m	0.05	0.05			
Intermediate component		150mm concrete slab	150mm concrete slab			
Conductivity	W/mK	2.16	2.16			
Thickness	m	0.15	0.15			
Intermediate component						
Conductivity	W/mK					
Thickness	m		_			
Internal Finish Material						
Conductivity	W/mK	0.38	0.38			
Thickness	m	0.01	0.01			
U-value of the Roof (Uri)	W/m²K	0.53	0.53			
Opaque Roof Area (Ari)	m²	154.87	13.18			
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.29	0.25			

3	m	0.01	0.01	
f the Roof (Uri)	W/m²K	0.53	0.53	
Roof Area (Ari)	m²	154.87	13.18	
duction = 3.47(Ari/Aro) U	ri αri Gs	3.29	0.25	
Heat Conduction throug	nh Opaque Roof = =	3.47(Ari/Aro) Uri ari 3.54	Gs W/m²	where i= 1, 2,, n

Components / Details		Code No.			
Description	Units	S1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
U-value of Skylight Glazing (Usi)	W/m²K	-			
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00			

Heat Conduction through Skylight	= 0.40	(Asi/Aro) l	Jsi Gs	where i= 1, 2,, n
	=	0.00	W/m²	

Part 3 - Calculation of Solar Radiation through Skylight				
Components / Details		Code No.		
Description	Units	S1		
Skylight Glazing Type		-		
Thickness	m	-		
Skylight Area (Asi)	m²	0.00		
Shading Coefficient of Skylight Glazing (SCr)		-		
Visible Light Transmittance (VLT)		-		
External Reflectance (ER)		-		
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00		

Solar Radiation t	hrough	n Skylight	= 41.10 (Asi/A = 0.00	Aro) (SCri) Gs W/m²	where i= 1, 2,	, n
Summary of RTT	V at R	oof 3.54 3.54	+ W/m²	0.00	+	0.00

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No.	BD 2/9179/15	
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 10)	_		
	·			

Overall Roof Area [a] 168.05 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof			
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)			
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]			
Flat Roof	168.05	3.54	0.00	0.00	3.54	3.54			

Overall RTTVroof =	3.54	W/m²	
<	4	W/m²	OK

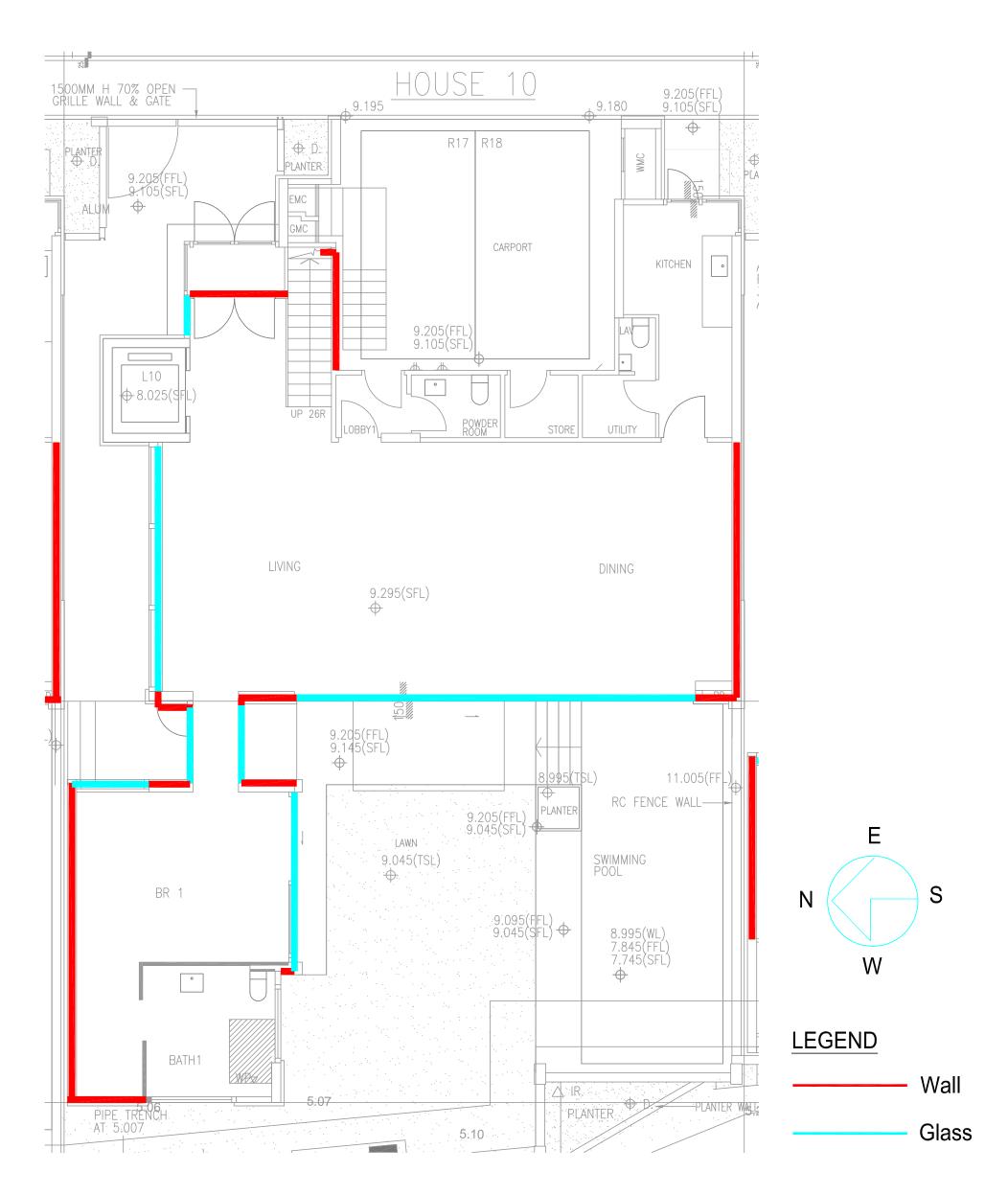
BD Ref. No. BD 2/9179/15

RTTV Summary Sheet

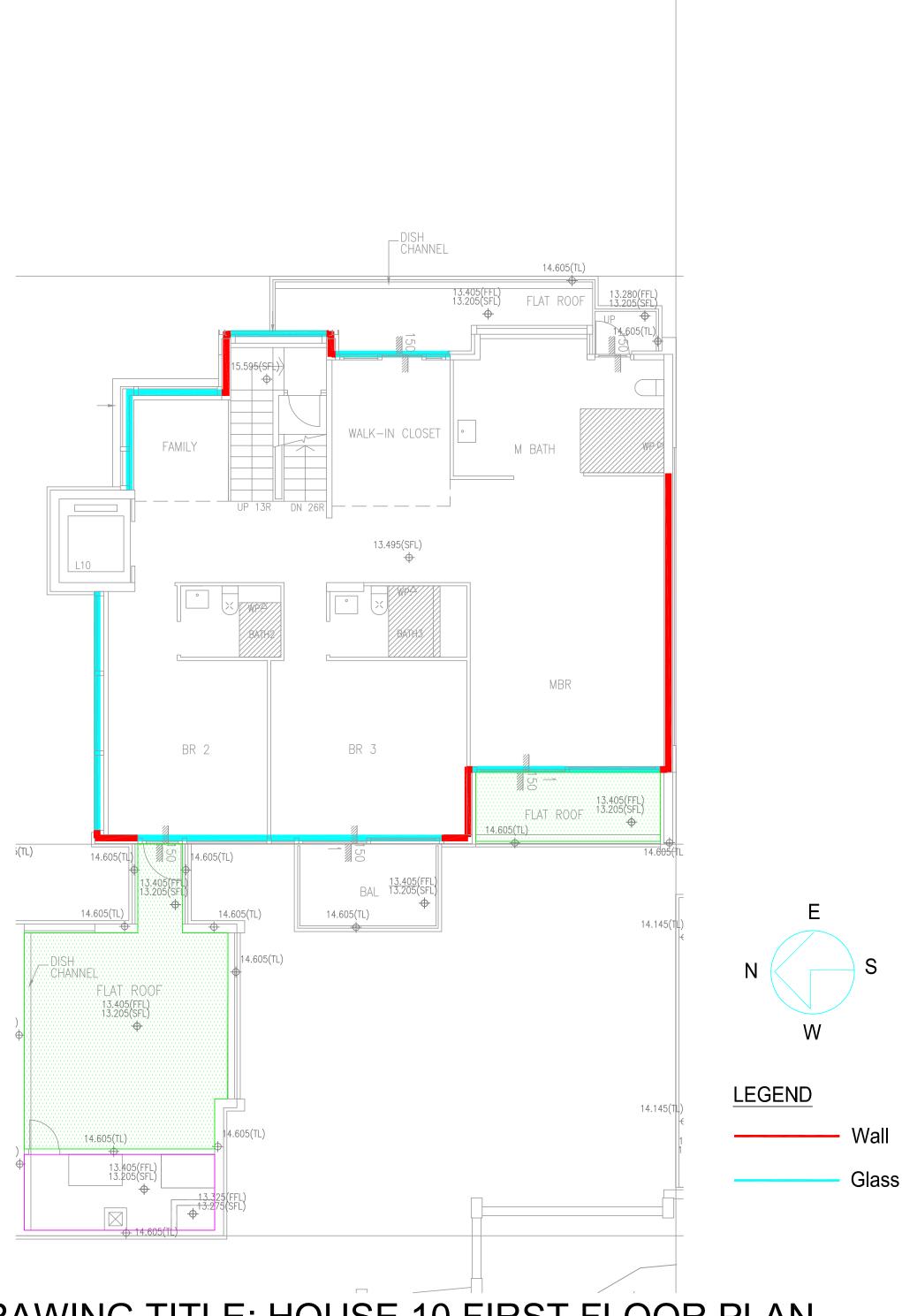
2 Acethors	Building Type:																							
Section Sect	RTTV Calculate	ed by:	1. R	egistered Pro	fessional		Thomas Anderson	& Partners	Consultin	g Engineer	rs Ltd.													
No continue																								
Transfer			3. Others, please specify-																					
Note	No. of Storeys (Residential Uni	its)	2																					
Note	Table 1	able 1																						
Market M	Table 1									D	eemed	to Satisfy RTT	V											
Morey Walkey 160 180 180 180 180 180 180 180 180 180 18	Eggada Orientat	ion Facina		West		1	North	I	Fact		I		* Wall	l			I		1			1		
Access Weeklines No. 1981		-				-																		
Manuel Scheller Cellura Sche																								
Marie Confession						_					_													
March Marc																								
Second Inference	Average Shadin Facade	g Coefficient of		0.43			0.43		0.43		0.43													
Note Contact Part	Visable Light To	ransmittance		53	%		53 %		53	%		53	%			%		%			%		%	
Note	External Reflect	tance		17	%		17 %		17	%		17	%			%		%	,	% %				
Mode	Table 2							l .																
Major Majo												RTTV _{Wall}												
The internal Walf Pote (page Walf and page W	Facade Orientat	ion Facing	West					North						East					South					
Record Number	Wall Orientation	n Factor			1.13	1				0.7	9					1.072				0.975				
Heat Conditional				101.7	m	² Wino	dow to Wall Ratio				n ² Wi	Window to Wall Ratio			35.2	m ²						n ² Window to Wall Ratio		
Heat Conditional	Total Window A	Area		59.81	m	2 =	0.59		29 63		n ² =	= 0.33			6.80	m ²	=	0.19		11.42	422		= 0.73	
Window W					111						11					111	W/							
Mary Gles Type	0 1 6																		_					
Figure					ec.						,		0/			ec					ec.			
	WIIIdow	Glass Type	n a					_			_			_					D - 41 - 4i					
Part					0.04.00	0.44				20.00									,			0.40		
Clear Area			Z Tinted			0.43		Z Tinted	Area =		. 0.			∠ Tinted								0.43		
Double Carrier Carri				m					m				7 %		m					m				
Double			☐ Clear		SC		VLT = %	Clear			2	VLT =	%	☐ Clear			VLT	~= %	Clear				VLT = %	
Claring Clar				m ²	=		ER = %	Ī	m²	-		ER =	%	Ī	m ²	=	ER:	= %		m ²	-		ER = %	
Solar Radiation Factor F			☑ Yes] No			✓ Yes		☐ No				∠ Yes	_ N	ю			✓ Yes		No			
Solar Radiation Factor F		External	Overhang	Z Yes		No		Overhang	Yes	Z] No			Overhang	Yes	ZN	lo		Overhang	Yes	Z	lo		
Solar Radiation through 10.21 W/m² 5.45 W/m² 8.09 W/m² 3.50 W/m² 3		Shading	Sidefin	✓ Yes		No		Sidefin	Yes	Z] No			Sidefin	☐ Yes	ZN	lo		Sidefin	☐ Yes	Z	lo		
Acrage Absorptivity 0.795 0.795 0.795 0.795 0.795 0.795	Solar Radiation	through		10.21			W/m ²		5.4	45		W/m ²			8.09		W	m ²		3.50			W/m ²	
RTTV _{wal} at each Faced 16.85 W/m² 11.07 W/m² 15.34 W/m² 12.18 W/m² Overall RTTV _{wal} 15.80 W/m² 10.18 W/m² Overall RTTV _{wal} 15.80 W/m² 10.18	Gazing	25.52.			0.70	-							0.705						0.705					
Overall RTTV _{wal} 13.80 W/m² Table 3 RTTV _{Roof} Good Orientation Factor Total Roof Area (Residential Units) 168.05 m² Total Skylight Area m² Gonduction Skylight Reflective Area = m² SC = VLT = % ER = % Skylight Clear Area = m² SC = VLT = % ER = % Glazing Clear Area = m² SC = VLT = % ER = % Skylight Scheduling Scheduling Skylight Scheduling Schedulin				16.05)	2												2					
Table 3 Not Factor 108.05 m²				16.85			W/m²							15.34		W	m²	12.18 W/m²						
Roof Orientation Factor Total Roof Area (Residential Units) Total Skylight Area Mym²		/all										13.80		W/m²										
Roof Orientation	Table 3																							
Total Roof Area (Residential Units) Mathematical Roof Area (Residential Units) Mathematical Roof (Roof Skylight Area Mathematical Roof (Roof Skylight Mathematical Roof (Roof Skylight Mathematical Roof (Roof Roof Roof Roof Roof Roof Roo												RTTV _{Roof}												
Units) Total Skylight →																								
Heat Conduction Skylight W/m²	Total Roof Area Units)	(Residential		168.05)	m ²																		
Conduction Skylight	Total Skylight A	Area		\smile		m ²																		
Skylight		Roof		3.54)	W/m	n ²																	
Glass Type	Conduction	Skylight		حهات		W/m	n ²																	
Tinted Area = m² SC = VLT = % ER = % Clear Area = m² SC = VLT = % ER = % Double Glazing Yes No External Shading Yes No No Solar Radiation through Gazing W/m² Average Absorptivity (Roof) O.8 W/m²			Reflect	tive Ar	rea =				m ²	SC =					VLT				%	ER =			%	
Clear Area = m² SC = VLT = % ER = % Skylight Double Glazing Yes No External Shading Yes No No Solar Radiation through Gazing W/m² Average Absorptivity (Roof) O.8 W/m²																								
Skylight Double Glazing Yes No External Shading Yes No Solar Radiation through Gazing W/m² Average Absorptivity (Roof) 0.8 W/m²																								
Glazing External	CI E I								m ⁻	SC =					VLI	=			%	ER =			%	
Shading Solar Radiation through Gazing Average Absorptivity (Roof) W/m ²		Glazing																						
Average Absorptivity (Roof) 0.8			∐ Yes] No																			
	Solar Radiation	through Gazing		~		W/m	n ²																	
Overall RTTV _{Roof} 3.54 W/m^2	Average Absorp	tivity (Roof)	(_	0.8																				
	Overall RTTV _R	oof		3.54	7	W/m	n ²																	

Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 10)

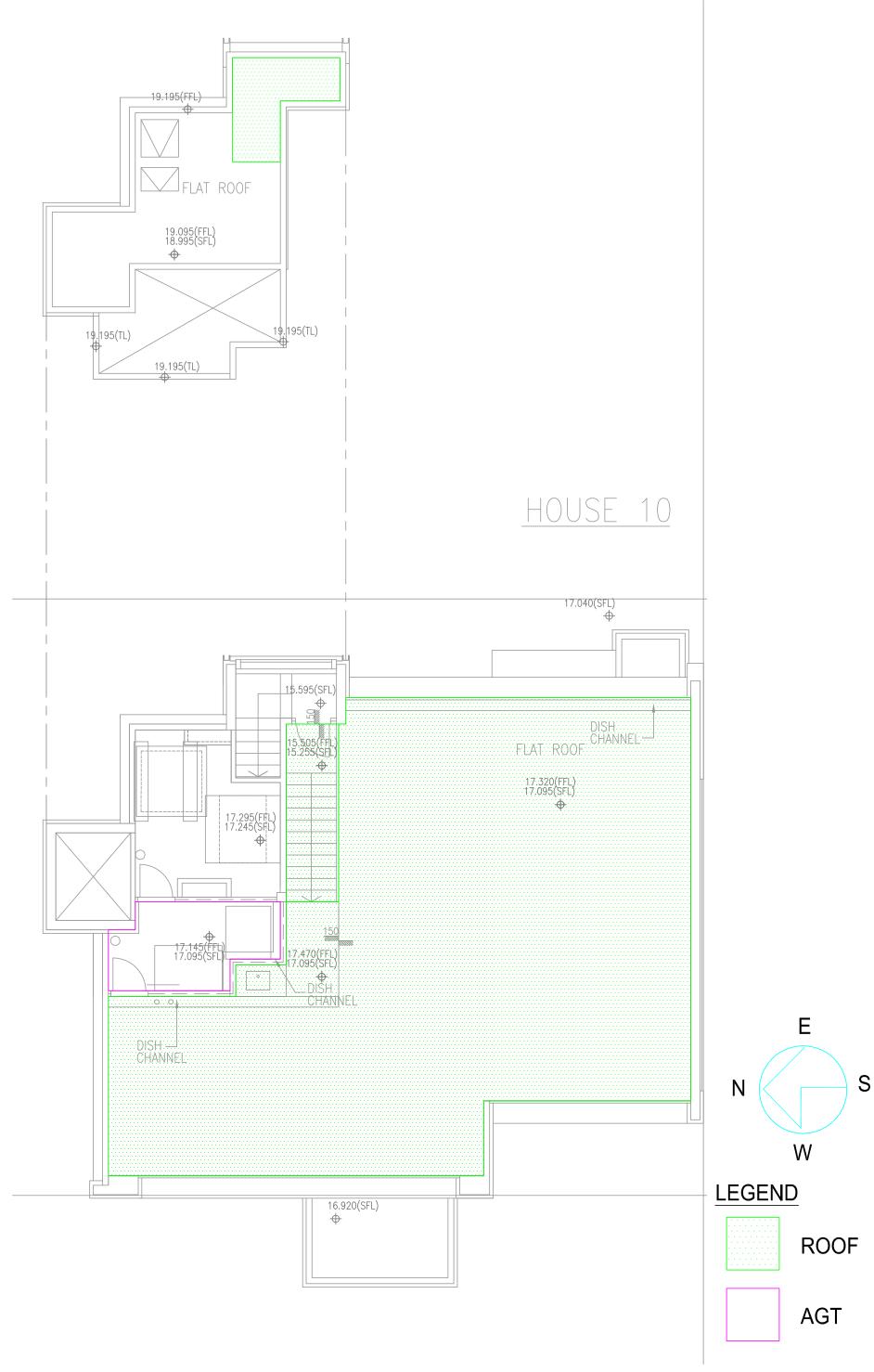
ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance



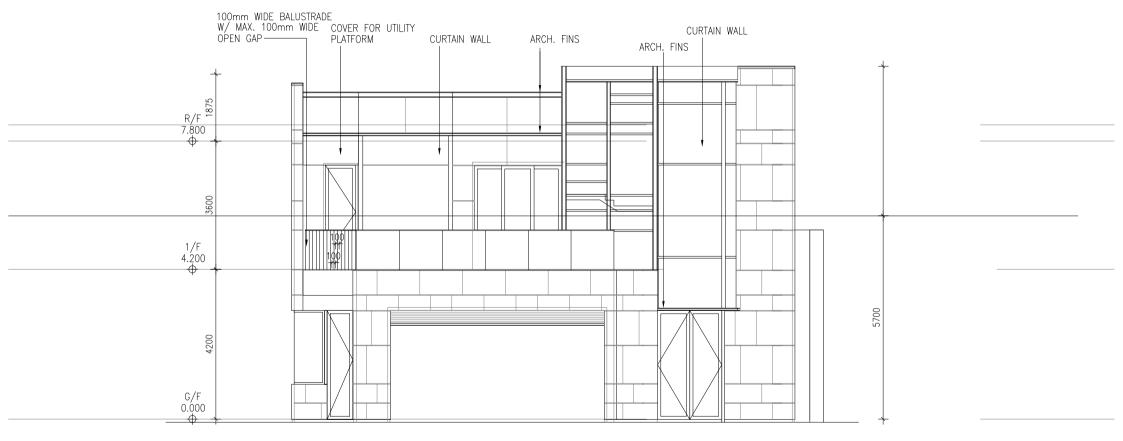
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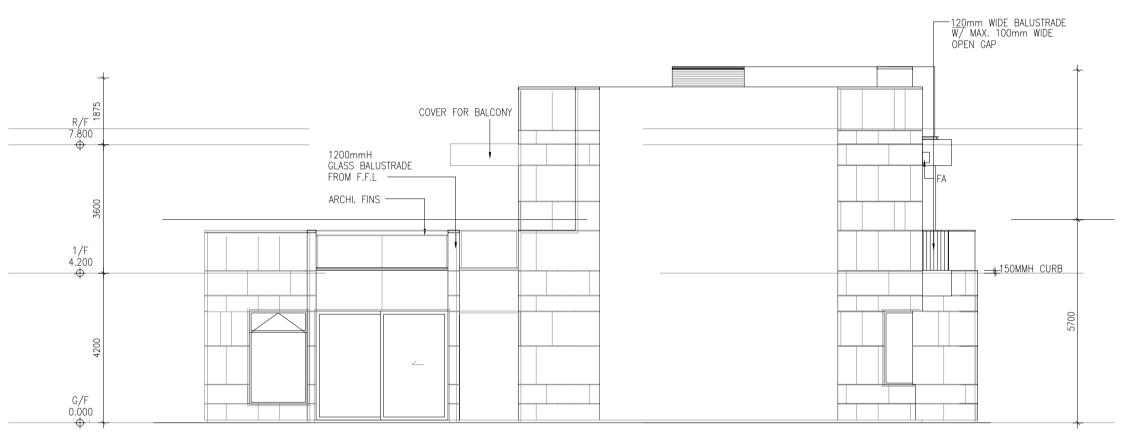
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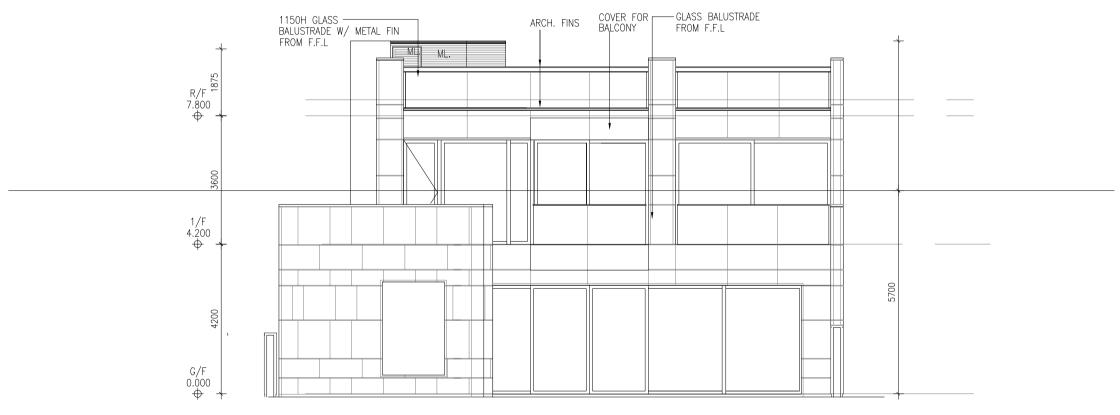
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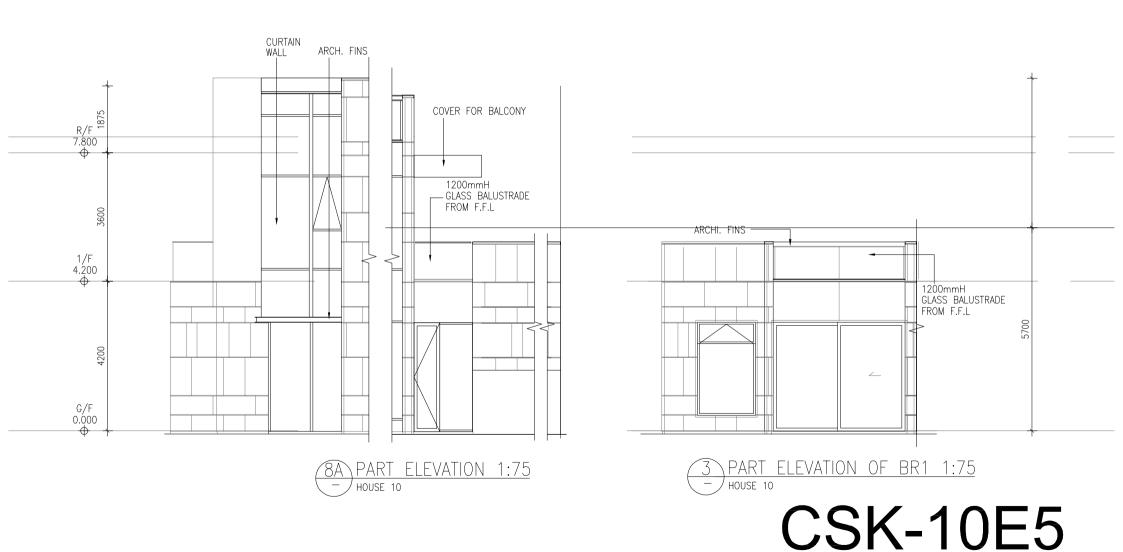
A EAST ELEVATION 1:75
HOUSE 10

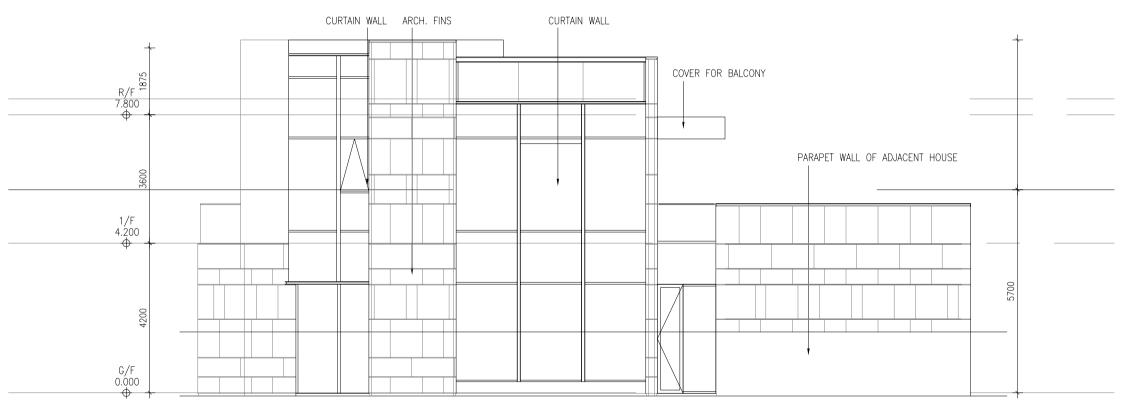


7 SOUTH ELEVATION 1:75
- HOUSE 10

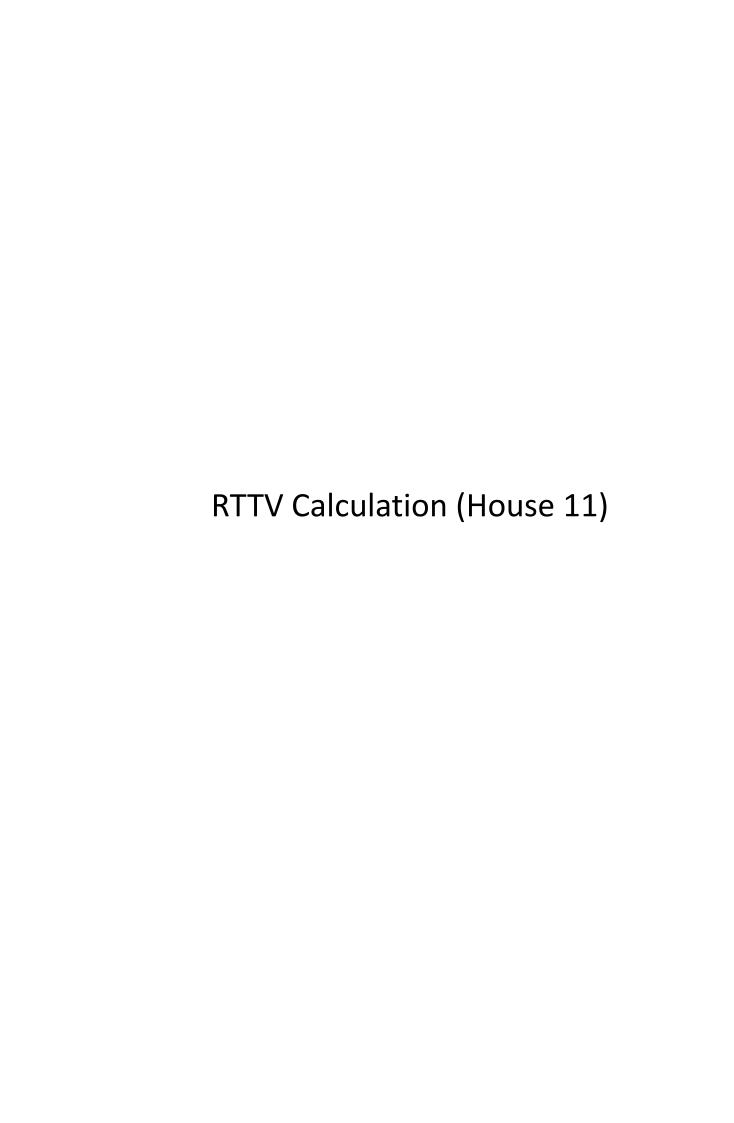


9 WEST ELEVATION 1:75 - HOUSE 10





8 NORTH ELEVATION 1:75
HOUSE 10



Total Gross Wall Areas 333.36 m²

)x 2.74 x 1 =

 $0.00 \times 2.74 \times 1 =$

1/F (Window GL02) - D

Gross Glazing Areas 15.23 m²

Total Gross Glazing Areas 125.19 m²

0.00 m²

West Elevations (House 11)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	zing Areas) (Ao) at West Elevations (House 11)	=	106.62 m²
Glazing Areas at	West Elevations (House 11)	=	53.65 m²
Breakdown of Glazin Glazing Areas	Unshaded (W-F1)	=	32.76 m²
Glazing Areas G/F	Shaded by Cover of Balcony Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.15 x 3.05 = 9.61 m²	1.000	9.61 m²
Glazing Areas	OPF 1.90 / 3.05 = 0.62 ECS = 0.666 Shaded by Built-Fin (Projection on Right) (W-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 4.28 x 2.64 = 11.29 m²	Ξ	11.29 m²
	SPF 1.60 / 4.28 = 0.37 ECS = 0.989		
Opaque Wall Areas	at West Elevations (House 11)	=	52.97 m²
Breakdown of Opaq RC Wall Areas	ue Wall Areas (W-W1)	=	52.97 m²

53.65

106.62

0.50

Sheet no. 3

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 11)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3) Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

3.42

W/m²K

W-W1	Description:			RC Wall Are	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

Sheet No.	4	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	s, Ngau Tam Mei, Yuen Long (House 11)	
	•		
Facade Orientation Facing	West	Gross Wall Area (Ao) = _	106.62
Window to Wall Ratio (WWR)	0.50	Wall Orientation Factor (Gw) =	1.131

Components / Details		Co	ode No.
Description	Units	W-W1	
External Finish Material		30mm Stone cladding	
Conductivity	W/mK	2.90	
Thickness	m	0.030	
Average Absorptivity (awi)	(a)	0.89	
Intermediate component		12mm cement/ sand render	
Conductivity	W/mK	0.72	
Thickness	m	0.01	
Intermediate component		200mm concrete wall	
Conductivity	W/mK	2.16	
Thickness	m	0.20	
Intermediate component			
Conductivity			
Thickness			
Intermediate component			
Conductivity			
Thickness			
Internal Finish Material		10mm AGT Tile	
Conductivity	W/mK	1.10	
Thickness	m	0.01	
U-value of Opaque Area (Uwi)	W/m²K	3.42	
Opaque Wall Area (Awi)	m²	52.97	
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	6.10	

Heat Conduction through Opaque Walls =	3.57(Awi/Ao) Uwi	awi Gw	where i= 1, 2,, n
=	6.10	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing					
Components / Details	Code No.				
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	53.65	9.61	11.29	
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.63	0.11	0.13	

Heat Conduction through Glazing	= 0.6	4 (Afi/Ao) l	Jfi Gw	where i= 1, 2,, n
	=	0.88	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.	Code No.		
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	32.76	9.61	11.29	
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43	
Visible Light Transmittance (VLT)	%	53	53	53	
External Reflectance (ER)	%	17	17	17	
External Shading Miltiplier (ESC)		1.00	0.67	0.99	
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	6.24	1.22	2.13	

Summary of RTTV at West Elevations (House 11)

North Elevations (House 11)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 11)

Glazing Areas at North Elevations (House 11) = 33.44 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 33.44 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 11) = 50.33 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(N-W1) = 50.33 m²

Window to Wall Ratio (WWR) = 33.44 / 83.76 = **0.40**

Sheet no. 5

Wall Orientation Factor Gw = 0.79 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 11)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = \frac{1}{(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)}$ where $Ri \qquad \text{Surface film resistance of internal surface (Refer to Table 2)}$

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)

χ Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

N-W1 Description: RC Wall Areas Wall Material External surface film resistance Ro 0.044 Air space resistanace Ra 0 30mm Stone cladding 0.03 2.9 0.010 0.72 0.017 12mm cement/ sand render 0.012 200mm concrete wall 0.2 2.16 0.093 0.009 10mm AGT Tile 0.01 / 1.1 Internal surface film resistance Ri 0.12

Total

0.293

Sheet No.	6	BD Ref No	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	i, Ngau Tam Mei, Yuen Long (House 11)	
	•		
Facade Orientation Facing	North	Gross Wall Area (Ao) =	83.76
Window to Wall Ratio (WWR)	0.40	Wall Orientation Factor (Gw) =	0.79

Components / Details	•		Code No.
Description	Units	N-W1	
External Finish Material		30mm Stone cladding	
Conductivity	W/mK	2.90	
Thickness	m	0.030	
Average Absorptivity (awi)	(a)	0.89	
Intermediate component		12mm cement/ sand render	
Conductivity	W/mK	0.72	
Thickness	m	0.01	
Intermediate component		200mm concrete wall	
Conductivity	W/mK	2.16	
Thickness	m	0.20	
Intermediate component			
Conductivity			
Thickness			
Intermediate component			
Conductivity			
Thickness			
Internal Finish Material		10mm AGT Tile	
Conductivity	W/mK	1.10	
Thickness	m	0.01	
U-value of Opaque Area (Uwi)	W/m²K	3.42	
Opaque Wall Area (Awi)	m²	50.33	
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	5.15	

Heat Conduction through Opaque Wal	through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw				
	=	5.15	W/m ²		

Components / Details		Code No.	
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	33.44	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.35	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw			where i= 1, 2,, n
	=	0.35	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	N-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	33.44			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	5.66			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 5.66 W/m²

Summary of RTTV at North Elevations (House 11)

= 5.15 + 0.35 + 5.66 = 11.16 W/m²

East Elevations (House 11)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 11)

Glazing Areas at East Elevations (House 11) = 22.88 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 22.88 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 11) = 33.82 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(E-W1) = 33.82 m²

Window to Wall Ratio (WWR) = 22.88 / 56.70 = **0.40**

Sheet no. 7

Wall Orientation Factor Gw = 1.072 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 11)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

E-W1 Description: RC Wall Areas

Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total	<u> </u>				0.293

Uw1 = ____1 = 3.42 W/m²K

Sheet No.	8	BD Ref No.	BD 2/9179/15
Building Address			
	•		
Facade Orientation Facing	East	Gross Wall Area (Ao) =	56.70
Window to Wall Ratio (WWR)	0.40	Wall Orientation Factor (Gw) =	1.072

Components / Details		Code No.			
Description	Units	E-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	33.82			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	6.94			

Heat Conduction through Opaque Walls =	where i= 1, 2,, r			
=	=_	6.94	W/m²	

Components / Details		Code No.	·
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	22.88	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.48	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.48 W/m ²	

Components / Details		Code No.		
Description	Units	E-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	22.88		
Shading Coefficient of Glazing (SCf)		0.43		
Visible Light Transmittance (VLT)	%	53		
External Reflectance (ER)	%	17		
External Shading Miltiplier (ESC)		1.00		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	7.77		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 7.77 W/m^2

Summary of RTTV at East Elevations (House 11)

= 6.94 + 0.48 + 7.77 = 15.19 W/m²

South Elevations (House 11)

Gross Wall Areas 86.28 m² (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 11) South Elevations (House 11) Glazing Areas at 15.23 m² **Breakdown of Glazing Areas Glazing Areas** Unshaded (S-F1) 15.23 m² ECS = 1.000

Opaque Wall Areas at South Elevations (House 11) 71.06 m²

Breakdown of Opaque Wall Areas RC Wall Areas (S-W1) 71.06 m²

15.23 86.28 Window to Wall Ratio (WWR) = 0.18 Sheet no. 9

Wall Orientation Factor

Gw = 0.975

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 11)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
		_

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

S-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

3.42 W/m²K

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	s, Ngau Tam Mei, Yuen Long (House 11)	
	•		
Facade Orientation Facing	South	Gross Wall Area (Ao) =	86.28
Window to Wall Ratio (WWR)	0.18	Wall Orientation Factor (Gw) =	0.975

Components / Details		Code No.		
Description	Units	S-W1		
External Finish Material		30mm Stone cladding		
Conductivity	W/mK	2.90		
Thickness	m	0.030		
Average Absorptivity (αwi)	(a)	0.89		
Intermediate component		12mm cement/ sand render		
Conductivity	W/mK	0.72		
Thickness	m	0.01		
Intermediate component		200mm concrete wall		
Conductivity	W/mK	2.16		
Thickness	m	0.20		
Intermediate component				
Conductivity				
Thickness				
Intermediate component				
Conductivity				
Thickness				
Internal Finish Material		10mm AGT Tile		
Conductivity	W/mK	1.10		
Thickness	m	0.01		
U-value of Opaque Area (Uwi)	W/m²K	3.42		
Opaque Wall Area (Awi)	m²	71.06		
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.72		

Heat Conduction through Opaque Wall	s =	3.57(Awi/Ao) Uwi av	wi Gw	where i= 1, 2,, n
	=	8.72	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing						
Components / Details		Code No.				
Description	Units	S-F1				
Glazing Type		Tinted				
Thickness	m	0.01				
Glazing Area (Afi)	m²	15.23				
U-value of Glazing (Ufi)	W/m²K	1.74				
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.19				

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.19 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	S-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	15.23			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	3.09			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 3.09 W/m^2

Summary of RTTV at South Elevations (House 11)

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 11)	_	

Overall Gross Wall Area [a] 333.36 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	106.62	6.10	0.88	9.58	16.56	5.30
North	83.76	5.15	0.35	5.66	11.16	2.81
East	56.70	6.94	0.48	7.77	15.19	2.58
South	86.28	8.72	0.19	3.09	12.00	3.10
		·				·
		·				·

Overall RTTVwall = 13.79 W/m²

< 14 W/m² OK

_	_		
	_	_	-
	•	n	n

Upper Roof

Sheet no	12

Gross Roof Areas (Opaque Walls + Sk	cylight Areas) (Aro) at	F	Roof			=	170.33 m ²
Skylight Areas at	Roof					=	0.00 m²
Breakdown of Skyli	ight Areas						
Skylight Areas	Unshaded	(S 1)		=	0.00 m ²
OpaqueAreas at	Roof					=	170.33 m ²
Breakdown of Opac	que Roof Areas	,	R1	,		=	450.072
1/F		(KI) =	26.80 m²	-	158.97 m ²
Roof Upper Roof				=	97.57 m ² 34.60 m ²		
Breakdown of Opac	nue Poof Areas						
RC Roof Areas	<u> 4uc 1.001 Aleas</u>	(R2)	5.50	=	11.36 m²
1/F Roof				=	5.56 m ² 5.80 m ²		

m²

Roof Orientation Factor	Gs =	2.16	(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8

Average Absorptivity =

0.896

'U' value of Opaque Roof Areas

U = $1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$

where Ri Surface film resistance of internal surface (Refer to Table 2)

Ro Surface film resistance of external surface (Refer to **Table 2**)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
Tot	al				1.858

$$Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$$

_R2	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
Tota	d[1.836

$$Uw1 = \frac{1}{1.836} = 0.54 \text{ W/m}^2\text{K}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105, I	Ngau Tam Mei, Yuen Long (House 11)	
Roof Orientation Facing	Flat	Gross Roof Area (Aro) =	170.33
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) =	2.16
			•

Components / Details		Code No.				
Description	Units	R1	R2			
External Finish Material		25mm Unglazed Porcelain Tiles (Grey)	10mm AGT Tile (Brown)			
Conductivity	W/mK	1.10	1.10			
Thickness	m	0.025	0.010			
Average Absorptivity (awi)	(a)	0.9	0.8			
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed			
Conductivity	W/mK	0.72	0.72			
Thickness	m	0.050	0.050			
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene			
Conductivity	W/mK	0.034	0.034			
Thickness	m	0.05	0.05			
Intermediate component		150mm concrete slab	150mm concrete slab			
Conductivity	W/mK	2.16	2.16			
Thickness	m	0.15	0.15			
Intermediate component						
Conductivity	W/mK					
Thickness	m					
Internal Finish Material						
Conductivity	W/mK	0.38	0.38			
Thickness	m	0.01	0.01			
U-value of the Roof (Uri)	W/m²K	0.53	0.53			
Opaque Roof Area (Ari)	m²	158.97	11.36			
Heat Conduction = 3.47(Ari/A	ro) Uri αri Gs	3.34	0.21			

nauction 0.47 (Mill/Mo) on an 05	0.07	V.Z I	
Heat Conduction through Opaque Roof =	3.47(Ari/Aro) Uri ari	Gs	where i= 1, 2,, r
=	3.55	W/m²	

Components / Details		Code No.			
Description	Units	S1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
U-value of Skylight Glazing (Usi)	W/m²K	-			
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00			

Heat Conduction through Skylight =	0.40	(Asi/Aro)	Usi Gs	where i= 1, 2,, r
=		0.00	W/m²	

Components / Details		Code No.			
Description	Units	S 1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
Shading Coefficient of Skylight Glazing (SCr)		-			
Visible Light Transmittance (VLT)		-			
External Reflectance (ER)		-			
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00			

Solar Radiation	through	Skylight	= 41.10 (Asi//	Aro) (SCri) Gs	where i= 1, 2,	, n
			= 0.00	W/m²		
Summary of RT	TV at R	oof				
	=	3.55	+	0.00	+	0.00
	=	3.55	W/m²			

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 11)		

Overall Roof Area [a] 170.33 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	170.33	3.55	0.00	0.00	3.55	3.55

Overall RTTVroof =	3.55	W/m²	
<	4	W/m²	OK

BD Ref. No. BD 2/9179/15

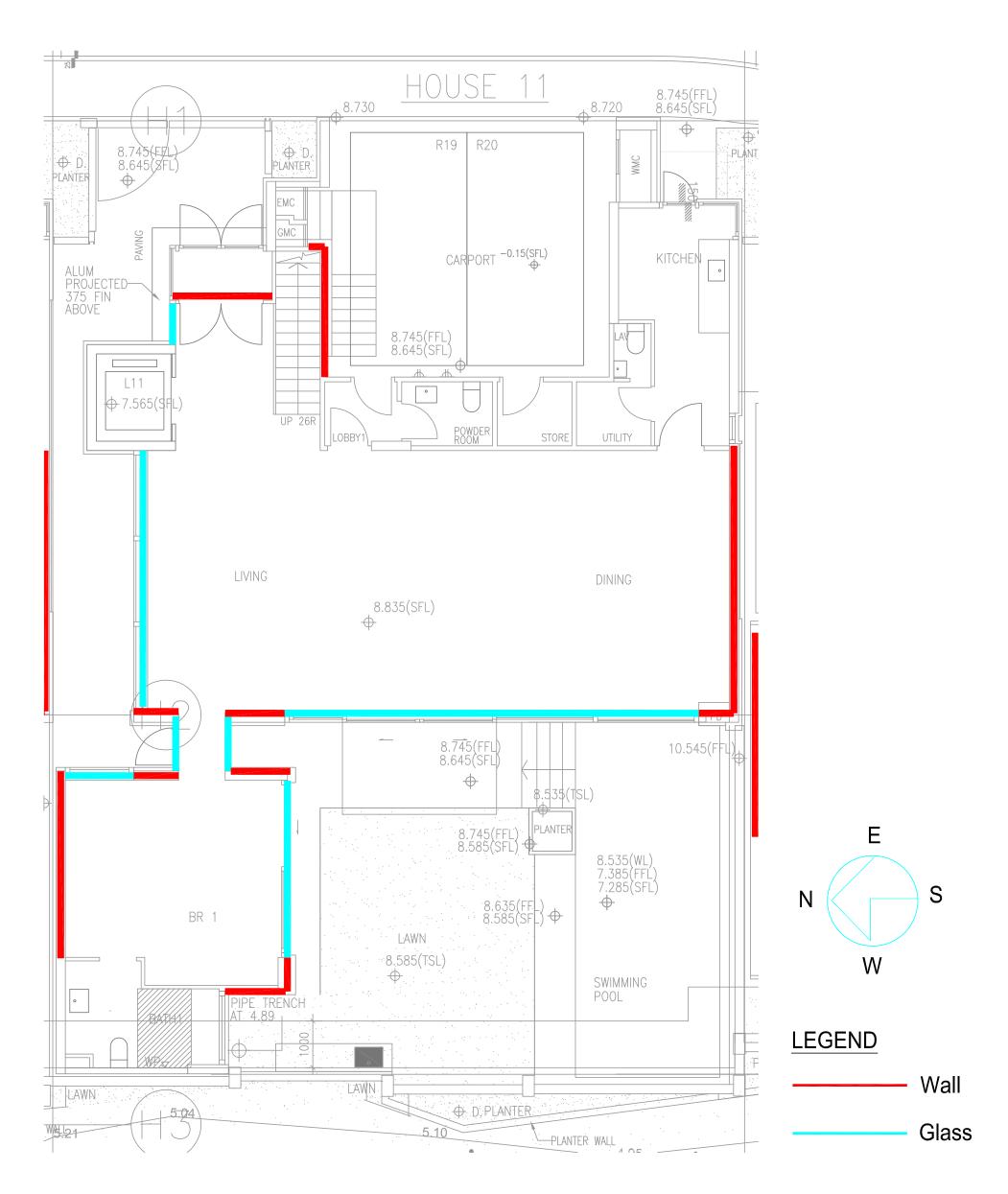
RTTV Summarv Sheet

Building Type:		Residential																					
RTTV Calculate	ed by:	✓ 1. Re	egistered Prof	essional	T	Thomas A	nderson	& Partners 0	Consulting 1	Engineers !	Ltd.												
		2. At	rchitect																				
		3. Ot	thers, please s	specify:-																			
No. of Storeys Residential Un	its)	2																					
Γable 1																							
										De	emed t	o Satisfy R	TTV _{Wall}										
acade Orientat	ion Facing		West			North			East			South	1										
Average Absorp	otivity		0.795			0.795			0.795			0.795											
Average Windo	w to Wall Ratio		0.59			0.33			0.19			0.73											$\overline{}$
Shading Coeffic	cient of Glazing		0.43			0.43			0.43			0.43											_
Average Shadin	g Coefficient of		0.43			0.43			0.43			0.43											
				0/		53	0/		52	0/	-		0/			0/		0/			0/		0/
Visable Light T			53	%		53	%		53	%	-	53	%			%		%			%		%
External Reflec	tance		17	%		17	%		17	%		17	%			%		%			%		%
Table 2																							
											l	RTTV _{Wall}											
acade Orientat		West						North						East					South				
Wall Orientation				1.131						0.79						1.072					0.975		
Fotal External V Residential Un			101.7	m ²	Window	to Wall R	latio		90.93	m	Wine	dow to Wal	l Ratio		35.2	m ²	Window to V	Vall Ratio		15.8	m ²	Window to Wall Ratio)
Total Window A	Area		59.81	m ²	=	0.59)		29.63	m	2 =	0	.33		6.80	m ²	=	0.19		11.42	m ²	= 0.73	
leat	Opaque Wall		6.10			W/m ²			5.15	5		W/m ²			6.94		W/n	1 ²		8.72	I	W/m ²	
Conduction	Window		0.88			W/m ²			0.35	5		W/m ²			0.48		W/n	2		0.19		W/m ²	
Window	Glass Type		Area =	SC		'LT=	%		Area =	SC		VLT=	%		Area =	SC	VLT =			Area =	SC		%
	3.	n a	m ²	=	E	R =	%	Reflective	m ²	=		ER =	%	Reflective	m ²	=	ER =	%	Reflective	m ²	=	ER =	%
		✓ Tinted	$Area = 59$ m^2	9.81 SC =	_	TLT = 5 $R = 1$	3 % 7 %	∠ Tinted	Area = m ²	29.63 SC =	0.4	3 VLT = ER =	53 % 17 %	∠ Tinted	Area = 6. m ²	.8 SC =	0.43 VLT = ER =	= 53 %	Z Tinted	Area = 11.4 m ²	2 SC =	0.43 VLT = 53 ER = 17	
		Clear	Area = m ²	SC =		'LT =	%	Clear	Area = m ²	SC =		VLT=	%	Clear	Area = m ²	SC =	VLT =		Clear	Area = m ²	SC =		%
		-			E	R =	%					ER =	%				ER =	%	-		<u> </u>	ER =	%
	Double Glazing	☑ Yes		No				Yes	L	No				Z Yes	□ N	lo			✓ Yes	□ N	0		
	External	Overhang	Z Yes	□ N				Overhang	☐ Yes	\square				Overhang	Yes	Z No			Overhang	☐ Yes	Z No		
	Shading	Sidefin	∠ Yes	□ N	lo			Sidefin	☐ Yes		No			Sidefin	☐ Yes	Z No	1		Sidefin	☐ Yes	Z No		
Solar Radiation Gazing	through		9.58			W/m ²			5.66	5		W/m ²			7.77		W/m	1 ²		3.09		W/m ²	
Average Absorp	otivity			0.795						0.79	5					0.795					0.795		$\overline{}$
RTTV _{Wall} at eac	ch Facade		16.56			W/m ²			11.1	6		W/m ²			15.19		W/n	2		12.00		W/m ²	$\overline{}$
Overall RTTV _w												13.79		W/m ²									_
Γable 3																							
											1	RTTV _{Roof}											$\overline{}$
Roof Orientatio	n Factor		2.16																				_
Total Roof Area Units)			170.33	$\overline{}$	m ²																		_
		_	مبر		,																		
Total Skylight A					m ²																		
	Roof Skylight		3.55)	W/m ²																		
					W/m ²				2 10						1,,,,,,,,								0.1
	Glass Type	Reflect		ea =						SC =					VLT				%	ER =			%
		Tinted		ea =						SC =					VLT				%	ER =			%
		Clear	An	ea =					m ² S	SC =					VLT	=			%	ER =			%
	Double Glazing	Yes		No																			
	External Shading	Yes		No																			
Solar Radiation	through Gazing	_	0		W/m ²																		-
Average Absorp			0.8																				_
	(001)		3.0	\																			

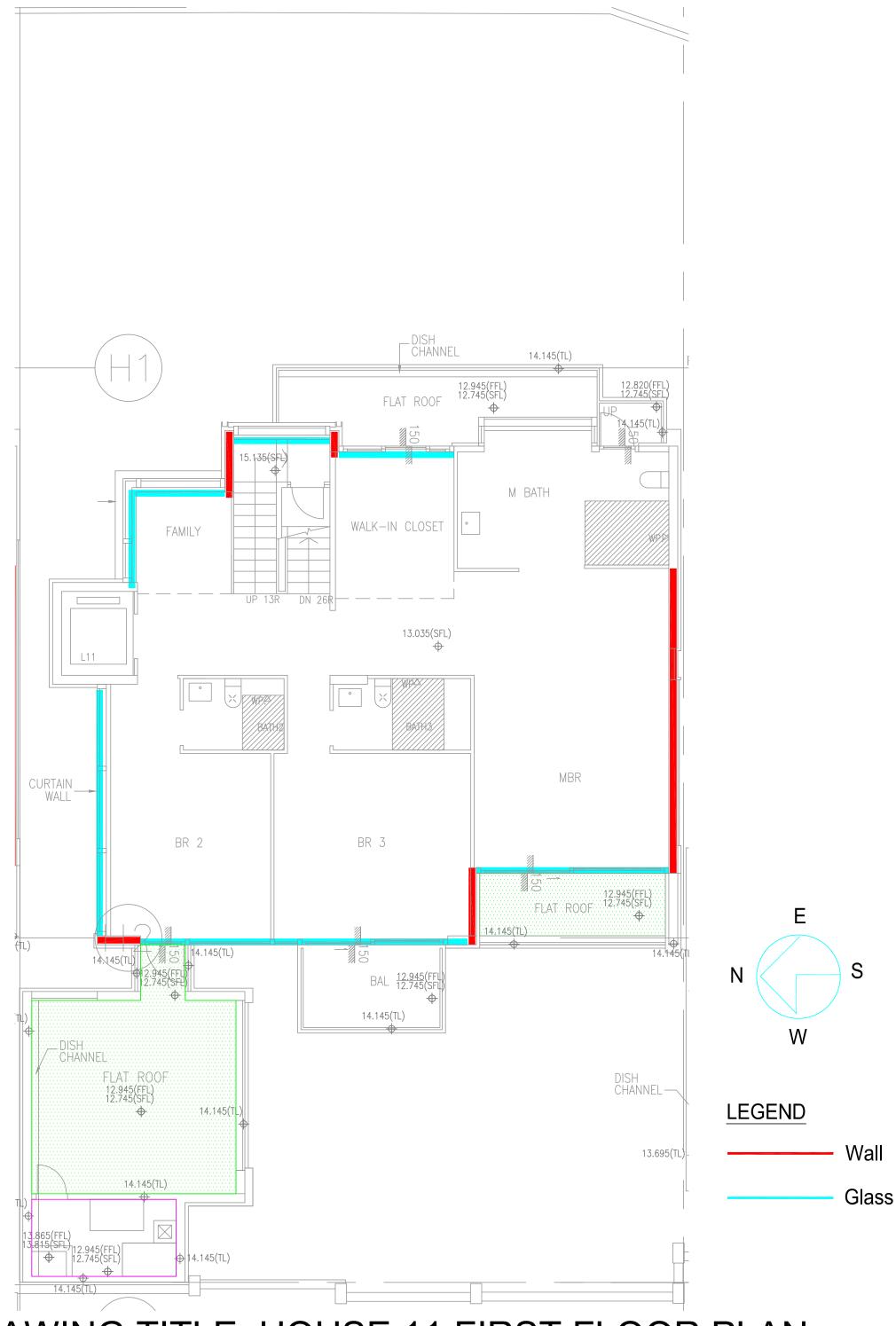
ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance

Address:

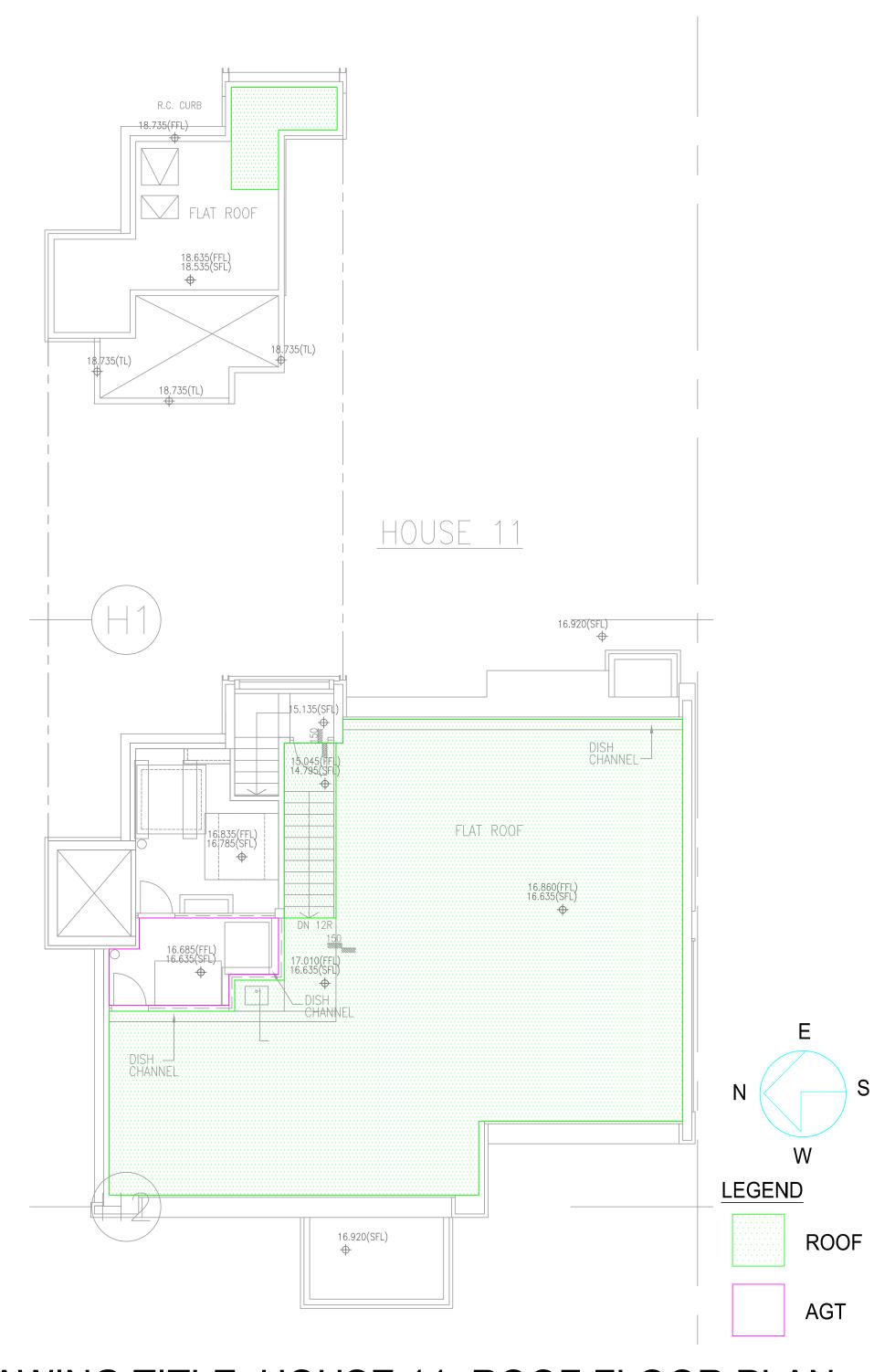
Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 11)



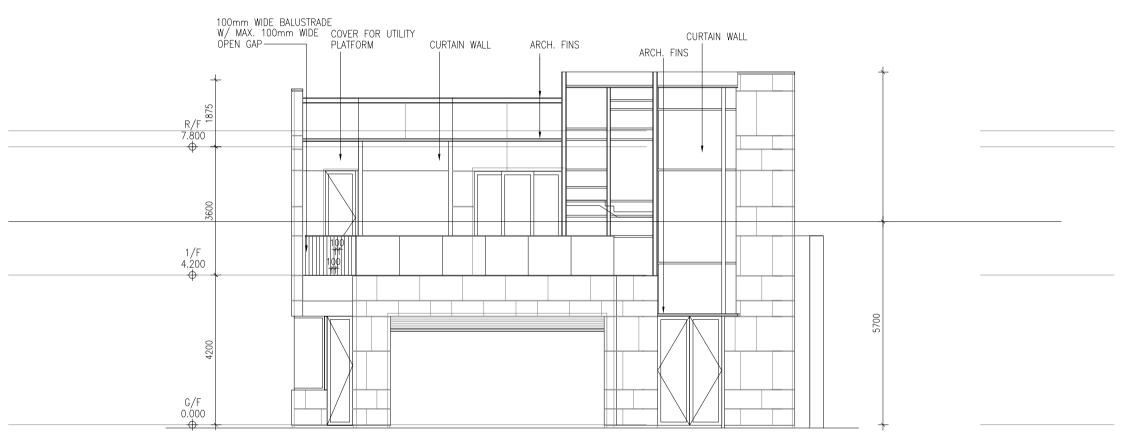
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DRAWING TITLE: HOUSE 11 FIRST FLOOR PLAN SCALE: 1:150@A4

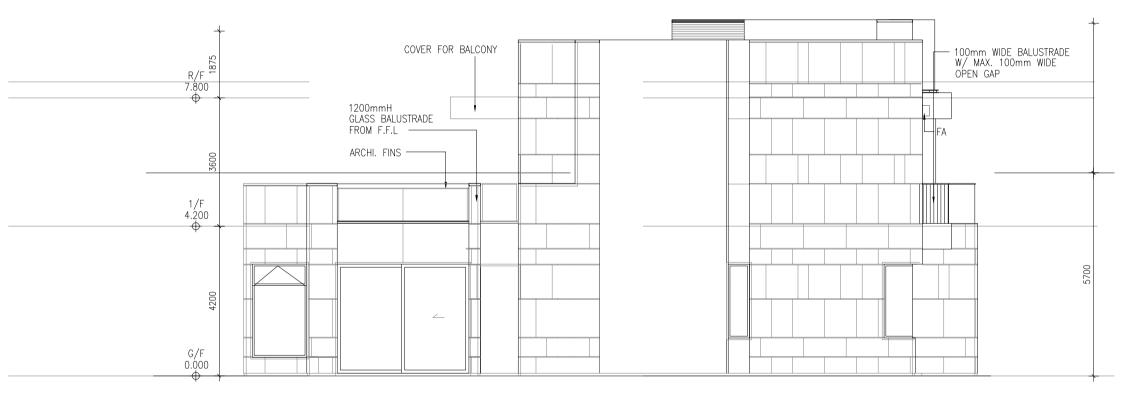


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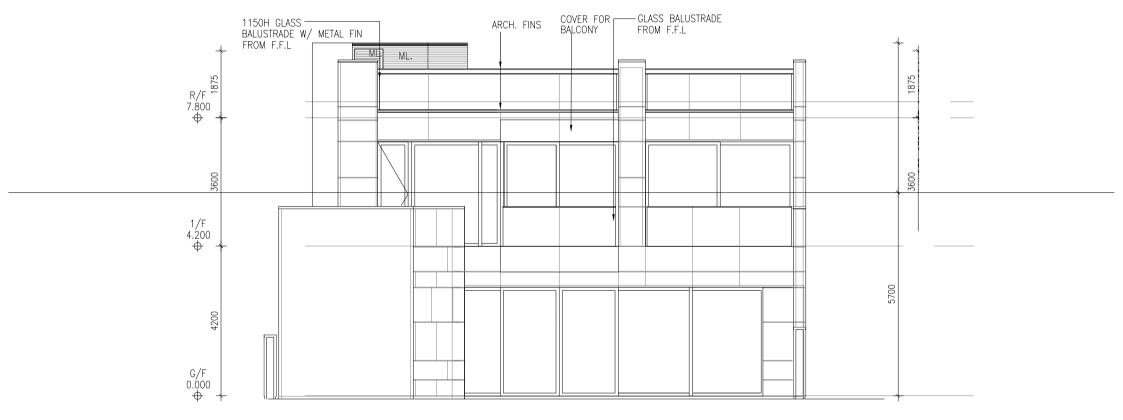
TA EAST ELEVATION 1:75

HOUSE 11



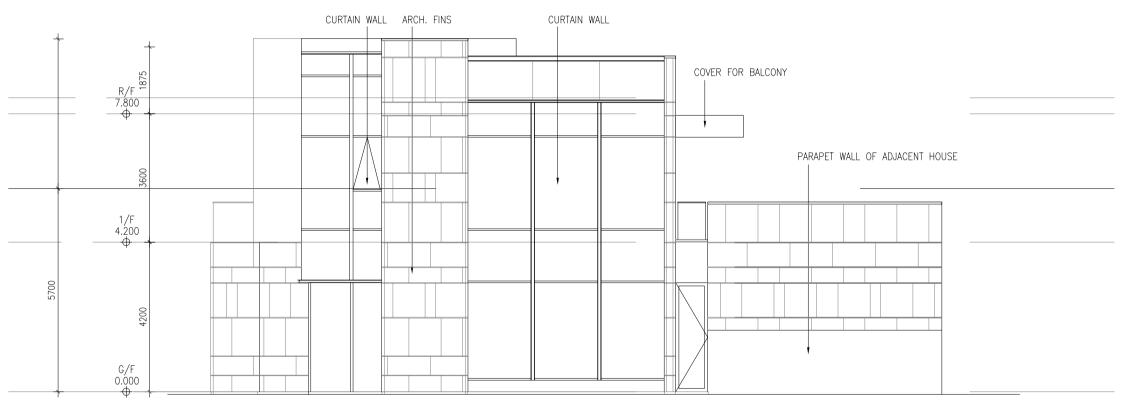
7 SOUTH ELEVATION 1:75

HOUSE 11

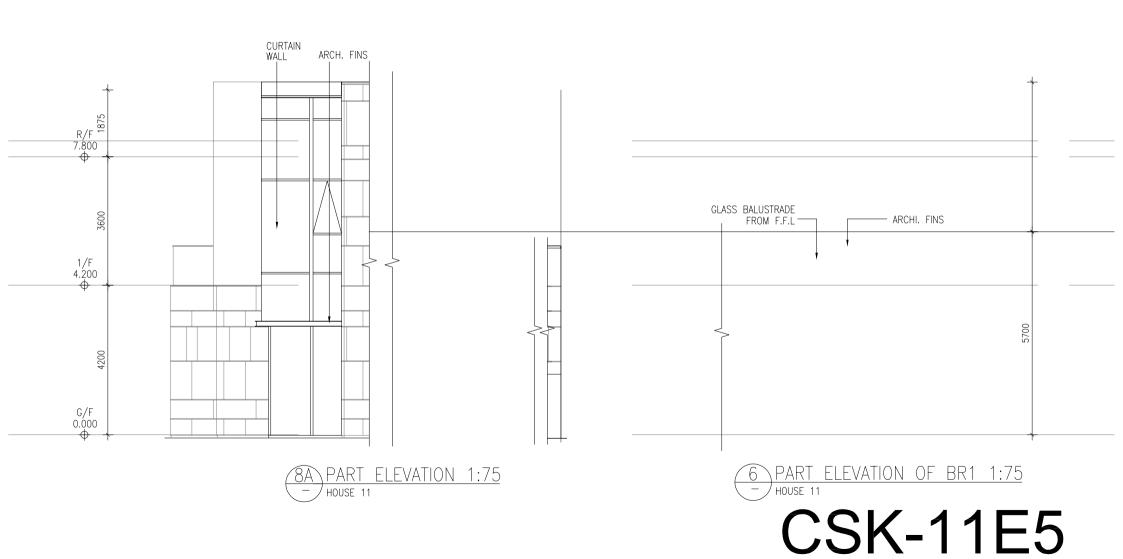


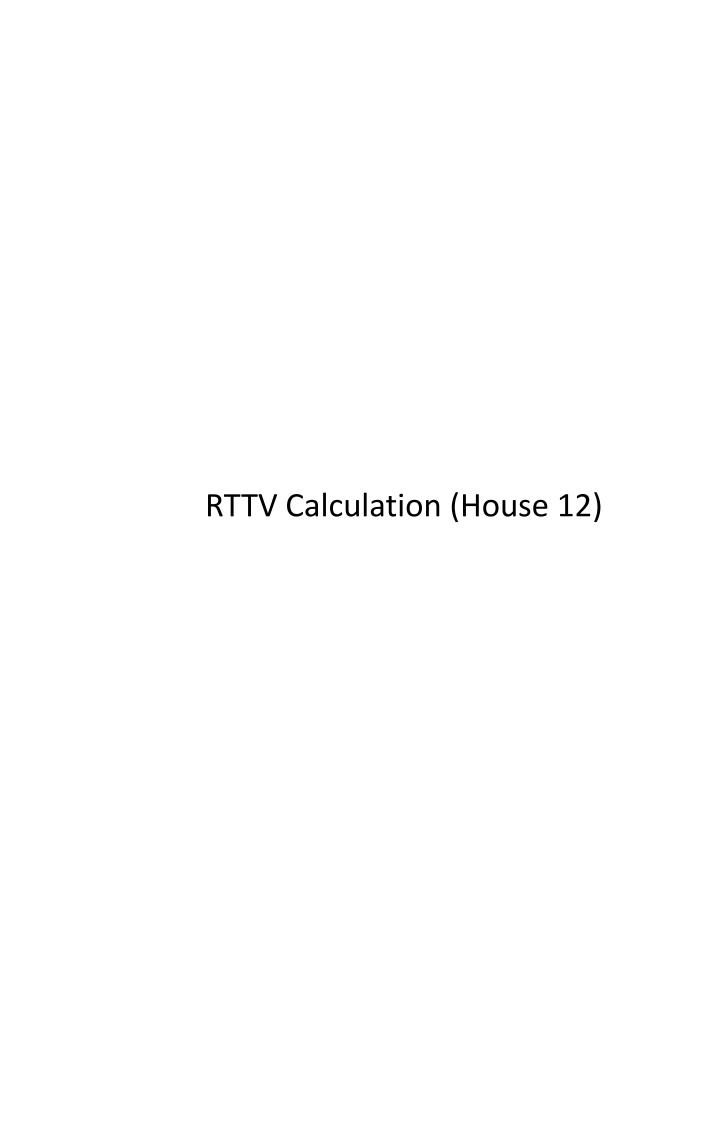
9 WEST ELEVATION 1:75

HOUSE 11



8 NORTH ELEVATION 1:75
HOUSE 11





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Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                                        Sheet no. 1
                                                                                                Storey heights (Residential Units):
                                                                                                G/F
                                                                                                                                      4.20 m
                                                                                                                                                   1 storey)
                                                                                                1/F
                                                                                                                                      3.60 m
                                                                                                                                                ( 1 storey)
                                                                                                R/F
                                                                                                                                      1.90 m
                                                                                                                                                ( 1 storey)
West Elevations (House 12) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                                                                )x 4.20 x 1 = 13.50 x 4.20 x 1 =
                                                                                                                                     56.70 m<sup>2</sup>
1/F
                                12.70
                                                                                )x \ 3.60 \ x \ 1 = 12.70 \ x \ 3.60 \ x \ 1 =
                                                                                                                                     45.72 m<sup>2</sup>
R/F
                                                                                )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                     0.00 m<sup>2</sup>
                                                                                                                                     Gross Wall Areas
                                                                                                                                                         102.42 m<sup>2</sup>
North Elevations (House 12) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                (12.30 + 1.50)
                                                                                )x 4.20 x 1 = 13.80 x 4.20 x 1 =
                                                                                                                                     57.96 m<sup>2</sup>
1/F
                                  8.60 + 0.90
                                                                                )x 3.60 x 1 =
                                                                                                   9.50 \times 3.60 \times 1 =
                                                                                                                                     34.20 m<sup>2</sup>
R/F
                                                                                )x 1.90 x 1 =
                                                                                                   0.00 \times 1.90 \times 1 =
                                                                                                                                     0.00 m<sup>2</sup>
                                                                                                                                     Gross Wall Areas
                                                                                                                                                          92.16 m<sup>2</sup>
East Elevations (House 12) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                  3.50 + 8.60
                                                                                )x 4.20 x 1 = 12.10 x 4.20 x 1
                                                                                                                                     50.82 m<sup>2</sup>
                                                                                                   6.60 \times 3.60 \times 1 =
1/F
                                  5.80 + 0.80
                                                                                )x 3.60 x 1 =
                                                                                                                                     23.76 m<sup>2</sup>
R/F
                                                                                )x 1.90 x 1 =
                                                                                                   0.00 \times 1.90 \times 1 =
                                                                                                                                     0.00 \, \text{m}^2
                                                                                                                                     Gross Wall Areas
                                                                                                                                                          74.58 m<sup>2</sup>
South Elevations (House 12) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                (14.00
                                                                                )x 4.20 x 1 = 14.00 x
                                                                                                              4.20 \times 1 =
                                                                                                                                     58.80 m<sup>2</sup>
1/F
                                  6.50
                                                                                )x 3.60 x 1 =
                                                                                                   6.50 \times 3.60 \times 1 =
                                                                                                                                     23.40\ m^{2}
R/F
                                                                                )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                     0.00 m<sup>2</sup>
                                                                                                                                     Gross Wall Areas
                                                                                                                                                           82.20 m<sup>2</sup>
```

Total Gross Wall Areas

351.36 m²

```
Total Glazing Area (Window + Balcony) Calculation
                                                                                                                                                                                  Sheet no. 2
                                                                                                                         Glazing heights (Residential Units):
                                                                                                                         G/F (Window GL02) - A
                                                                                                                                                               3.05 m
                                                                                                                                                                                 storey)
                                                                                                                         G/F (Window GL02) - B
                                                                                                                                                      =
                                                                                                                                                               3.15 m
                                                                                                                                                                                 storey)
                                                                                                                         1/F (Window GL02) - C
                                                                                                                                                      =
                                                                                                                                                               2.66 m
                                                                                                                                                                                 storey)
                                                                                                                         1/F (Window GL02) - D
                                                                                                                                                               2.74 m
                                                                                                                                                                             1
                                                                                                                                                                                storey)
West Elevations (House 12) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
                                                                                                        )x 3.05 x 1 =
G/F (Window GL02) - A
                                   9.90
                                                                                                                            9.90 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              30.15 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                   7.50 + 4.50
                                                                                                        )x 2.66 x 1 =
                                                                                                                           12.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              31.86 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 = 0.00 x 2.74 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                     62.01 m<sup>2</sup>
North Elevations (House 12) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   7.70
                                                                                                        )x 3.05 x 1 =
                                                                                                                           7.70 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              23.45 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                    2.80 + 5.40
                                                                                                        )x 2.66 x 1 =
                                                                                                                            8.20 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              21.77 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                     45.22 m<sup>2</sup>
East Elevations (House 12)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   2.60
                                                                                                        )x 3.05 x 1 =
                                                                                                                            2.60 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                               7.92 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                        )x 3.15 x 1 =
G/F (Window GL02)
                                                                                                        )x 0.86 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       0.86 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02)
                                   0.70 + 2.20 + 3.10
                                                                                                        )x 2.64 x 1 =
                                                                                                                            2.90 x
                                                                                                                                       2.64 \times 1 =
                                                                                                                                                               7.66 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                     15.57 m<sup>2</sup>
South Elevations (House 12) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   3.05
                                            1.90
                                                                                                        )x 3.05 x 1 =
                                                                                                                            4.95 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                               15.07 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 \text{ m}^2
1/F (Window GL02) - C
                                                                                                        )x 2.66 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                               0.00 \, m^2
                                                                                                                                                               0.00 \text{ m}^2
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     15.07 m<sup>2</sup>
```

Total Gross Glazing Areas 137.87 m²

West Elevations (House 12)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	azing Areas) (Ao) at West Elevations (House 12)	=	102.42 m²
Glazing Areas at	West Elevations (House 12)	=	62.01 m²
Breakdown of Glazing Areas	ng Areas Unshaded (W-F1)	=	40.52 m ²
	ECS =	1.000	
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys $3.15 \times 3.05 = 9.61 \text{ m}^2$	=	9.61 m ²
	OPF 1.90 / 3.05 = 0.62 ECS = 0.666		
Glazing Areas	Shaded by Built-Fin (Projection on Right) (W-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 4.50 x 2.64 = 11.88 m^2	=	11.88 m²
	SPF 1.60 / 4.28 = 0.37 ECS = 0.989		
Opaque Wall Areas	at West Elevations (House 12)	=	40.41 m²
Breakdown of Opaq RC Wall Areas	ue Wall Areas (W-W1)	=	40.41 m²

62.01

102.42

0.61

Sheet no. 3

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 12)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

W-W1	Description:			RC Wall Are	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

3.42 W/m²K

Sheet No.	4	BD Ref No.	BD 2/9179/15
Building Address			
	•		_
Facade Orientation Facing	West	Gross Wall Area (Ao) =	102.42
Window to Wall Ratio (WWR)	0.61	Wall Orientation Factor (Gw) =	1.131

Components / Details		Code No.					
Description	Units	W-W1					
External Finish Material		30mm Stone cladding					
Conductivity	W/mK	2.90					
Thickness	m	0.030					
Average Absorptivity (awi)	(a)	0.89					
Intermediate component		12mm cement/ sand render					
Conductivity	W/mK	0.72					
Thickness	m	0.01					
Intermediate component		200mm concrete wall					
Conductivity	W/mK	2.16					
Thickness	m	0.20					
Intermediate component							
Conductivity							
Thickness							
Intermediate component							
Conductivity							
Thickness							
Internal Finish Material		10mm AGT Tile					
Conductivity	W/mK	1.10					
Thickness	m	0.01					
U-value of Opaque Area (Uwi)	W/m²K	3.42					
Opaque Wall Area (Awi)	m²	40.41					
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	4.84					

Heat Conduction through Opaque Walls =	3.57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, r
=	4.84	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing								
Components / Details	Code No.	Code No.						
Description	Units	W-F1	W-F2	W-F3				
Glazing Type		Tinted	Tinted	Tinted				
Thickness	m	0.01	0.01	0.01				
Glazing Area (Afi)	m²	62.01	9.61	11.88				
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74				
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.76	0.12	0.15				

Heat Conduction through Glazing	=	0.64 (Afi/Ao) U	fi Gw	where i= 1, 2,, n
	=	1.03	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing							
Components / Details		Code No.					
Description	Units	W-F1	W-F2	W-F3			
Glazing Type		Tinted	Tinted	Tinted			
Thickness	m	0.01	0.01	0.01			
Glazing Area (Afi)	m²	40.52	9.61	11.88			
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43			
Visible Light Transmittance (VLT)	%	53	53	53			
External Reflectance (ER)	%	17	17	17			
External Shading Miltiplier (ESC)		1.00	0.67	0.99			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	8.03	1.27	2.33			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 11.63 W/m²

Summary of RTTV at West Elevations (House 12)

North Elevations (House 12)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 12)

Glazing Areas at North Elevations (House 12) = 45.22 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 45.22 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 12) = 46.94 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(N-W1) = 46.94 m²

Window to Wall Ratio (WWR) = 45.22 / 92.16 = **0.49**

Sheet no. 5

(Refer to Table 9)

Wall Orientation Factor Gw = 0.79

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 12)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total	<u> </u>				0.293

Uw1 = ____1 = 3.42 W/m²K

Sheet No.	6	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105, No	gau Tam Mei, Yuen Long (House 12)	
Facade Orientation Facing	North	Gross Wall Area (Ao) =	92.16
Window to Wall Ratio (WWR)	0.49	Wall Orientation Factor (Gw) =	0.79

Components / Details		Code No.		
Description	Units	N-W1		
External Finish Material		30mm Stone cladding		
Conductivity	W/mK	2.90		
Thickness	m	0.030		
Average Absorptivity (awi)	(a)	0.89		
Intermediate component		12mm cement/ sand render		
Conductivity	W/mK	0.72		
Thickness	m	0.01		
Intermediate component		200mm concrete wall		
Conductivity	W/mK	2.16		
Thickness	m	0.20		
Intermediate component				
Conductivity				
Thickness				
Intermediate component				
Conductivity				
Thickness				
Internal Finish Material		10mm AGT Tile		
Conductivity	W/mK	1.10		
Thickness	m	0.01		
U-value of Opaque Area (Uwi)	W/m²K	3.42		
Opaque Wall Area (Awi)	m²	46.94		
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	4.37	_	

Heat Conduction through Opaque Wall	s =	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	4.37	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing						
Components / Details		Code No.				
Description	Units	N-F1				
Glazing Type		Tinted				
Thickness	m	0.01				
Glazing Area (Afi)	m²	45.22				
U-value of Glazing (Ufi)	W/m²K	1.74				
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.43				

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n
	=	0.43 W/m	2

Part 3 - Calculation of Solar Radiation	through Glazing		
Components / Details		Code No.	
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	45.22	
Shading Coefficient of Glazing (SCf)		0.40	
Visible Light Transmittance (VLT)	%	53	
External Reflectance (ER)	%	17	
External Shading Miltiplier (ESC)		1.00	
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	6.47	

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 6.47 W/m²

Summary of RTTV at North Elevations (House 12)

East Elevations (House 12)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 12) = 74.58 m²

Glazing Areas at East Elevations (House 12) = 15.57 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 15.57 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 12) = 59.01 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(E-W1) = 59.01 m²

Window to Wall Ratio (WWR) = 15.57 / 74.58 = **0.21**

Sheet no. 7

Wall Orientation Factor Gw = 1.072 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 12)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (Refer \ to \ Table \ 5)$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

E-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

Uw1 = ____1 = 3.42 W/m²K

Sheet No.	8	BD Ref No.	BD 2/9179/15	
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 12)			
Facade Orientation Facing	East	Gross Wall Area (Ao) =	74.58	
Window to Wall Ratio (WWR)	0.21	Wall Orientation Factor (Gw) =	1.072	

Components / Details		Code No.				
Description	Units	E-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (αwi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	59.01				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	9.21				

Heat Conduction through Opaque Wall	s =	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	9.21	W/m²	

Components / Details		Code No.	
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	15.57	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.25	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.25 W/m	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	E-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	15.57			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	4.02			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 4.02 W/m²

Summary of RTTV at East Elevations (House 12)

South Elevations (House 12)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 12)

Glazing Areas at South Elevations (House 12) = 15.07 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 15.07 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 12) = 67.13 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (S-W1) = 67.13 m²

Window to Wall Ratio (WWR) = 15.07 / 82.20 = 0.18

Sheet no. 9

Wall Orientation Factor

Gw = 0.975

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 12)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Ri Surface film resistance of internal surface (Refer to **Table 2**)

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)
Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

S-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

 $Uw1 = \frac{1}{0.303}$ = 3.42 W/m²K

Sheet No.	10	BD Ref No.	BD 2/9179/15	
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 12)			
			_	
Facade Orientation Facing	South	Gross Wall Area (Ao) =	82.20	
Window to Wall Ratio (WWR)	0.18	Wall Orientation Factor (Gw) =	0.975	

Components / Details		Code No.				
Description	Units	S-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	67.13				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.64				

Heat Conduction through Opaque Walls =	= 3.5	57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, r
=	=	8.64	W/m²	

Components / Details		Code No.	
Description	Units	S-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	15.07	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.20	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n	
	=	0.20 \	N/m²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details		Code No.				
Description	Units	S-F1				
Glazing Type		Tinted				
Thickness	m	0.01				
Glazing Area (Afi)	m²	15.07				
Shading Coefficient of Glazing (SCf)		0.43				
Visible Light Transmittance (VLT)	%	53				
External Reflectance (ER)	%	17				
External Shading Miltiplier (ESC)		1.00				
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	3.21				

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 3.21 W/m²

Summary of RTTV at South Elevations (House 12)

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 12)	,

Overall Gross Wall Area [a] 351.36 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	102.42	4.84	1.03	11.63	17.50	5.10
North	92.16	4.37	0.43	6.47	11.27	2.96
East	74.58	9.21	0.25	4.02	13.47	2.86
South	82.20	8.64	0.20	3.21	12.05	2.82

Overall RTTVwall = 13.74 W/m²

< 14 W/m²

OK

Sheet no	12

Gross Roof Areas (Opaque Walls + Sk	ylight Areas) (Aro) at		Roof			=	163.59 m ²
Skylight Areas at	Roof					=	0.00 m ²
Breakdown of Skyli	ght Areas						
Skylight Areas	Unshaded	(S1)		=	0.00 m ²
OpaqueAreas at	Roof					=	163.59 m²
Breakdown of Opac RC Roof Areas 1/F Roof Upper Roof	<u>ue Roof Areas</u>	(R1) = = =	34.80 m² 92.21 m² 24.60 m²	=	151.61 m²
Breakdown of Opac RC Roof Areas 1/F Roof Upper Roof	ue Roof Areas	(R2) = = =	5.78 m² 6.20 m² m²	=	11.98 m²

Roof Orientation Factor	Gs = 2.16	(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8

Average Absorptivity =

0.896

'U' value of Opaque Roof Areas

U = $1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$

 $where \ \ Ri \qquad \text{Surface film resistance of internal surface (Refer to \textbf{Table 2})}$

Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
Tot	al				1.858

$$Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$$

_R2	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
T.,	.]				4 000
Tota	1				1.836

$$Uw1 = \frac{1}{1.836} = 0.54 \text{ W/m}^2\text{K}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. BI	O 2/9179/15
Building Address	Lot 2115, D.D. 105, N	Ngau Tam Mei, Yuen Long (House 12)	
Roof Orientation Facing	Flat	Gross Roof Area (Aro) =	163.59
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) =	2.16

Components / Details		Code No.					
Description	Units	R1	R2				
External Finish Material		25mm Unglazed Porcelain Tiles (Grey)	10mm AGT Tile (Brown)				
Conductivity	W/mK	1.10	1.10				
Thickness	m	0.025	0.010				
Average Absorptivity (awi)	(a)	0.9	0.8				
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed				
Conductivity	W/mK	0.72	0.72				
Thickness	m	0.050	0.050				
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene				
Conductivity	W/mK	0.034	0.034				
Thickness	m	0.05	0.05				
Intermediate component		150mm concrete slab	150mm concrete slab				
Conductivity	W/mK	2.16	2.16				
Thickness	m	0.15	0.15				
Intermediate component							
Conductivity	W/mK						
Thickness	m						
Internal Finish Material							
Conductivity	W/mK	0.38	0.38				
Thickness	m	0.01	0.01				
U-value of the Roof (Uri)	W/m²K	0.53	0.53				
Opaque Roof Area (Ari)	m²	151.61	11.98				
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.31	0.23				

Heat Conduction th	rough Opaque Roof	= 3.47(Ari/Aro) Uri c = 3.55	nri Gs W/m²	where i= 1, 2,, ı
nduction = 3.47(Ari/A	ro) Uri ari Gs	3.31	0.23	
Roof Area (Ari)	m²	151.61	11.98	
of the Roof (Uri)	W/m²K	0.53	0.53	
S	m	0.01	0.01	

Components / Details		Code	e No.		
Description	Units	S 1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
U-value of Skylight Glazing (Usi)	W/m²K	-			
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00			

Heat Conduction through Skylight	= 0.40	(Asi/Aro) l	Usi Gs	where i= 1, 2,, n
	=	0.00	W/m²	

Part 3 - Calculation of Solar Radiation through Skylight									
Components / Details			Code No.						
Description	Units	S1							
Skylight Glazing Type		-							
Thickness	m	-							
Skylight Area (Asi)	m²	0.00							
Shading Coefficient of Skylight Glazing (SCr)		-							
Visible Light Transmittance (VLT)		-							
External Reflectance (ER)		-							
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00							

Solar Radiation throug	h Skylight	= 41.10 (Asi/A = 0.00	ro) (SCri) Gs W/m²	where i= 1, 2,	, n
Summary of RTTV at F	Roof 3.55	+	0.00	+	0.00
=	3.55	W/m²	0.00	*	0.00

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Ruilding Address	Lot 2115 D.D. 105 Ngau Tam Mei, Yuen Long (House 12)	

Overall Roof Area [a] 163.59 m²

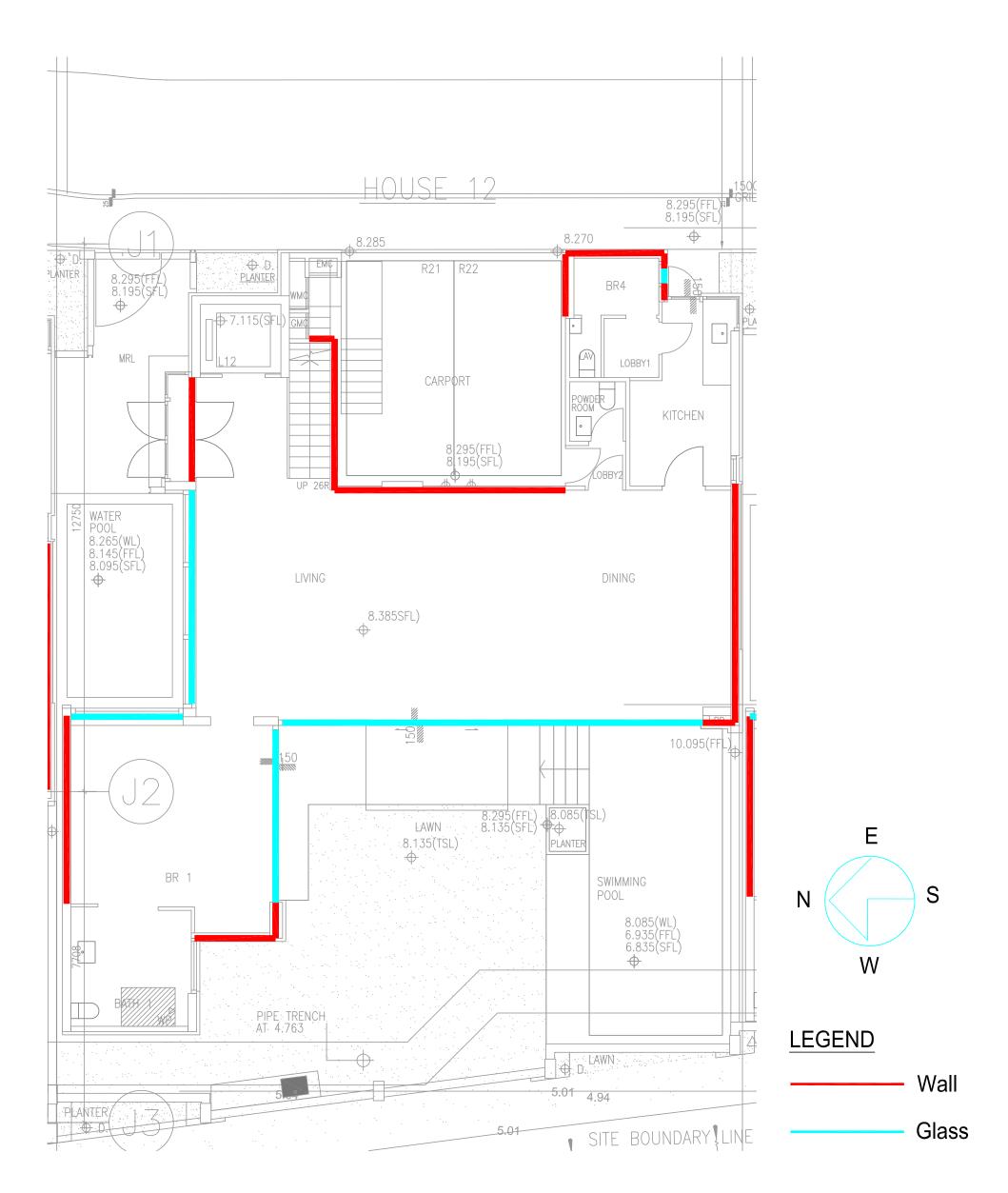
Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	163.59	3.55	0.00	0.00	3.55	3.55

Overall RTTVroof = 3.55 W/m²
< 4 W/m² OK

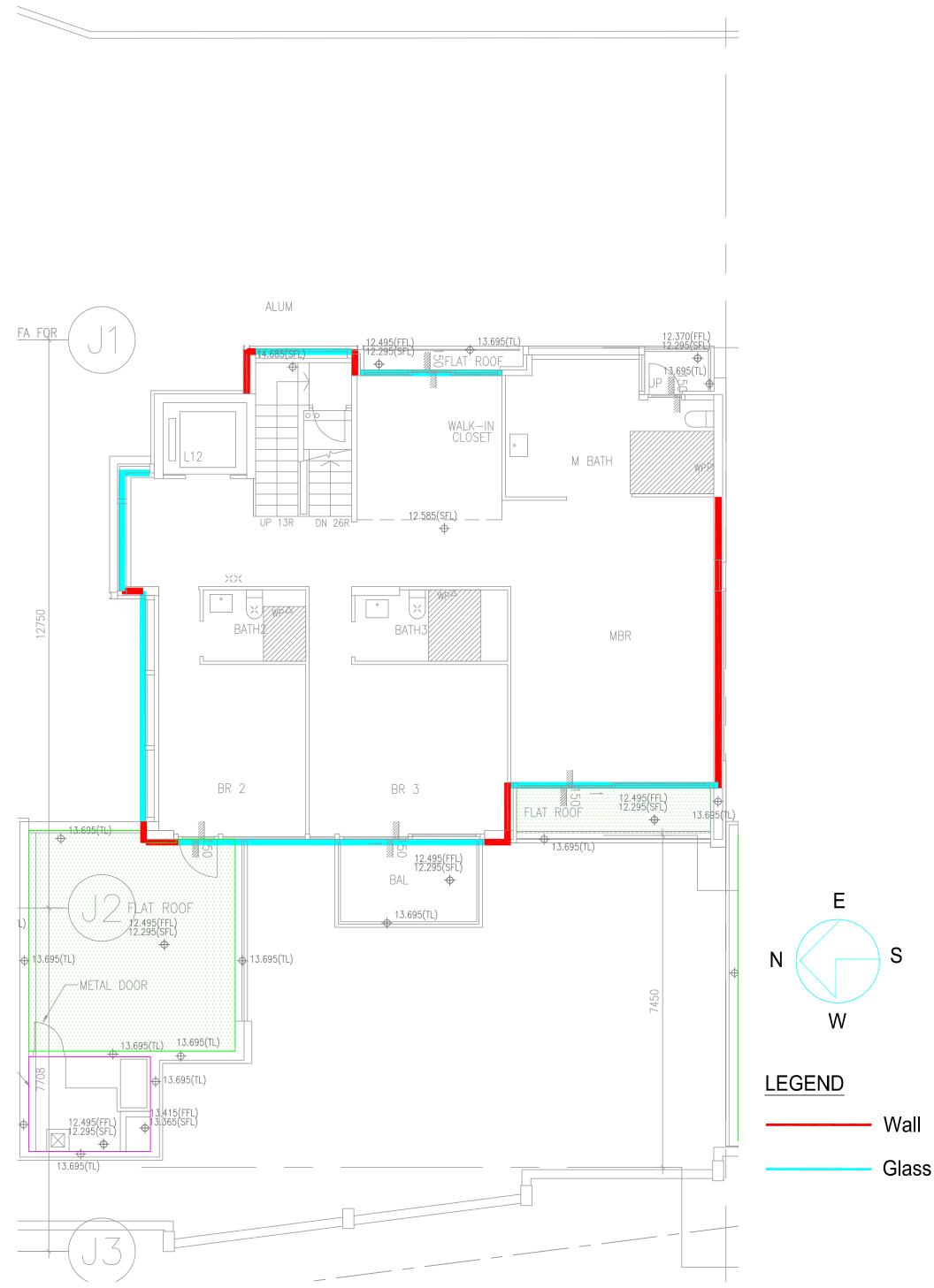
RTTV Summary Sheet

Address:	Lot 2115, D.D. 1	05, Ngau Ta	am Mei, Yu	en Long (H	Iouse 12))															BD Ref. No. BD 2/9179/15
Building Type:		Residential	1																		BD 2/91/9/13
RTTV Calcula	ted by:		egistered Pro	efessional		Thomas Anderse	n & Partners	Consulting F	noineers	I td											
KTTV Calcula	ica by.		rchitect	ressional		Thomas / urders	in ee'r arthers	Consuming L	ingineers :	Ltu.											
			thers, please	specify:-																	
No. of Storeys (Residential Ur	sita)	2	, p	open.j.																	
Table 1	iits)																				
									Deer	ned to S	Satisfy RTTV _w	all									
Facade Orienta	tion Facing		West			North		East			South										
Average Absor	ptivity		0.795			0.8		0.8			0.8										
Average Windo	ow to Wall Ratio		0.51			0.37		0.18			0.23										
	cient of Glazing		0.43			0.43		0.43			0.43										
Average Shadii Facade	ng Coefficient of		0.43			0.43		0.43			0.43										
Visable Light T	ransmittance		53	%		53 %		53	%		53 %	6			%		%			%	%
External Reflec	tance		17	%		17 %		17	%		17 %	6			%		%			%	%
Table 2							1								ı			1			
$RTTV_Wall$																					
Facade Orienta		West					North					Ea	ast					South			
Wall Orientatio				1.131					0.79						1.072					0.975	
Total External (Residential Ur			120.0	m ²	Windov	w to Wall Ratio		63.1	m ²	Windo	w to Wall Ratio	'		46.4	m ²	Window to	Wall Ratio		78.1	m ²	Window to Wall Ratio
Total Window	Area		61.73	m ²	=	0.51		23.37	m ²	-	0.37			8.25	m ²	=	0.18		18.12	m ²	= 0.23
Heat	Opaque Wall		4.84			W/m ²		4.37			W/m ²			9.21		W/r	n ²		8.64		W/m ²
Conduction	Window		1.03			W/m ²		0.43			W/m ²			0.25		W/r			0.20		W/m ²
Window	Glass Type		Area = m ²	SC =		VLT = % ER = %	Reflective	Area = m ²	SC =	L	VLT = % ER = %	D.	eflective	Area = m ²	SC =	VLT ER =		Reflective	Area = m ²	SC =	VLT = % ER = %
				51.73 SC	0.43				3.37 SC		VLT = 53 %		Tinted		25 SC	0.43 VLT		Tinted		12 SC	0.43 VLT = 53 %
			m ²	=		ER = 17 %	-	m ²	=	L	ER = 17 %		Timed	m ²	=	ER =			m ²	=	ER = 17 %
		Clear	Area =	SC		VLT = %	☐ Clear	Area =	SC		VLT = %		Clear	Area =	SC	VLT		Clear	Area =	SC	VLT = %
			m ²	=	I	ER = %	1	m ²	=		ER = %	6		m ²	=	ER =	%		m ²	=	ER = %
	Double Glazing	✓ Yes		No	•		☑ Yes		No				Yes	[]	No	•		✓ Yes	_ l	No	•
	External	Overhang	Z Yes	l	No		Overhang	☐ Yes	Z 1	No		Ov	verhang	Yes	Z N	0		Overhang	☐ Yes	ΖN	0
	Shading	Sidefin	Yes	l	No		Sidefin	Yes		No		Sic	defin	Yes	Z N	0		Sidefin	Yes	ZN	0
Solar Radiation Gazing	through		11.63			W/m ²		6.47			W/m ²			4.02		W/r	n ²		3.21		W/m ²
Average Absor	ptivity			0.795					0.795				0.795								
RTTV _{Wall} at ea	ch Facade		17.50)		W/m ²		11.27			W/m ²		13.47 W/m ² 12.05 W/m ²				W/m ²				
Overall RTTV	Wall										13.74	•	W/m ²					•			
Table 3		•																			
n 00 1		1								RT	TTV _{Roof}										
Roof Orientation Total Roof Are			2.16 163.59		m ²																
Units)	a (Kesidelidai		105.59)	m																
Total Skylight	Area		$\overrightarrow{\sim}$	\leftarrow	m ²																
Heat	Roof		3.55)	W/m ²																
Conduction	Skylight	_	\sim		W/m ²																
	Glass Type	☐ Reflect	tive A	rea =				m ² SC	=					VLT	`=			%	ER =		%
		☐ Tinted	A	rea =				m ² SC	=					VL1	`=			%	ER =		%
		☐ Clear	A	rea =				m ² SC	=					VLT	`=			%	ER =		%
Skylight	Double Glazing	☐ Yes	Ī	No										•					•		
	External Shading	☐ Yes] No																	
Solar Radiation	through Gazing	<u> </u>			W/m ²																
Average Absor		(.	0.8	$\overline{}$	vv/III																
Overall RTTV		(3.55	-)-	W/m ²																

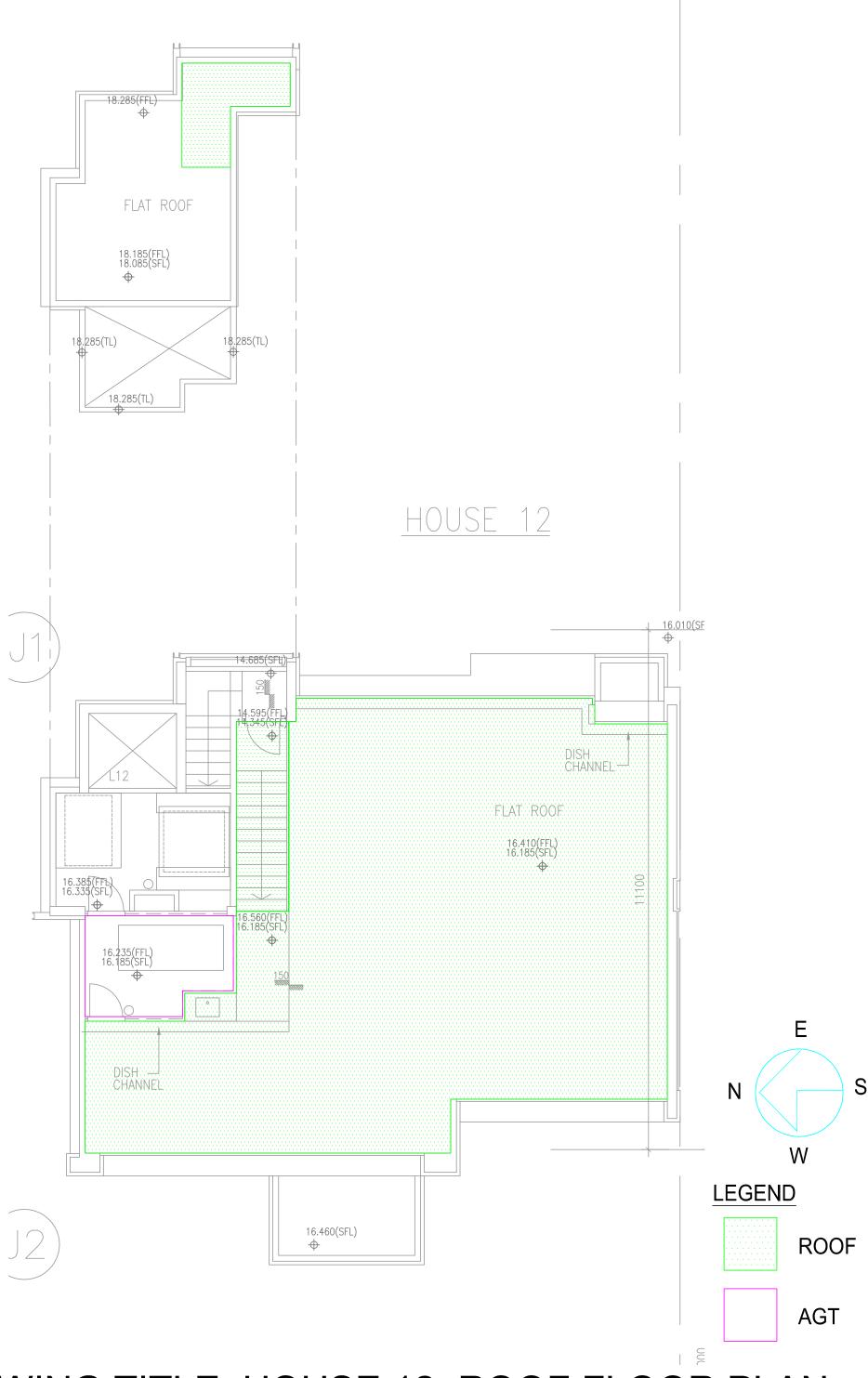
ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance



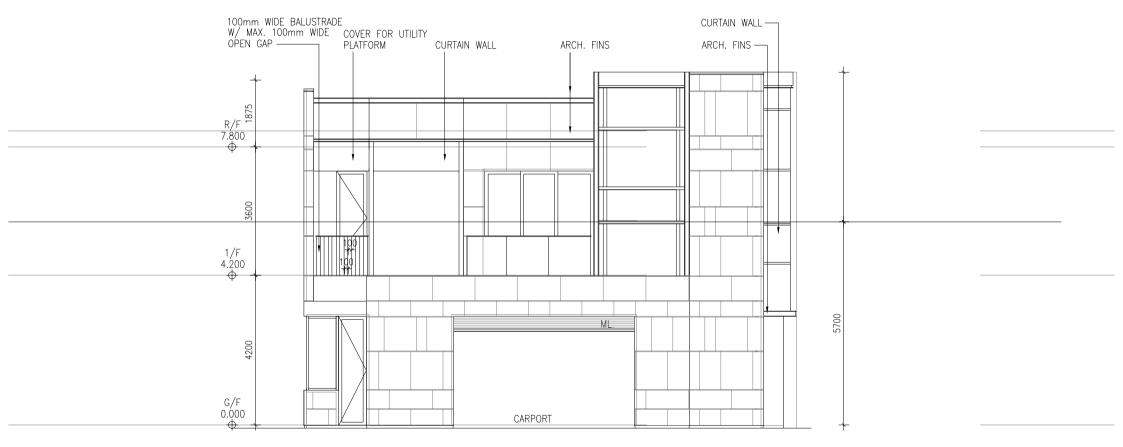
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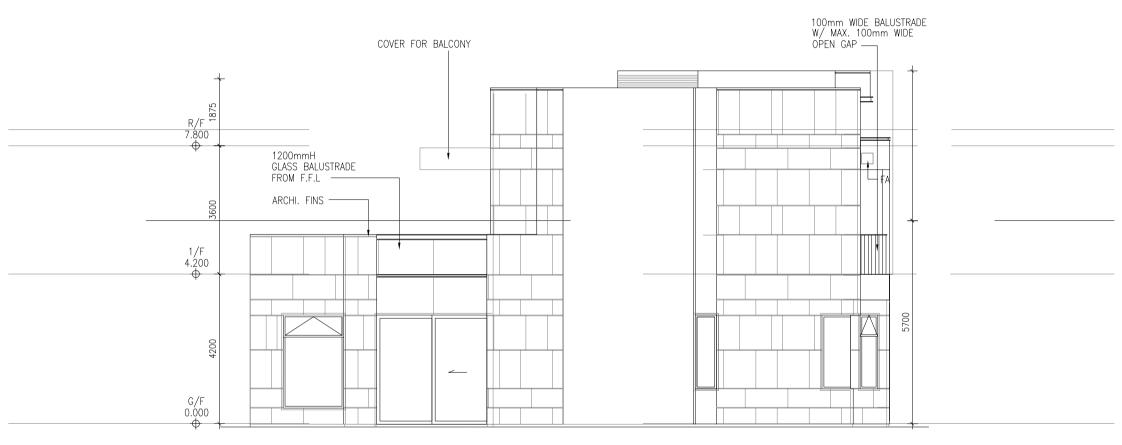
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DRAWING TITLE: HOUSE 12 ROOF FLOOR PLAN SCALE: 1:150@A4

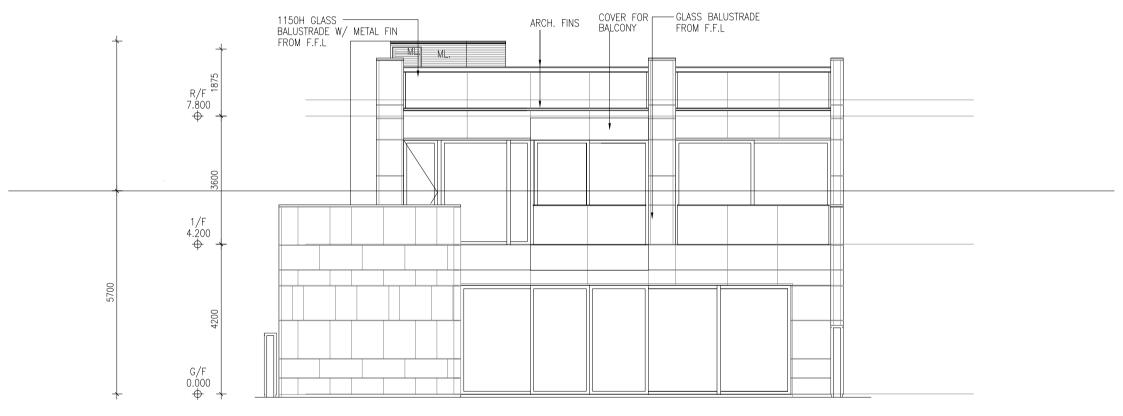


1 EAST ELEVATION 1:75 HOUSE 12



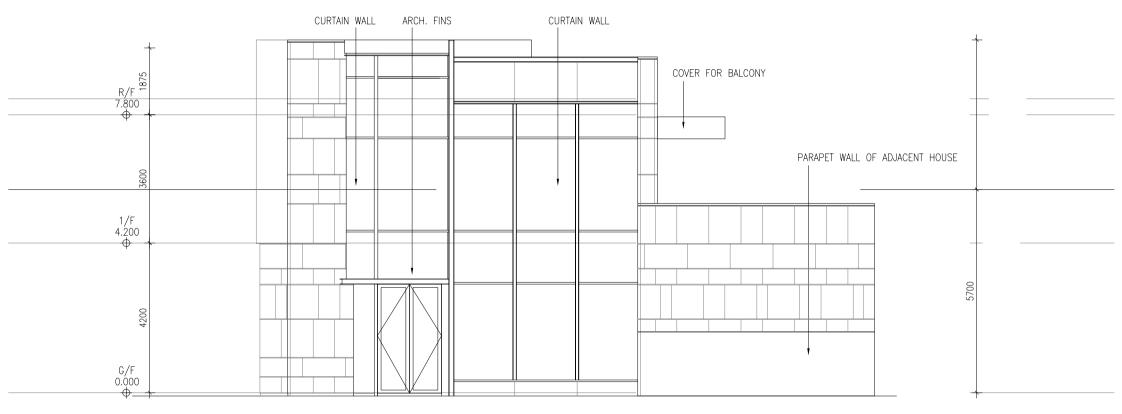
7 SOUTH ELEVATION 1:75

HOUSE 12

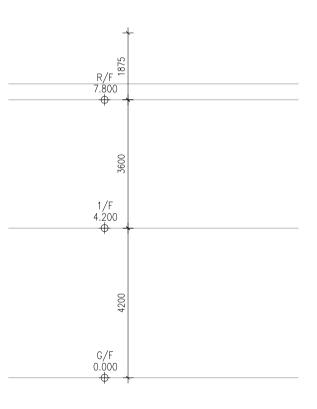


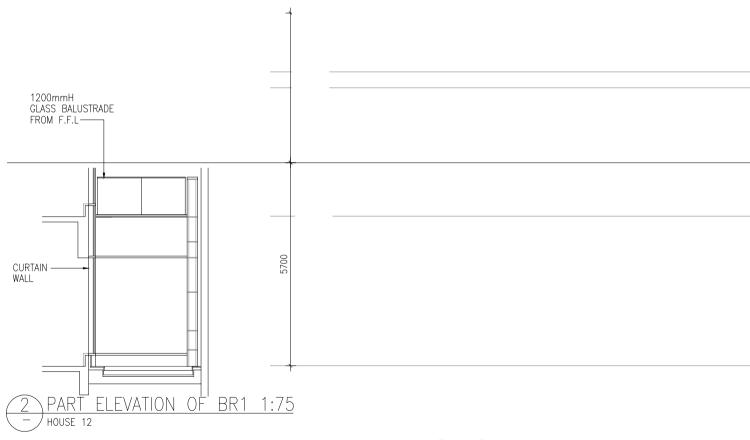
9 WEST ELEVATION 1:75

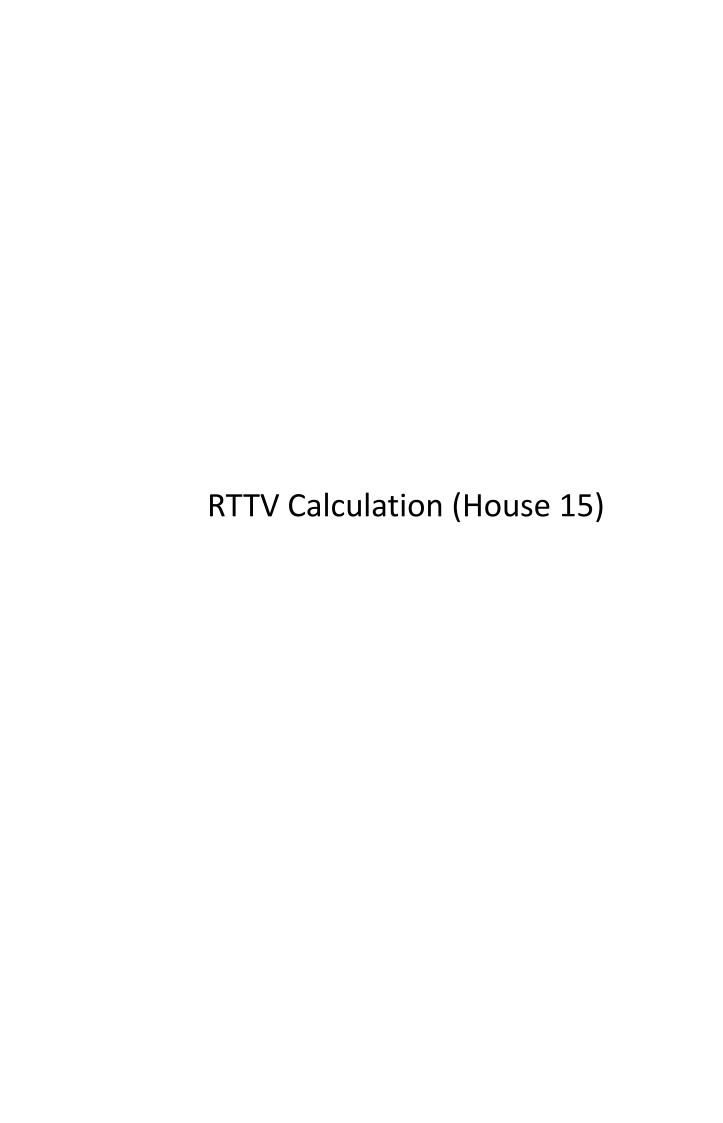
HOUSE 12

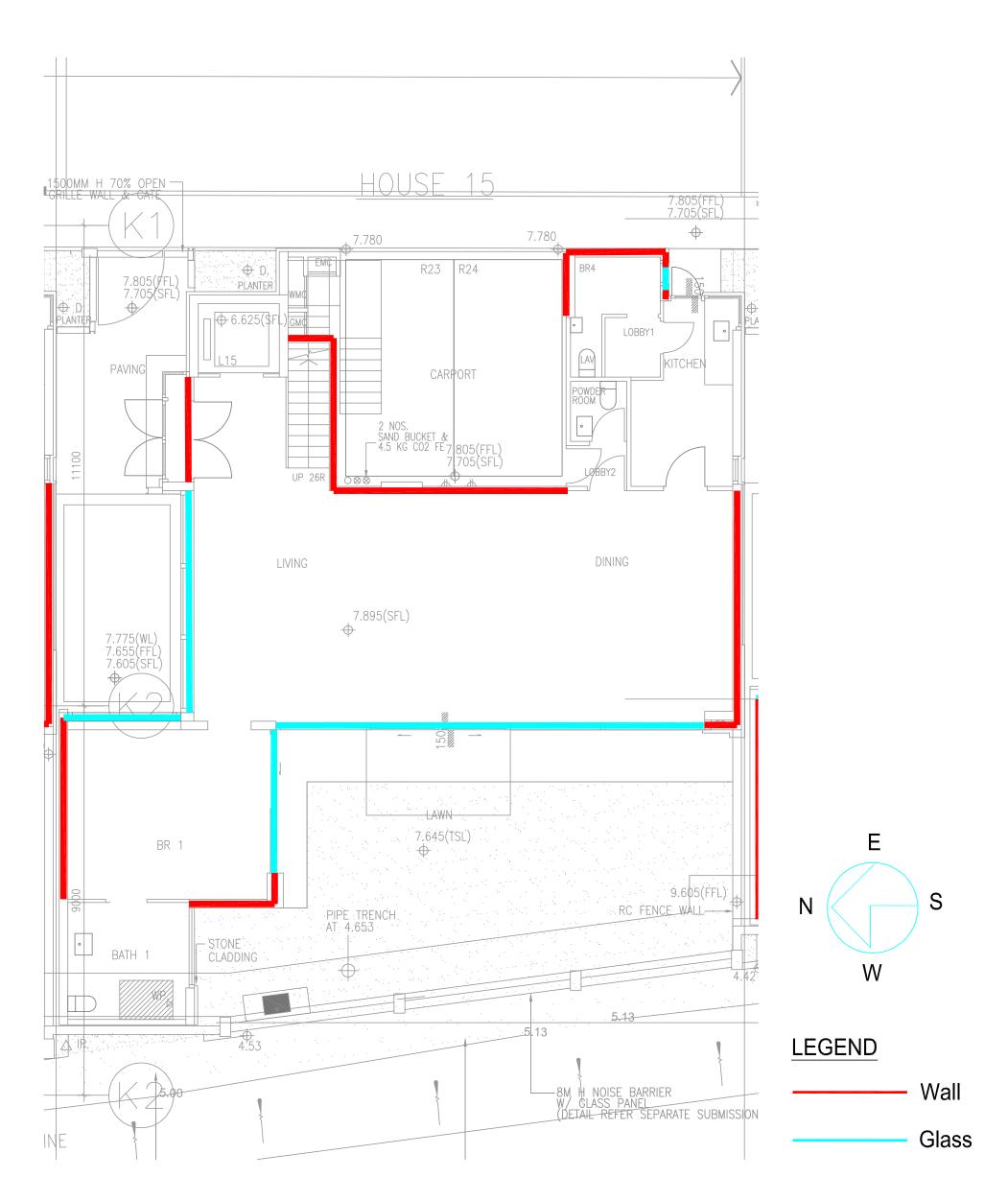


8 NORTH ELEVATION 1:75
HOUSE 12

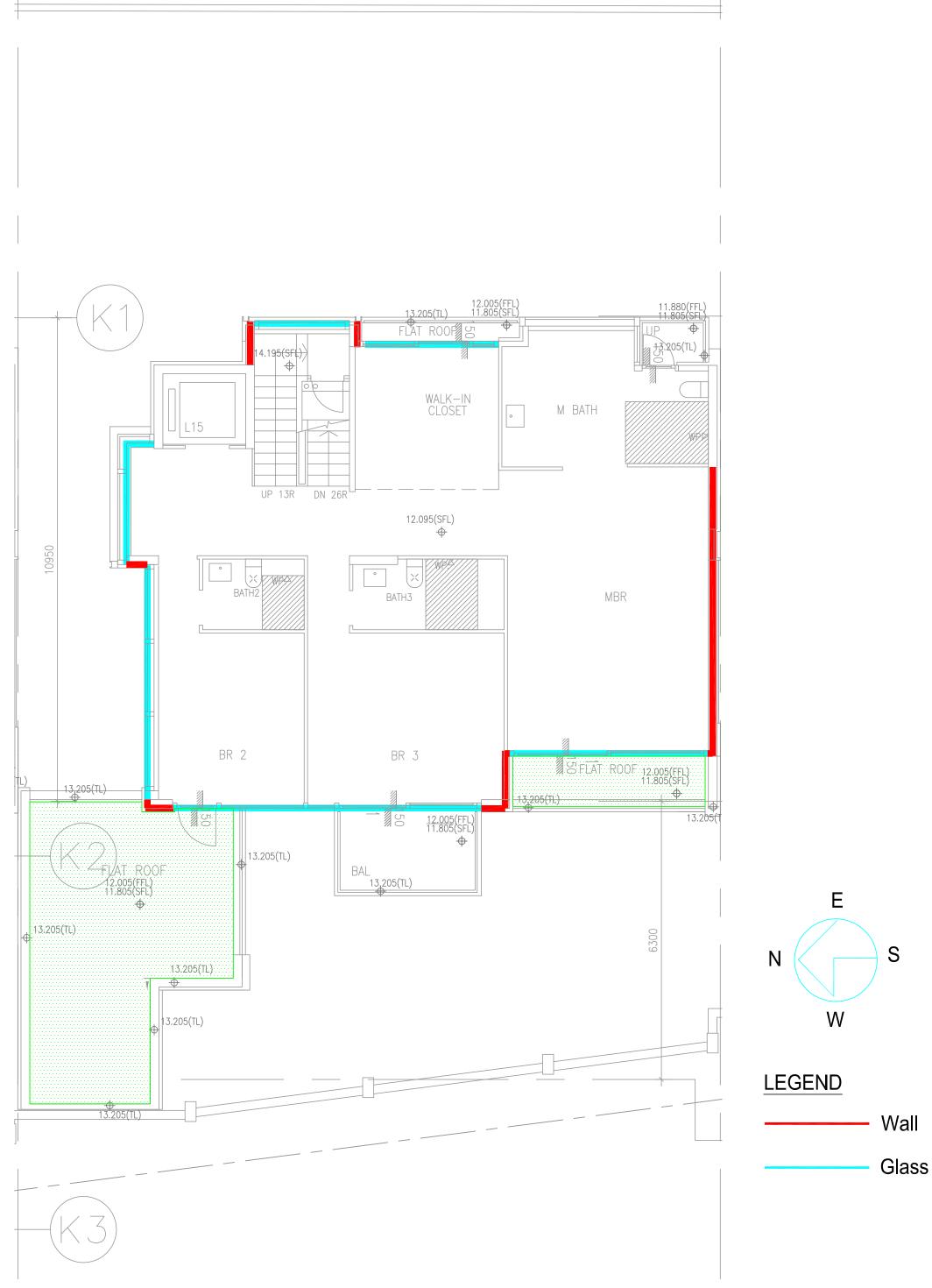




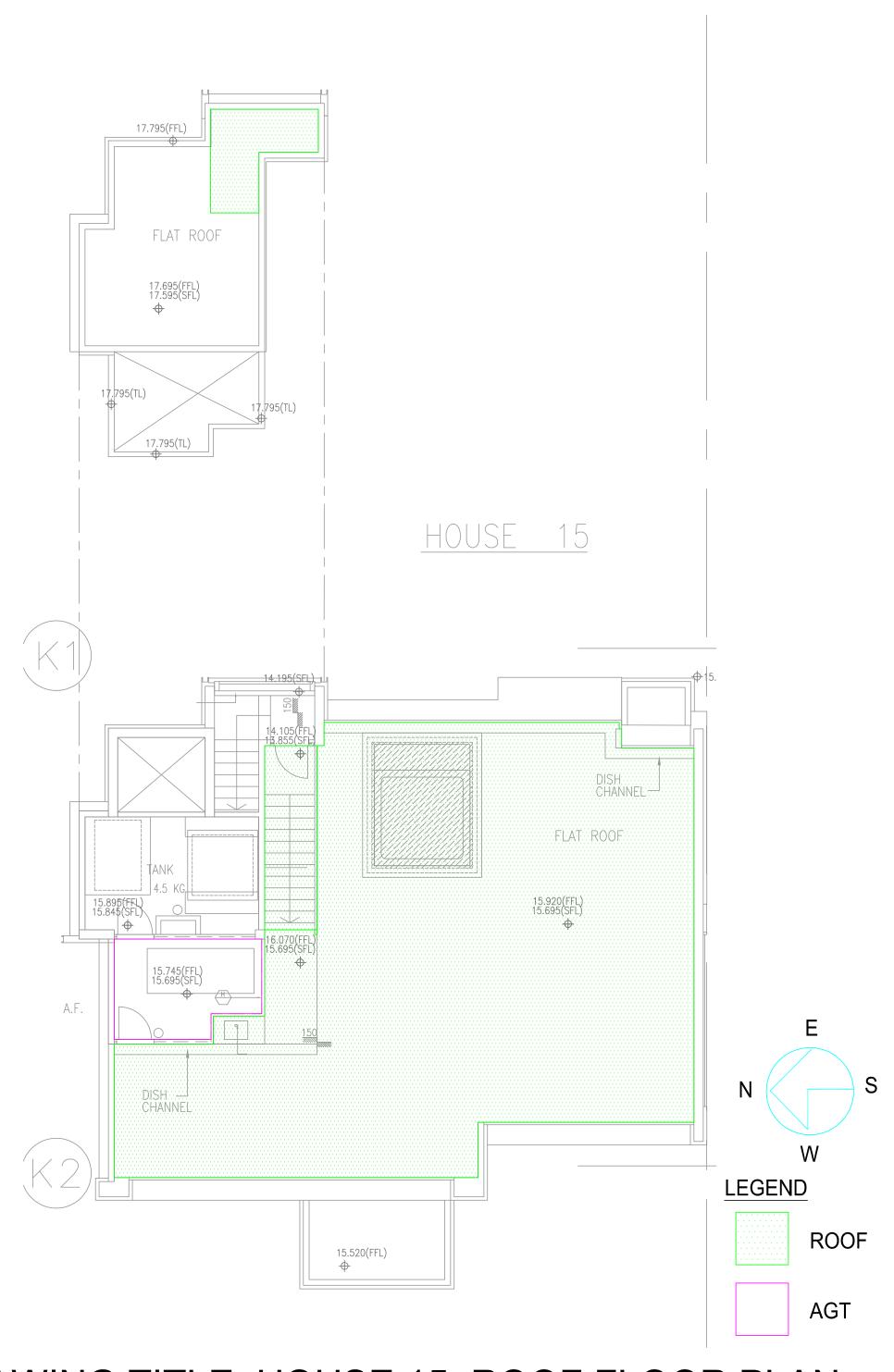




DRAWING TITLE: HOUSE 15 GROUND FLOOR PLAN SCALE: 1:150@A4



DRAWING TITLE: HOUSE 15 FIRST FLOOR PLAN SCALE: 1:150@A4



DRAWING TITLE: HOUSE 15 ROOF FLOOR PLAN SCALE: 1:150@A4

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Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                                       Sheet no. 1
                                                                                               Storey heights (Residential Units):
                                                                                               G/F
                                                                                                                                     4.20 m
                                                                                                                                                 1 storey)
                                                                                               1/F
                                                                                                                                     3.60 m
                                                                                                                                               ( 1 storey)
                                                                                               R/F
                                                                                                                                     1.90 m
                                                                                                                                               ( 1 storey)
West Elevations (House 15) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                                                               )x 4.20 x 1 = 23.50 x 4.20 x 1 =
                                                                                                                                    98.70 m<sup>2</sup>
1/F
                                12.70
                                                                               )x 3.60 x 1 = 12.70 x
                                                                                                             3.60 \times 1 =
                                                                                                                                    45.72 m<sup>2</sup>
R/F
                                                                               )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                    0.00 m<sup>2</sup>
                                                                                                                                    Gross Wall Areas
                                                                                                                                                        144.42 m<sup>2</sup>
North Elevations (House 15) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                ( 13.00
                                       1.50
                                                                               )x 4.20 x 1 = 14.50 x 4.20 x 1 =
                                                                                                                                    60.90 m<sup>2</sup>
                                                                                                  9.50 \times 3.60 \times 1 =
1/F
                                  8.60 + 0.90
                                                                               )x 3.60 x 1 =
                                                                                                                                    34.20 m<sup>2</sup>
R/F
                                                                               )x 1.90 x 1 =
                                                                                                  0.00 \times 1.90 \times 1 =
                                                                                                                                    0.00 m<sup>2</sup>
                                                                                                                                    Gross Wall Areas
                                                                                                                                                         95.10 m<sup>2</sup>
East Elevations (House 15) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                 2.70
                                         8.70
                                                                               )x 4.20 x 1 = 11.40 x 4.20 x 1
                                                                                                                                    47.88 m<sup>2</sup>
1/F
                                  5.80 + 0.80
                                                                               )x 3.60 x 1 =
                                                                                                  6.60 \times 3.60 \times 1 =
                                                                                                                                    23.76 m<sup>2</sup>
R/F
                                                                               )x 1.90 x 1 =
                                                                                                  0.00 \times 1.90 \times 1 =
                                                                                                                                    0.00 \, \text{m}^2
                                                                                                                                    Gross Wall Areas
                                                                                                                                                         71.64 m<sup>2</sup>
South Elevations (House 15) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                (13.00
                                                                               )x 4.20 x 1 = 13.00 x
                                                                                                             4.20 \times 1 =
                                                                                                                                    54.60 m<sup>2</sup>
1/F
                                  6.50
                                                                               )x 3.60 x 1 =
                                                                                                  6.50 \times 3.60 \times 1 =
                                                                                                                                    23.40\ m^{2}
R/F
                                                                               )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                                    0.00 m<sup>2</sup>
                                                                                                                                   Gross Wall Areas
                                                                                                                                                         78.00 m<sup>2</sup>
```

Total Gross Wall Areas

389.16 m²

```
Total Glazing Area (Window + Balcony) Calculation
                                                                                                                                                                                  Sheet no. 2
                                                                                                                         Glazing heights (Residential Units):
                                                                                                                         G/F (Window GL02) - A
                                                                                                                                                               3.05 m
                                                                                                                                                                                 storey)
                                                                                                                         G/F (Window GL02) - B
                                                                                                                                                      =
                                                                                                                                                               3.15 m
                                                                                                                                                                                 storey)
                                                                                                                         1/F (Window GL02) - C
                                                                                                                                                      =
                                                                                                                                                               2.66 m
                                                                                                                                                                                 storey)
                                                                                                                         1/F (Window GL02) - D
                                                                                                                                                               2.74 m
                                                                                                                                                                             1
                                                                                                                                                                                 storey)
West Elevations (House 15) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
                                                                                                        )x 3.05 x 1 =
G/F (Window GL02) - A
                                   9.90
                                                                                                                            9.90 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              30.15 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                   7.50 + 4.50
                                                                                                        )x 2.66 x 1 =
                                                                                                                           12.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              31.86 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 = 0.00 x 2.74 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                     62.01 m<sup>2</sup>
North Elevations (House 15) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   7.80
                                                                                                        )x 3.05 x 1 =
                                                                                                                           7.80 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              23.75 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                    2.80 + 5.40
                                                                                                        )x 2.66 x 1 =
                                                                                                                            8.20 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              21.77 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                     45.52 m<sup>2</sup>
East Elevations (House 15)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   2.70
                                                                                                        )x 3.05 x 1 =
                                                                                                                            2.70 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                                8 22 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                            0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
                                                                                                        )x 3.15 x 1 =
G/F (Window GL02)
                                                                                                        )x 0.86 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       0.86 \times 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
1/F (Window GL02)
                                   0.70 + 2.20 + 3.10
                                                                                                        )x 2.64 x 1 =
                                                                                                                           2.90 x
                                                                                                                                       2.64 \times 1 =
                                                                                                                                                               7.66 m<sup>2</sup>
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                     15.88 m<sup>2</sup>
South Elevations (House 15) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   0.50 + 3.30
                                                                                                        )x 3.05 x 1 =
                                                                                                                            3.80 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              11.57 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                        )x 3.15 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                                0.00 \text{ m}^2
1/F (Window GL02) - C
                                                                                                        )x 2.66 x 1 =
                                                                                                                            0.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                                0.00 m<sup>2</sup>
                                                                                                                                                                0.00 \text{ m}^2
1/F (Window GL02) - D
                                                                                                        )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                           Gross Glazing Areas
                                                                                                                                                                                     11.57 m<sup>2</sup>
```

Total Gross Glazing Areas

134.98 m²

West Elevations (House 15)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	azing Areas) (Ao) at West Elevations (House 15)	=	144.42 m²
Glazing Areas at	West Elevations (House 15)	=	62.01 m ²
Breakdown of Glazi Glazing Areas	ng Areas Unshaded (W-F1)	=	40.52 m²
	ECS =	1.000	
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.15 x 3.05 = 9.61 m^2	=	9.61 m²
	OPF 1.90 / 3.05 = 0.62 ECS = 0.666		
Glazing Areas	Shaded by Built-Fin (Projection on Right) (W-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 4.50 x 2.64 = 11.88 m²	=	11.88 m²
	SPF 1.60 / 4.28 = 0.37 ECS = 0.989		
Opaque Wall Areas	at West Elevations (House 15)	=	82.41 m²
Breakdown of Opaq RC Wall Areas	ue Wall Areas (W-W1)	=	82.41 m²

62.01

144.42

0.43

Sheet no. 3

W/m²K

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 15)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (Refer \ to \ Table \ 5)$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to Table 2) Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

_W-W1	Description:			RC Wall Are	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

3.42

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	4	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
	•		_
Facade Orientation Facing	West	Gross Wall Area (Ao) =	144.42
Window to Wall Ratio (WWR)	0.43	Wall Orientation Factor (Gw) =	1.131

Components / Details		Code No.			
Description	Units	W-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	82.41			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	7.01			

Heat Conduction through Opaque Walls =	3.57(Awi/Ao)	Uwi awi Gw	where i= 1, 2,, n
=	7.01	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing					
Components / Details	Code No.				
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	62.01	9.61	11.88	
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.54	0.08	0.10	

Heat Conduction through Glazing	= 0.64	(Afi/Ao) l	Jfi Gw	where i= 1, 2,, n
	=	0.73	W/m²	

Components / Details	Code No.				
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	40.52	9.61	11.88	
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43	
Visible Light Transmittance (VLT)	%	53	53	53	
External Reflectance (ER)	%	17	17	17	
External Shading Miltiplier (ESC)		1.00	0.67	0.99	
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	5.70	0.90	1.65	

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 8.25 W/m^2

Summary of RTTV at West Elevations (House 15)

= 7.01 + 0.73 + 8.25 = 15.98 W/m²

North Elevations (House 15)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 15)

Glazing Areas at North Elevations (House 15) = 45.52 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 45.52 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 15) = 49.58 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (N-W1) = 49.58 m²

Window to Wall Ratio (WWR) = 45.52 / 95.10 = **0.48**

Sheet no. 5

Wall Orientation Factor

w = 0.79

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 15)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
		_

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Ri Surface film resistance of internal surface (Refer to Table 2)

 $Ro \qquad \text{Surface film resistance of external surface (Refer to \textbf{Table 2})}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total	·				0.293

Uw1 = ____1 = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	6	6 BD Ref No. BD 2/9179/15			
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 15)				
	•				
Facade Orientation Facing	North	Gross Wall Area (Ao) = 95	.10		
Window to Wall Ratio (WWR)	0.48	Wall Orientation Factor (Gw) = 0.	.79		

Components / Details		Code No.			
Description	Units	N-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (αwi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	49.58			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	4.47			

Heat Conduction through Opaque Wall	s = 1	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	4.47	W/m²	

Components / Details		Code No.	
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	45.52	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.42	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw			where i= 1, 2,, n
	=	0.42	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	N-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	45.52			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	6.79			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 6.79 W/m²

Summary of RTTV at North Elevations (House 15)

East Elevations (House 15)

Gross Wall Areas 71.64 m² (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 15) Glazing Areas at East Elevations (House 15) 15.88 m² **Breakdown of Glazing Areas Glazing Areas** Unshaded (E-F1) 15.88 m²

ECS = 1.000

East Elevations (House 15) **Opaque Wall Areas at** 55.76 m²

Breakdown of Opaque Wall Areas RC Wall Areas (E-W1) 55.76 m²

Window to Wall Ratio (WWR) = 71.64 15.88 0.22 Sheet no. 7

Wall Orientation Factor

Gw = 1.072

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 15)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
_		

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

E-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	8	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
	•		
Facade Orientation Facing	East	Gross Wall Area (Ao) =	71.64
Window to Wall Ratio (WWR)	0.22	Wall Orientation Factor (Gw) =	1.072

Components / Details	s / Details		Code No.	
Description	Units	E-W1		
External Finish Material		30mm Stone cladding		
Conductivity	W/mK	2.90		
Thickness	m	0.030		
Average Absorptivity (awi)	(a)	0.89		
Intermediate component		12mm cement/ sand render		
Conductivity	W/mK	0.72		
Thickness	m	0.01		
Intermediate component		200mm concrete wall		
Conductivity	W/mK	2.16		
Thickness	m	0.20		
Intermediate component				
Conductivity				
Thickness				
Intermediate component				
Conductivity				
Thickness				
Internal Finish Material		10mm AGT Tile		
Conductivity	W/mK	1.10		
Thickness	m	0.01		
U-value of Opaque Area (Uwi)	W/m²K	3.42		
Opaque Wall Area (Awi)	m²	55.76		
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	9.06		

Heat Conduction through Opaque Walls =	where i= 1, 2,, n		
=	9.06	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing					
Components / Details		Code No.			
Description	Units	E-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	15.88			
U-value of Glazing (Ufi)	W/m²K	1.74			
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.26			

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.26 W/m ²	

Part 3 - Calculation of Solar Radiation t	hrough Glazing		
Components / Details		Code No.	
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	15.88	
Shading Coefficient of Glazing (SCf)		0.43	
Visible Light Transmittance (VLT)	%	53	
External Reflectance (ER)	%	17	
External Shading Miltiplier (ESC)		1.00	
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	Cwi)Gw	4.27	

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 4.27 W/m²

Summary of RTTV at East Elevations (House 15)

South Elevations (House 15)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 15)

Glazing Areas at South Elevations (House 15) = 11.57 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 11.57 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 15) = 66.43 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(S-W1) = 66.43 m²

Window to Wall Ratio (WWR) = 11.57 / 78.00 = 0.15

Sheet no. 9

Wall Orientation Factor Gw = 0.975 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 15)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
_		

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to Table 2)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to Table 2)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

S-W1 Description: RC Wall Areas

Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

Uw1 = ____ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	, Ngau Tam Mei, Yuen Long (House 15)	
Facade Orientation Facing	South	Gross Wall Area (Ao) =	78.00
Window to Wall Ratio (WWR)	0.15	Wall Orientation Factor (Gw) =	0.975

Components / Details		Code No.				
Description	Units	S-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (αwi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	66.43				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	9.01				

Heat Conduction through Opaque Walls	=	3.57(Awi/Ao) Uwi α	wi Gw	where i= 1, 2,, n
	=	9.01	W/m²	

Components / Details	Code No.		
Description	Units	S-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	11.57	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.16	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.16 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details		Code No.				
Description	Units	S-F1				
Glazing Type		Tinted				
Thickness	m	0.01				
Glazing Area (Afi)	m²	11.57				
Shading Coefficient of Glazing (SCf)		0.43				
Visible Light Transmittance (VLT)	%	53				
External Reflectance (ER)	%	17				
External Shading Miltiplier (ESC)		1.00				
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	2.60				

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 2.60 W/m²

Summary of RTTV at South Elevations (House 15)

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

 Sheet No.
 11
 BD Ref No.
 BD 2/9179/15

 Building Address
 Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 15)
 BD Ref No.
 BD 2/9179/15

Overall Gross Wall Area [a] 389.16 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	144.42	7.01	0.73	8.25	15.98	5.93
North	95.10	4.47	0.42	6.79	11.68	2.85
East	71.64	9.06	0.26	4.27	13.59	2.50
South	78.00	9.01	0.16	2.60	11.77	2.36
				·		

Overall RTTVwall = 13.65 W/m²

14 W/m² OK

01	40
Sheet no.	12

Gross Roof Areas (Opaque Walls + Sk	ylight Areas) (Aro) at		Roof			=	164.30 m ²
Skylight Areas at	Roof					=	0.00 m ²
Breakdown of Skylig	ght Areas						
Skylight Areas	Unshaded	(S1)		=	0.00 m ²
OpaqueAreas at	Roof					=	164.30 m ²
Breakdown of Opaq RC Roof Areas	ue Roof Areas	(R1)		=	158.28 m²
1/F		(IX.	=	30.74 m²		100.20 111
Roof Upper Roof				=	92.74 m ² 34.80 m ²		
Breakdown of Opaq	ue Roof Areas						
RC Roof Areas		(R2) =	m²	=	6.02 m ²
Roof				=	6.02 m ²		
Upper Roof				=	m²		

Roof Orientation Factor Gs	s =	2.16	(Refer to Table 9)
----------------------------	-----	------	--------------------

Average Absorptivity (a) of the External Opaque Wall at

Roof

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8

Average Absorptivity =

0.896

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$

where Ri Surface film resistance of internal surface (Refer to Table 2)

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

Description:		Roof Area		
		Ro	=	0.055
		Ra	=	0
0.025	1	1.1	=	0.023
0.05	1	0.72	=	0.069
0.05	1	0.034	=	1.471
0.15	1	2.16	=	0.069
0.01	1	1.1	=	0.009
		Ri	=	0.162
al				1.858
	0.025 0.05 0.05 0.15 0.01	0.025 / 0.05 / 0.05 / 0.15 / 0.01 /	Ro Ra 0.025 / 1.1 0.05 / 0.72 0.05 / 0.034 0.15 / 2.16 0.01 / 1.1 Ri	Ro = Ra = 0.025 / 1.1 = 0.05 / 0.72 = 0.05 / 0.034 = 0.15 / 2.16 = 0.01 / 1.1 = Ri =

$$Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$$

_R2	Descrip	otion:		Root Area		
Roof Material						
External surface film resistance				Ro	=	0.055
Air space resistanace				Ra	=	0
50mm cement/ sand screed		0.05	1	0.72	=	0.069
50mm expanded polystyrene		0.05	1	0.034	=	1.471
150mm concrete slab		0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.162
	Total					1.836

$$Uw1 = \frac{1}{1.836} = 0.54 \text{ W/m}^2\text{K}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. E	BD 2/9179/15
Building Address	Lot 2115, D.D. 105,	Ngau Tam Mei, Yuen Long (House 15)	
Roof Orientation Facing Skylight to Roof Ratio (SRR) =	Flat	Gross Roof Area (Aro) = _ Roof Orientation Factor (Gs) =	164.30 2.16

Components / Details			Code No.	
Description	Units	R1	R2	
External Finish Material		25mm Unglazed Porcelain Tiles (Grey)	10mm AGT Tile (Brown)	
Conductivity	W/mK	1.10	1.10	
Thickness	m	0.025	0.010	
Average Absorptivity (awi)	(a)	0.9	0.8	
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed	
Conductivity	W/mK	0.72	0.72	
Thickness	m	0.050	0.050	
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene	
Conductivity	W/mK	0.034	0.034	
Thickness	m	0.05	0.05	
Intermediate component		150mm concrete slab	150mm concrete slab	
Conductivity	W/mK	2.16	2.16	
Thickness	m	0.15	0.15	
Intermediate component				
Conductivity	W/mK			
Thickness	m			
Internal Finish Material				
Conductivity	W/mK	0.38	0.38	
Thickness	m	0.01	0.01	
U-value of the Roof (Uri)	W/m²K	0.53	0.53	
Opaque Roof Area (Ari)	m²	158.28	6.02	
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.44	0.12	

Heat Conduction through Opaque Roo	f = 3.	.47(Ari/Aro) Uri ari	Gs	where i= 1, 2,, ı
	=_	3.56	W/m²	

Part 2 - Calculation of Heat Conduction through Skylight					
Components / Details		Code No.			
Description	Units	S 1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
U-value of Skylight Glazing (Usi)	W/m²K	-			
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00			

Heat Conduction through Skyligh	t = 0.4	0 (Asi/Arc) Usi Gs	where i= 1, 2,, n
	=	0.00	W/m ²	

Part 3 - Calculation of Solar Radiation thr	ough Skylight			
Components / Details			Code No.	
Description	Units	S 1		
Skylight Glazing Type		-		
Thickness	m	-		
Skylight Area (Asi)	m²	0.00		
Shading Coefficient of Skylight Glazing (SCr)	-		
Visible Light Transmittance (VLT)		-		
External Reflectance (ER)		-		
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00		

Solar Radiation through Skylight = 41.10 (Asi/Aro) (SCri) Gs where i= 1, 2, ..., n = 0.00 W/m²

Summary of RTTV at Roof = 3.56 + 0.00 + 0.00 = 3.56 W/m²

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Duilding Addrson	Let 2115 D.D. 105 Nacy Tem Mci. Vyen Leng (Heyes 15)	

Building Address Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 15)

Overall Roof Area [a] 164.30 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	164.30	3.56	0.00	0.00	3.56	3.56

Overall RTTVroof = 3.56 W/m²

< 4 W/m² OK

BD Ref. No.

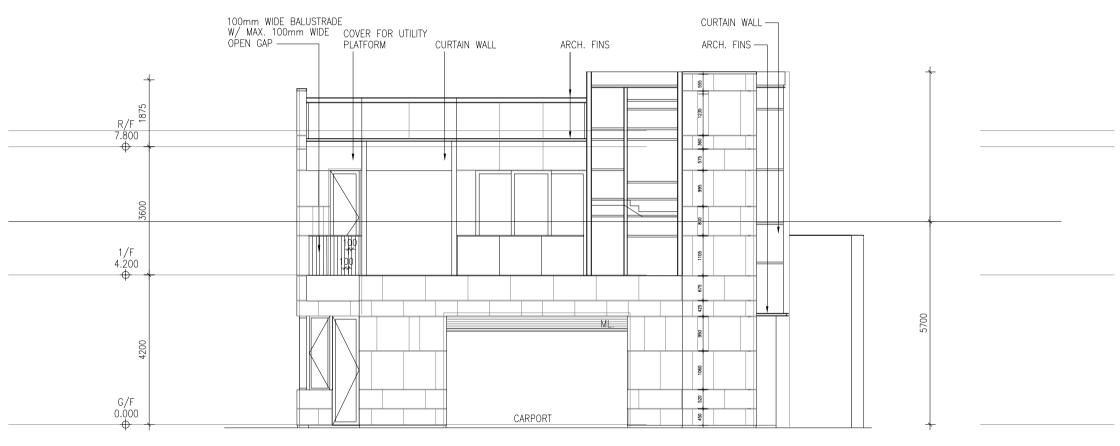
RTTV Summarv Sheet

Mile	96 96
So all side	96 96
A column	96 96
No efficient of the stand of t	96 96
Provide	96 96
Table	96 96
Part	96 97
Part	96 96
Part	96 97
Average Absorption by Mall Ratio	96 96
Note	96 94
Station Confident Glazing G	96 94
Note the second of the second	% %
Fixed Parameter	9/6 0/.
Franche	% %
Table Tab	% %
Table Tab	
Table 2	% %
Fixed Part Fixe	70 70
Solid Soli	
Wildow to Wall Ratio Conduction Conduc	
Total External Wall Area 120.0 m2 Window to Wall Ratio (Residential Units) Mindow	
Residential Unity Resi	0.975
Total Window Area 0.18 0.1	m ² Window to Wall Ratio
Part Conduction Find	
Part Conduction Find	m ² = 0.23
Vindow V	W/m ²
Window Glass Type Glass Type Glass Type Glass Type Glass Type Glazing Gazing	
Reflective Ref	W/m²
Tinted Area = 61.73 SC 0.43 VLT = 53 % Tinted Area = 23.37 SC 0.43 VLT = 53 % Tinted Area = 23.37 SC 0.43 VLT = 53 % Tinted Area = 15 RE 17 % Tinted Area = 8.25 SC 0.43 VLT = 53 % Tinted Area = 15 RE 17 % Tinted Tinte	SC VLT = %
Marage Absorptivity	= ER = %
Clear Area = SC VLT = % Clear Area = SC VLT = % Clear Area = ER = 17 K Clear Area = ER = 17	.12 SC 0.43 VLT = 53 %
Double Glazing	ER = 17 %
Double Glazing	SC VLT = %
Double Glazing	= ER = %
Clazing	No
Shading Sidefin ✓ Yes No Sidefin ✓ Yes No Sidefin ✓ Yes ✓ No Sidefin ✓ Yes ✓ No Sidefin ✓ Yes	
Shading Sidefin ✓ Yes No Sidefin ✓ Yes No Sidefin ✓ Yes ✓ No Sidefin ✓ Yes ✓ No Sidefin ✓ Yes	☑ No
Solar Radiation through Gazing 8.25 W/m² 6.79 W/m² 4.27 W/m² 2.60 Average Absorptivity 0.795 0.795 0.795 0.795 0.795 0.795 11.68 W/m² 13.59 W/m² 11.77	
Gazing Joseph Gazing </td <td>☑ No</td>	☑ No
Average Absorptivity 0.795 0.795 0.795 RTTV _{Wall} at each Facade 15.98 W/m ² 11.68 W/m ² 13.59 W/m ² 11.77	W/m ²
RTTV _{Wall} at each Facade 15.98 W/m^2 11.68 W/m^2 13.59 W/m^2 11.77	
	0.795
Overall RTTV _{Wall} 13.65 W/m ²	W/m ²
Table 3	
$ m RTTV_{Rof}$	
Roof Orientation Factor 2.16	
Total Roof Area (Residential 164.30 m ²	
Units) m	
Total Skylight Area m ²	
Heat Roof (3.56) W/m ²	
Conduction Skylight W/m ²	
Glass Type \square Reflective Area = m^2 SC = VLT = $\%$ ER =	%
$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	%
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	
	9/_
Skylight Double Yes No	%
Glazing	%
External Yes No	%
Shading	%
	96
Solar Radiation through Gazing 0 W/m ²	%
Solar Radiation through Gazing W/m ² Average Absorptivity (Roof) 0.8	%

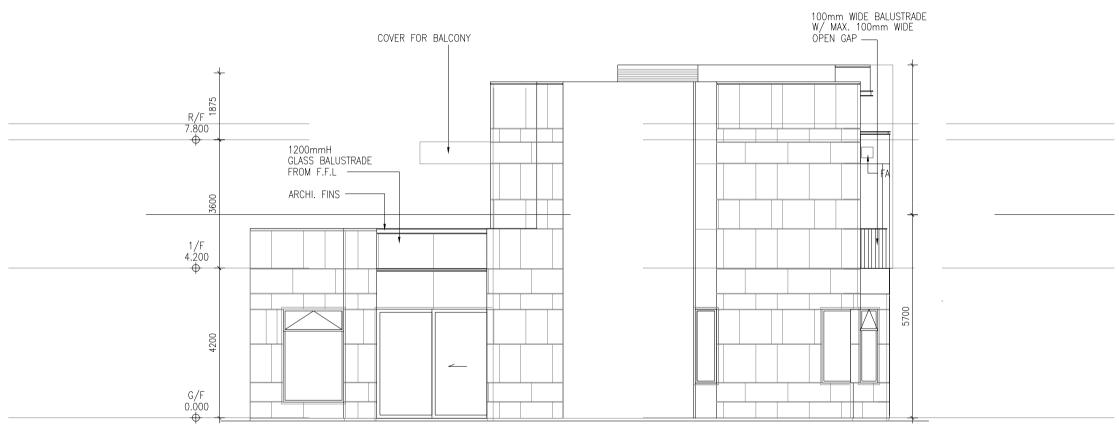
Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 15)

Address:

ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance

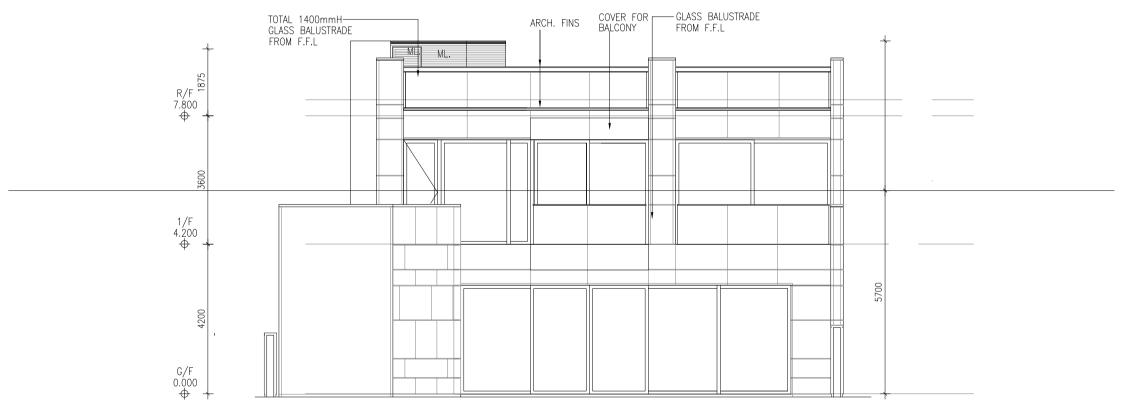


1 EAST ELEVATION 1:75
- HOUSE 15



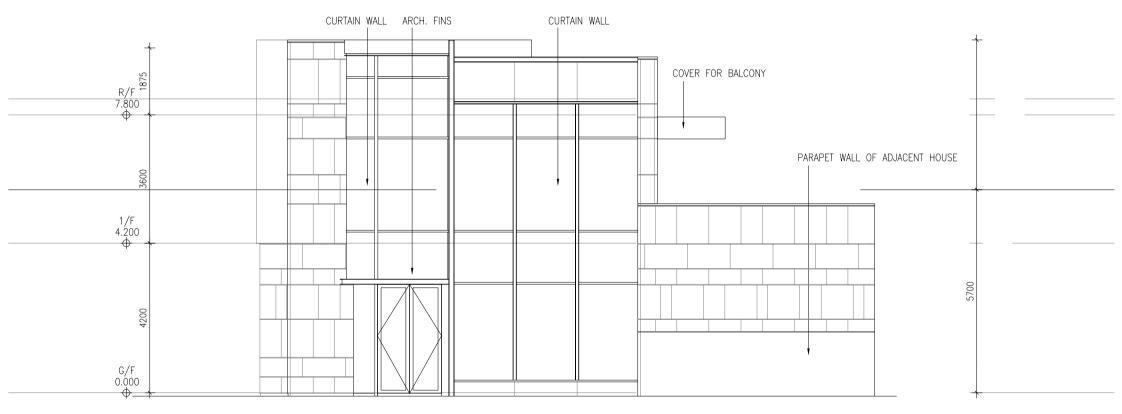
7 SOUTH ELEVATION 1:75

HOUSE 15



9 WEST ELEVATION 1:75

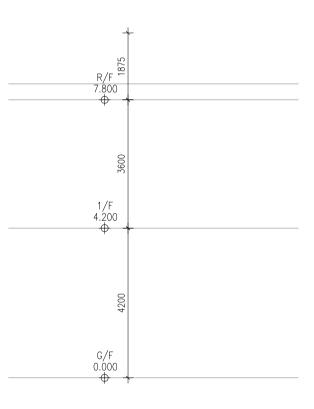
- HOUSE 15

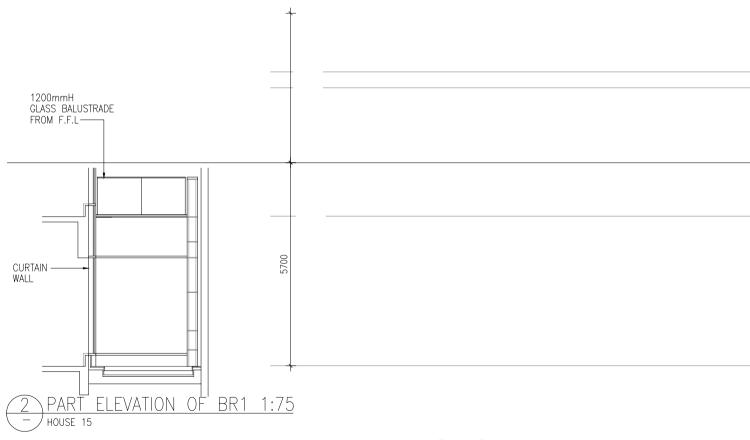


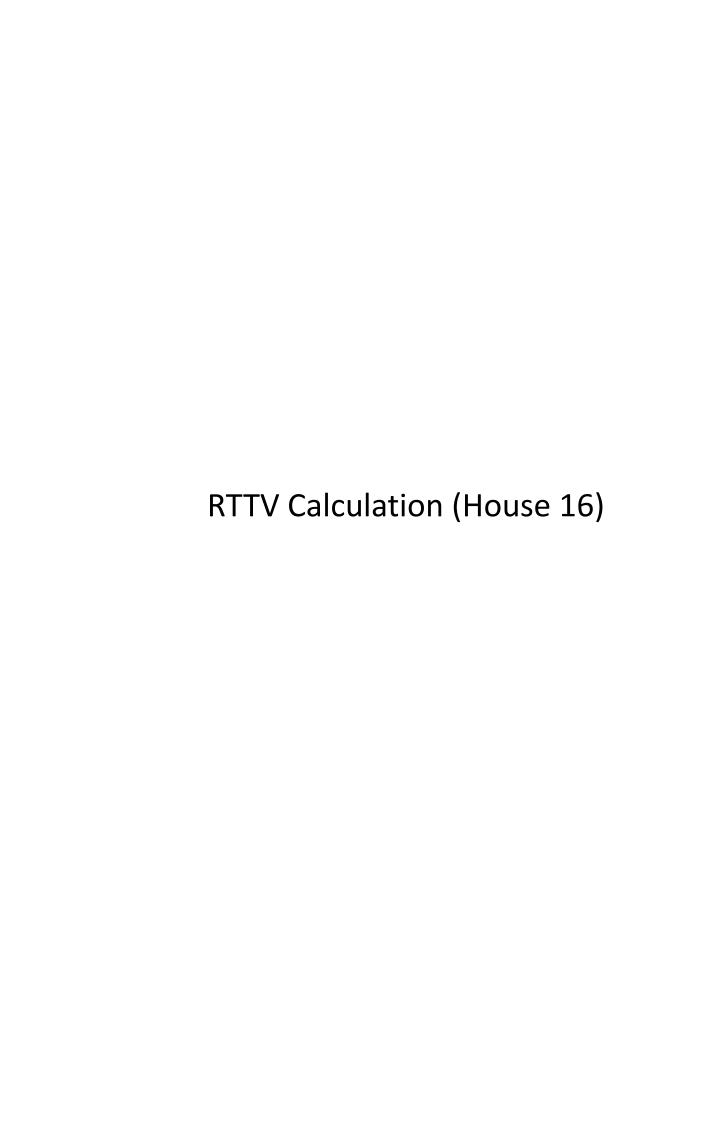
8 NORTH ELEVATION 1:75

HOUSE 6

CSK-16E4







```
Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                                        Sheet no. 1
                                                                                                Storey heights (Residential Units):
                                                                                                G/F
                                                                                                                                      4.20 m
                                                                                                                                                   1 storey)
                                                                                                1/F
                                                                                                                                      3.60 m
                                                                                                                                                ( 1 storey)
                                                                                                R/F
                                                                                                                                      2.25 m
                                                                                                                                                ( 1 storey)
West Elevations (House 16) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                (10.50 + 1.65)
                                                                                )x 4.20 x 1 = 12.15 x 4.20 x 1 =
                                                                                                                                     51.03 m<sup>2</sup>
1/F
                                ( 12.70
                                                                                )x \ 3.60 \ x \ 1 = 12.70 \ x \ 3.60 \ x \ 1 =
                                                                                                                                     45.72 m<sup>2</sup>
R/F
                                                                                )x 2.25 x 1 = 0.00 x 2.25 x 1 =
                                                                                                                                     0.00 m<sup>2</sup>
                                                                                                                                     Gross Wall Areas
                                                                                                                                                          96.75 m<sup>2</sup>
North Elevations (House 16) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                (13.00 + 1.50)
                                                                                )x 4.20 x 1 = 14.50 x 4.20 x 1 =
                                                                                                                                     60.90 m<sup>2</sup>
1/F
                                  8.60 + 0.90
                                                                                )x 3.60 x 1 =
                                                                                                  9.50 \times 3.60 \times 1 =
                                                                                                                                     34.20 m<sup>2</sup>
R/F
                                                                                )x 2.25 x 1 =
                                                                                                   0.00 \times 2.25 \times 1 =
                                                                                                                                     0.00 m<sup>2</sup>
                                                                                                                                     Gross Wall Areas
                                                                                                                                                          95.10 m<sup>2</sup>
East Elevations (House 16) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                  9.00 + 2.90
                                                                                )x 4.20 x 1 = 11.90 x 4.20 x 1 =
                                                                                                                                     49.98 m<sup>2</sup>
1/F
                                  5.80 + 0.80
                                                                                )x 3.60 x 1 =
                                                                                                   6.60 \times 3.60 \times 1 =
                                                                                                                                     23.76 m<sup>2</sup>
R/F
                                                                                )x 2.25 x 1 =
                                                                                                   0.00 \times 2.25 \times 1 =
                                                                                                                                     0.00 \, \text{m}^2
                                                                                                                                     Gross Wall Areas
                                                                                                                                                          73.74 m<sup>2</sup>
South Elevations (House 16) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                (11.50
                                                                                )x 4.20 x 1 = 11.50 x
                                                                                                              4.20 \times 1 =
                                                                                                                                     48.30 m<sup>2</sup>
1/F
                                  6.50
                                                                                )x 3.60 x 1 =
                                                                                                   6.50 \times 3.60 \times 1 =
                                                                                                                                     23.40\ m^{2}
R/F
                                                                                )x 2.25 x 1 = 0.00 x 2.25 x 1 =
                                                                                                                                     0.00 m<sup>2</sup>
                                                                                                                                    Gross Wall Areas
                                                                                                                                                          71.70 m<sup>2</sup>
```

Total Gross Wall Areas

337.29 m²

```
Total Glazing Area (Window + Balcony) Calculation
                                                                                                                                                                                  Sheet no. 2
                                                                                                                        Glazing heights (Residential Units):
                                                                                                                        G/F (Window GL02) - A
                                                                                                                                                              3.05 m
                                                                                                                                                                                storey)
                                                                                                                        G/F (Window GL02) - B
                                                                                                                                                     =
                                                                                                                                                              3.15 m
                                                                                                                                                                                storey)
                                                                                                                                                              2.66 m
                                                                                                                        1/F (Window GL02) - C
                                                                                                                                                      =
                                                                                                                                                                                storey)
                                                                                                                        1/F (Window GL02) - D
                                                                                                                                                              2.74 m
                                                                                                                                                                             1
                                                                                                                                                                                storey)
West Elevations (House 16) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
                                                                                                       )x 3.05 x 1 =
G/F (Window GL02) - A
                                   8.50
                                                                                                                           8.50 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              25.88 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                       )x 3.15 x 1 =
                                                                                                                           0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                   7.50 + 4.50
                                                                                                       )x 2.66 x 1 =
                                                                                                                          12.00 x
                                                                                                                                      2.66 \times 1 =
                                                                                                                                                              31.86 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                       )x 2.74 x 1 = 0.00 x 2.74 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                    57.74 m<sup>2</sup>
North Elevations (House 16) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   7.70
                                                                                                       )x 3.05 x 1 =
                                                                                                                           7.70 \times 3.05 \times 1 =
                                                                                                                                                              23.45 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                       )x 3.15 x 1 =
                                                                                                                           0.00 x
                                                                                                                                      3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                    2.80 + 5.40
                                                                                                       )x 2.66 x 1 =
                                                                                                                           8.20 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              21.77 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                       )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                    45.22 m<sup>2</sup>
East Elevations (House 16)
                                  Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   2.80
                                                                                                       )x 3.05 x 1 =
                                                                                                                           2.80 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                               8.53 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                           0.00 x
                                                                                                                                      3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                       )x 3.15 x 1 =
G/F (Window GL02)
                                                                                                       )x 0.86 x 1 =
                                                                                                                           0.00 x
                                                                                                                                       0.86 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02)
                                   0.70 + 2.20 + 3.10
                                                                                                       )x 2.64 x 1 =
                                                                                                                           2.90 x
                                                                                                                                       2.64 \times 1 =
                                                                                                                                                               7.66 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                    16.18 m<sup>2</sup>
South Elevations (House 16) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   0.50 + 2.60
                                                                                                       )x 3.05 x 1 =
                                                                                                                           3.10 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                               9.44 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                       )x 3.15 x 1 =
                                                                                                                           0.00 x
                                                                                                                                       3.15 \times 1 =
                                                                                                                                                               0.00 \text{ m}^2
1/F (Window GL02) - C
                                                                                                       )x 2.66 x 1 =
                                                                                                                           0.00 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                               0.00 \, m^2
                                                                                                                                                               0.00 \text{ m}^2
1/F (Window GL02) - D
                                                                                                       )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
```

Gross Glazing Areas Total Gross Glazing Areas **128.58** m²

9.44 m²

West Elevations (House 16)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	zing Areas) (Ao) at West Elevations (House 16)	=	96.75 m²
Glazing Areas at	West Elevations (House 16)	=	57.74 m²
Breakdown of Glazin Glazing Areas	ng Areas Unshaded (W-F1) ECS =	= 1.000	36.26 m ²
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.15 x 3.05 = 9.61 m ²	=	9.61 m²
Glazing Areas	OPF 1.90 / 3.05 = 0.62 ECS = 0.666 Shaded by Built-Fin (Projection on Right) (W-F3) (W-F3) Glazing Area = Length of Glazing 4.50 x Glazing Height x No. of Storeys = 11.88 m² SPF 1.60 / 4.28 = 0.37 ECS = 0.989	Ξ	11.88 m²
Opaque Wall Areas		=	39.01 m²
Breakdown of Opaq RC Wall Areas	ue wali Areas (W-W1)	=	39.01 m²

57.74

96.75

0.60

Sheet no. 3

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 16)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
		_

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

3.42

W/m²K

W-W1	Description:			RC Wall Are	eas	
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	/	2.9	=	0.010
12mm cement/ sand render		0.012	/	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	/	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
Tota	al					0.293

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	4	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	i, Ngau Tam Mei, Yuen Long (House 16)	
	•		
Facade Orientation Facing	West	Gross Wall Area (Ao) =	96.75
Window to Wall Ratio (WWR)	0.60	Wall Orientation Factor (Gw) =	1.131

Components / Details		Code No.			
Description	Units	W-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	39.01			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	4.95			

Heat Conduction through Opaque Wall	s =	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	4.95	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing					
Components / Details	Code No.				
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	57.74	9.61	11.88	
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.75	0.13	0.15	

Heat Conduction through Glazing	= 0.6	64 (Afi/Ao) L	Jfi Gw	where i= 1, 2,, n
	=	1.03	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details	Code No.				
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	36.26	9.61	11.88	
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43	
Visible Light Transmittance (VLT)	%	53	53	53	
External Reflectance (ER)	%	17	17	17	
External Shading Miltiplier (ESC)		1.00	0.67	0.99	
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	7.61	1.34	2.47	

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 11.42 W/m^2

Summary of RTTV at West Elevations (House 16)

North Elevations (House 16)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 16)

Glazing Areas at North Elevations (House 16) = 45.22 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 45.22 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 16) = 49.88 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (N-W1) = 49.88 m²

Window to Wall Ratio (WWR) = 45.22 / 95.10 = **0.48**

Sheet no. 5

(Refer to Table 9)

Wall Orientation Factor Gw = 0.79

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 16)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to Table 2)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to Table 2)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials
 K Thermal conductivity of building materials (Refer to **Table 1**)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Tota	I				0.293

Uw1 = ____1 = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	6	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	5, Ngau Tam Mei, Yuen Long (House 16)	
	•		
Facade Orientation Facing	North	Gross Wall Area (Ao) =	95.10
Window to Wall Ratio (WWR)	0.48	Wall Orientation Factor (Gw) =	0.79

Components / Details		Code No.				
Description	Units	N-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	49.88				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	4.50				

Heat Conduction through Opaque Wall	s =	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	4.50	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing						
Components / Details		Code No.				
Description	Units	N-F1				
Glazing Type		Tinted				
Thickness	m	0.01				
Glazing Area (Afi)	m²	45.22				
U-value of Glazing (Ufi)	W/m²K	1.74				
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.42				

Heat Conduction through Glazing	= 0.64	4 (Afi/Ao)	Ufi Gw	where i= 1, 2,, n
	=	0.42	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	N-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	45.22			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	6.74			

Solar Radiation through Glazing	=	41.75 (Afi/Ao)(SCfi)(ESCwi)Gw	where i= 1, 2,, n
	=	6.74	W/m²	

Summary of RTTV at North Elevations (House 16)

East Elevations (House 16)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 16)

Glazing Areas at East Elevations (House 16) = 16.18 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 16.18 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 16) = 57.56 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(E-W1) = 57.56 m²

Window to Wall Ratio (WWR) = 16.18 / 73.74 = 0.22

Sheet no. 7

(Refer to Table 9)

Wall Orientation Factor Gw = 1.072

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 16)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials
 k Thermal conductivity of building materials (Refer to Table 1)

E-W1 Description: RC Wall Areas

	D 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

Uw1 = ____1 = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	8	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	i, Ngau Tam Mei, Yuen Long (House 16)	
	•		
Facade Orientation Facing	East	Gross Wall Area (Ao) =	73.74
Window to Wall Ratio (WWR)	0.22	Wall Orientation Factor (Gw) =	1.072

Components / Details		Code No.				
Description	Units	E-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	57.56				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	9.08				

Heat Conduction through Opaque Walls	; =	3.57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, r
	=	9.08	W/m²	

Components / Details		Code No.		
Description	Units	E-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	16.18		
U-value of Glazing (Ufi)	W/m²K	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.26		

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw			where i= 1, 2,, n
	=	0.26	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	E-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	16.18			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	4.22			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 4.22 W/m²

Summary of RTTV at East Elevations (House 16)

South Elevations (House 16)

Gross Wall Areas 71.70 m² (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 16) Glazing Areas at South Elevations (House 16) 9.44 m² **Breakdown of Glazing Areas Glazing Areas** Unshaded (S-F1) 9.44 m² ECS = 1.000

Opaque Wall Areas at South Elevations (House 16) 62.26 m²

Breakdown of Opaque Wall Areas RC Wall Areas (S-W1) 62.26 m²

Window to Wall Ratio (WWR) = 9.44 71.70 0.13 Sheet no. 9

Wall Orientation Factor

Gw = 0.975

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 16)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity =

0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to Table 2) Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

S-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	, Ngau Tam Mei, Yuen Long (House 16)	
Facade Orientation Facing	South	Gross Wall Area (Ao) =	71.70
Window to Wall Ratio (WWR)	0.13	Wall Orientation Factor (Gw) =	0.975

Components / Details		Code No.			
Description	Units	S-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (αwi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	62.26			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	9.19			

Heat Conduction through Opaque Wall	ls = 3	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	9.19	W/m²	

Components / Details	Code No.		
Description	Units	S-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	9.44	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.14	

Heat Conduction through Glazing	=	0.64 (Afi/Ao) Ufi Gw	where i= 1, 2,, n
	=	0.14 W/m ²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	S-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	9.44			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	2.30			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n

= 2.30 W/m²

Summary of RTTV at South Elevations (House 16)

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 16)	,
		·

Overall Gross Wall Area [a] 337.29 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	96.75	4.95	1.03	11.42	17.40	4.99
North	95.10	4.50	0.42	6.74	11.66	3.29
East	73.74	9.08	0.26	4.22	13.57	2.97
South	71.70	9.19	0.14	2.30	11.64	2.47
			·			
				_		

Overall RTTVwall = 13.72 W/m²

< 14 W/m²

OK

Roof

Upper Roof

Sheet no	12

Gross Roof Areas (Opaque Walls + Sk	ylight Areas) (Aro) at	ı	Roof			=	162.62 m²
Skylight Areas at	Roof					=	0.00 m ²
Breakdown of Skyli	ght Areas						
Skylight Areas	Unshaded	(S 1)		=	0.00 m ²
• • •							400.00
OpaqueAreas at	Roof					=	162.62 m ²
Breakdown of Opag	ue Roof Areas	,					
RC Roof Areas		(R1) =	34.63 m²	=	156.50 m ²
Roof				=	87.07 m²		
Upper Roof				=	34.80 m ²		
Breakdown of Opag	ue Roof Areas						
RC Roof Areas 1/F		(R2) =	m²	=	6.12 m ²
1/1				-			

6.12 m²

m²

Poof	Orientation	Factor	

Gs = 2.16

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

Roof

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8

Average Absorptivity =

0.896

'U' value of Opaque Roof Areas

U = $1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$

where Ri Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
To	otal				1.858

$$Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$$

_R2	Description	:		Root Area		
Roof Material						
External surface film resistance				Ro	=	0.055
Air space resistanace				Ra	=	0
50mm cement/ sand screed		0.05	1	0.72	=	0.069
50mm expanded polystyrene		0.05	1	0.034	=	1.471
150mm concrete slab		0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.162
	Total					1.836

$$Uw1 = \frac{1}{1.836} = 0.54 \text{ W/m}^2\text{K}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	, Ngau Tam Mei, Yuen Long (House 16)	
	•		
Roof Orientation Facing	Flat	Gross Roof Area (Aro) =	162.62
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) =	2.16

Components / Details			Code No.	
Description	Units	R1	R2	
External Finish Material		25mm Unglazed	10mm	
Conductivity	W/mK	1.10	1.10	
Thickness	m	0.025	0.010	
Average Absorptivity (awi)	(a)	0.9	0.8	
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed	
Conductivity	W/mK	0.72	0.72	
Thickness	m	0.050	0.050	
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene	
Conductivity	W/mK	0.034	0.034	
Thickness	m	0.05	0.05	
Intermediate component		150mm concrete slab	150mm concrete slab	
Conductivity	W/mK	2.16	2.16	
Thickness	m	0.15	0.15	
Intermediate component				
Conductivity	W/mK			
Thickness	m			
Internal Finish Material				
Conductivity	W/mK	0.38	0.38	
Thickness	m	0.01	0.01	
U-value of the Roof (Uri)	W/m²K	0.53	0.53	
Opaque Roof Area (Ari)	m²	156.50	6.12	
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.44	0.12	

Heat Conduction through Opaque Roo	f = 3.47(A)	Ari/Aro) Uri α	ri Gs	where i= 1, 2,, n
	=	3.56	W/m²	

Components / Details			Code	e No.	
Description	Units	S 1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
U-value of Skylight Glazing (Usi)	W/m²K	-			
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00			

Heat Conduction through Skylight	t = 0.40	(Asi/Aro)	Usi Gs	where i= 1, 2,, n
	=	0.00	W/m²	

Part 3 - Calculation of Solar Radiation through Skylight					
Components / Details		Code No.			
Description	Units	S1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
Shading Coefficient of Skylight Glazing (SCr)		-			
Visible Light Transmittance (VLT)		-			
External Reflectance (ER)		-			
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00			

Solar Radiation the	rough	Skylight	= 41.10 (Asi = 0.00	/Aro) (SCri) Gs W/m²	where i= 1, 2	,, n
Summary of RTTV	at Ro	oof				
	=	3.56	+	0.00	+	0.00
	=	3.56	W/m²			

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 16)	

Overall Roof Area [a] 162.62 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	162.62	3.56	0.00	0.00	3.56	3.56

Overall RTTVroof =	3.56	W/m²	
<	4	W/m²	OK

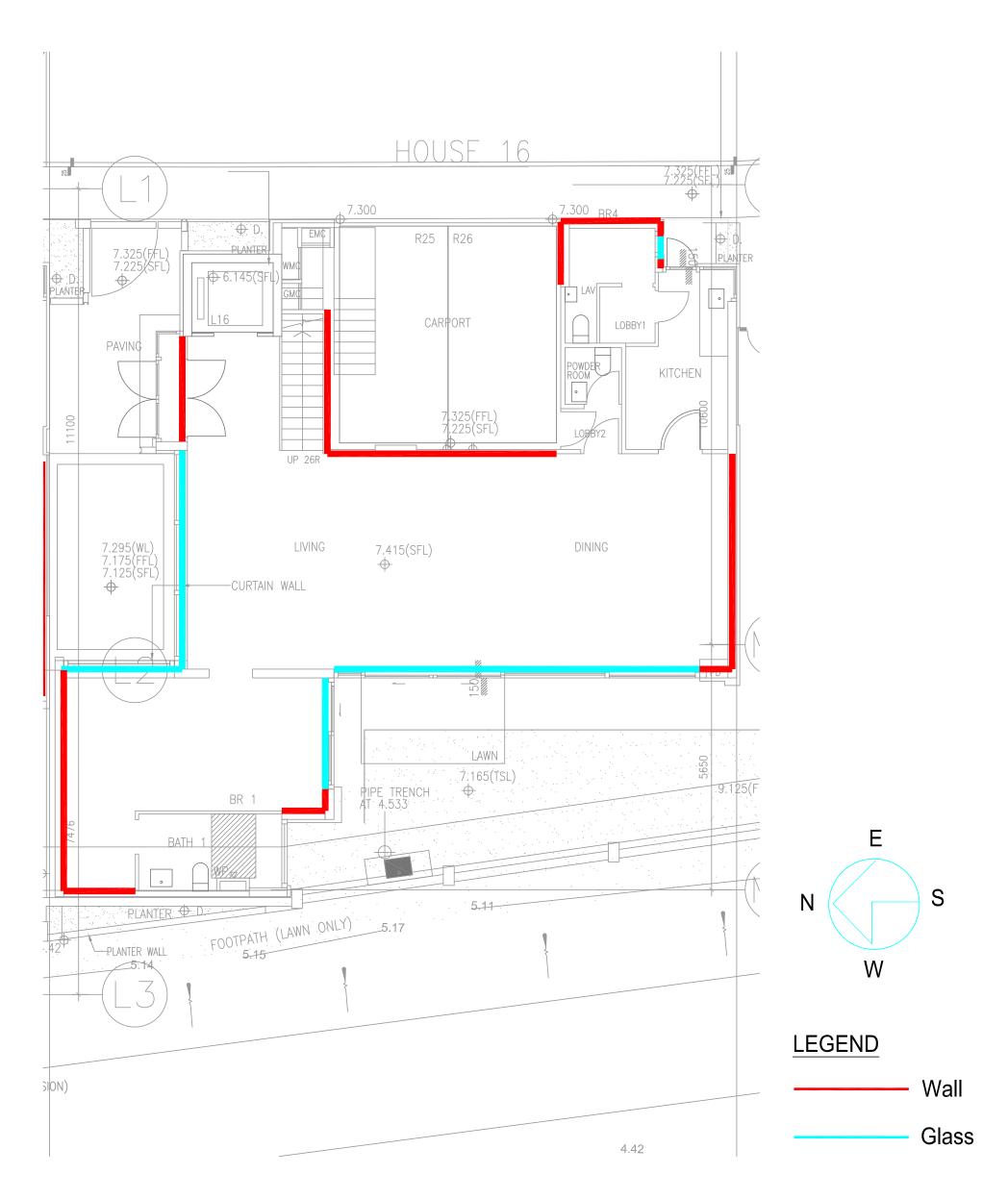
RTTV Summarv Sheet

																					BD 2/9179/15
Building Type:		Residential																			
RTTV Calculate	ed by:	✓ 1. Re	egistered Prof	fessional	Thoma	Anderson	& Partners	Consulting Er	ngineers L	d.											
		2. Ar	chitect																		
		3. Ot	hers, please s	specify:-																	
No. of Storeys (Residential Un	its)	2																			
Table 1																					
									Deer	ned to	Satisfy RT	TV									
Facade Orientat	tion Facing		West		Nort			East	Dec.	100	South	- Wall			1			1			
Average Absorp			0.795		0.8			0.8			0.8										
	w to Wall Ratio		0.51		0.37			0.18			0.23										
	cient of Glazing		0.43		0.43			0.43			0.43										
Average Shadir Facade	ng Coefficient of		0.43		0.43			0.43			0.43										
Visable Light T	ransmittance		53	%	53	%		53	%		53	%			%		%			%	%
External Reflec	tance		17	%	17	%		17	%		17	%			%		%			%	%
Table 2															•					•	
										R	TTV _{Wall}										
Facade Orientat	tion Facing	West					North						East					South			
Wall Orientation	n Factor			1.131					0.79						1.072					0.975	
Total External V	Wall Area		120.0	m ²	Window to Wa	ll Ratio		63.1	m ²	Windo	w to Wall	Ratio		46.4	m ² V	/indow to Wa	all Ratio		78.1	m ²	Window to Wall Ratio
(Residential Un	its)																				
Total Window A			61.73	m²		.51		23.37	m ²	=	0.3	7		8.25	m ² =		0.18		18.12	m ²	= 0.23
Heat Conduction	Opaque Wall		4.95		W/m ²			4.50			W/m ²			9.08		W/m ²			9.19		W/m ²
Conduction	Window		1.03		W/m ²			0.42			W/m ²			0.26		W/m ²			0.14		W/m ²
Window	Glass Type	D. G i	Area =	SC	VLT =	%	,	Area =	SC		VLT=			Area =	SC	VLT=	%		Area =	SC	VLT = %
			m ²	=	ER =	%	Reflective	m ²	=		ER =	%	Reflective	m ²	=	ER =	%	Reflective	m ²	=	ER = %
			Area = 6	1.73 SC	0.43 VLT =	53 %	Z Tinted	Area = 23	3.37 SC	0.43	VLT =	53 %	Z Tinted	Area = 8.2	5 SC (0.43 VLT=	53 %	✓ Tinted	Area = 18.	12 SC	0.43 VLT = 53 %
			m ²	=	ER =	17 %		m ²	=		ER =	17 %	•	m ²	=	ER =	17 %		m ²	=	ER = 17 %
		Clear	Area =	SC	VLT =	%	Clear	Area =	SC		VLT=		Clear	Area =	SC	VLT=	%	Clear	Area =	SC	VLT = %
			m ²	=	ER =	%		m ²	=		ER =	%		m ²	=	ER =	%	-	m ²	=	ER = %
	Double	✓ Yes		No			✓ Yes		No				✓ Yes	N	io.			✓ Yes		Jo	
	Glazing	<u></u>		140			<u>∠</u> 103		140						0			<u></u>	ш.	10	
		Odi	[Z] v		r-		O	□ v	[7] >	r -			O		[Z] N			O	□ v	[Z] N	
	External Shading	Overhang	Z Yes	□ N			Overhang	Yes	Z 1				Overhang	Yes	Z No			Overhang	Yes	Z No	
		Sidefin	∠ Yes	□ N			Sidefin	☐ Yes	Z	10	2		Sidefin	Yes	Z No	2		Sidefin	☐ Yes	Z No	
Solar Radiation Gazing	through		11.42		W/m ²			6.74			W/m ²			4.22		W/m ²			2.30		W/m ²
Average Absorp				0.795					0.795						0.795					0.795	
RTTV _{Wall} at eac			17.40		W/m ²			11.66			W/m ²			13.57		W/m ²			11.64		W/m ²
Overall RTTV _w	/all										13.72		W/m ²								
Table 3																					
										R	TTV _{Roof}										
Roof Orientatio	n Factor		2.16	_																	
Total Roof Area	a (Residential	(162.62)	m ²																
Units)			ノレ	ノ																	
Total Skylight A	Area		~		m ²																
Heat	Roof	(3.56	7	W/m ²																
Conduction	Skylight	_		/ 	W/m ²																
	Glass Type	Reflecti	ive Ar	ea =				m ² SC	· =					VLT	_			%	ER =		%
	Glass Type	☐ Tinted												VLT				%	ER =		%
				ea =																	
		Clear		ea =				m ² SC	:=					VLT	=			%	ER =		%
	Double Glazing	☐ Yes		No																	
	External	☐ Yes		No																	
	Shading																				
Solar Radiation	through Gazing	_	0		W/m ²																
Average Absorp		(0.8																		
Overall RTTV _R			3.56)	W/m ²																

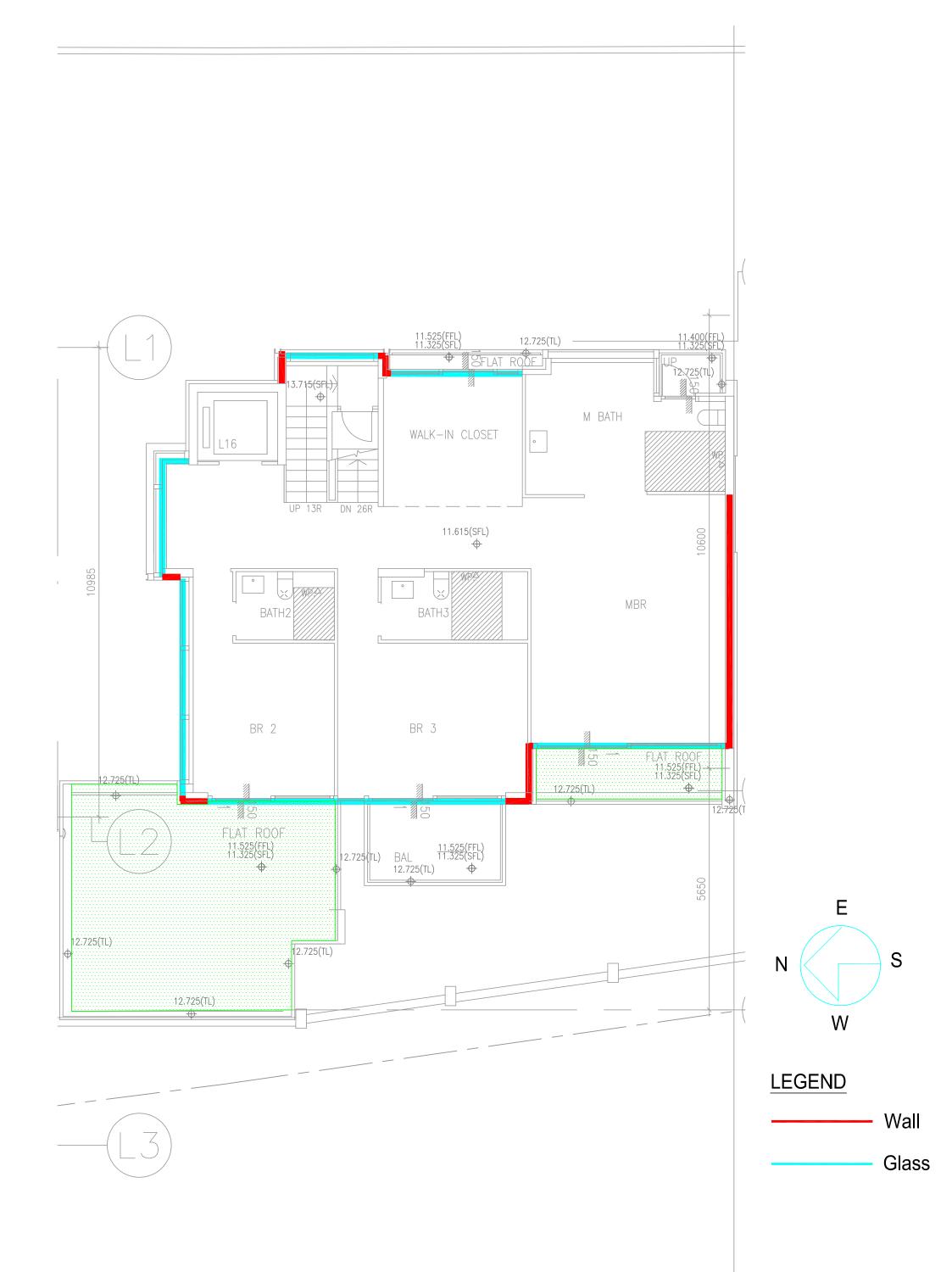
ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance

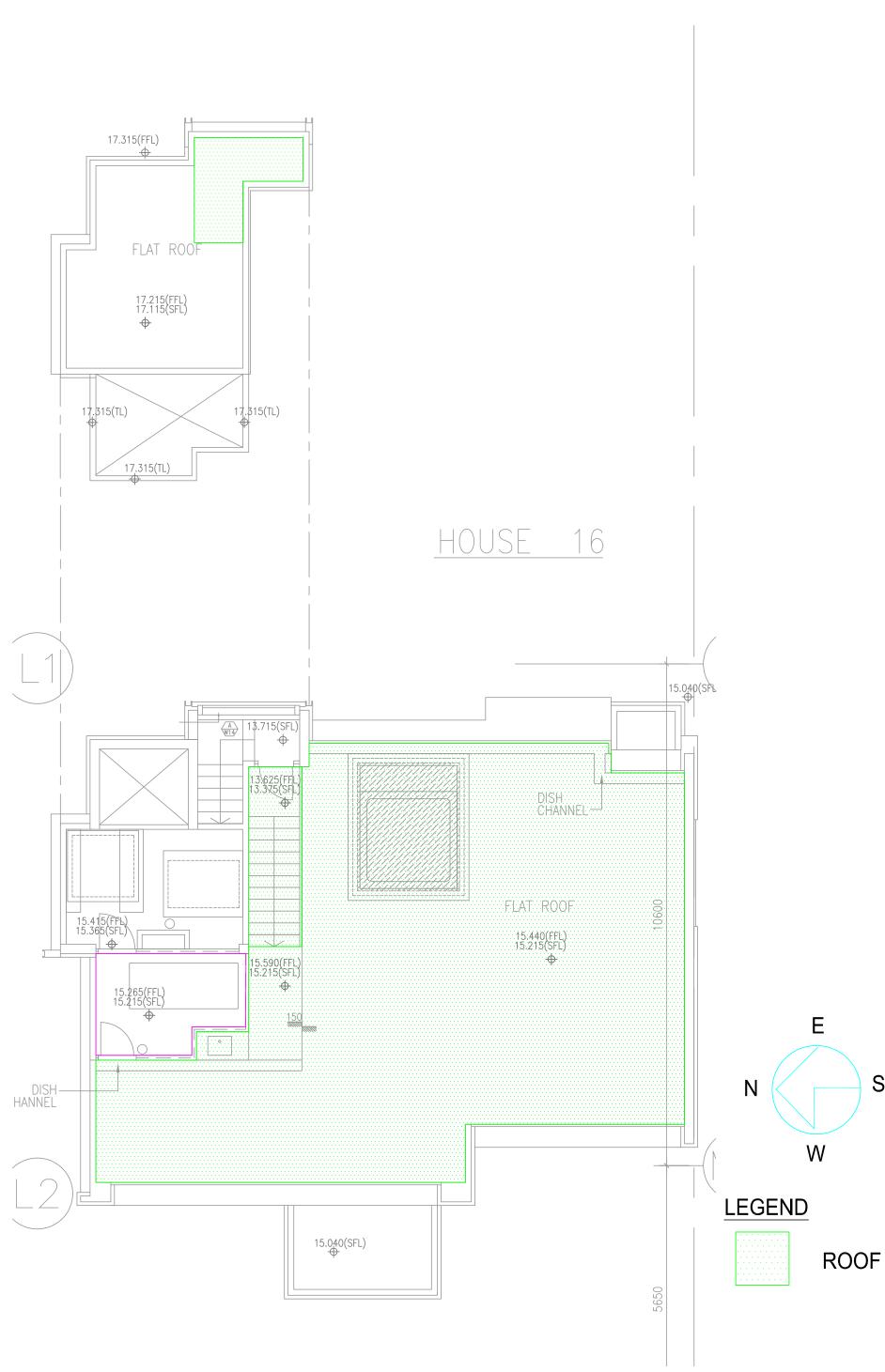
Address:

Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 16)

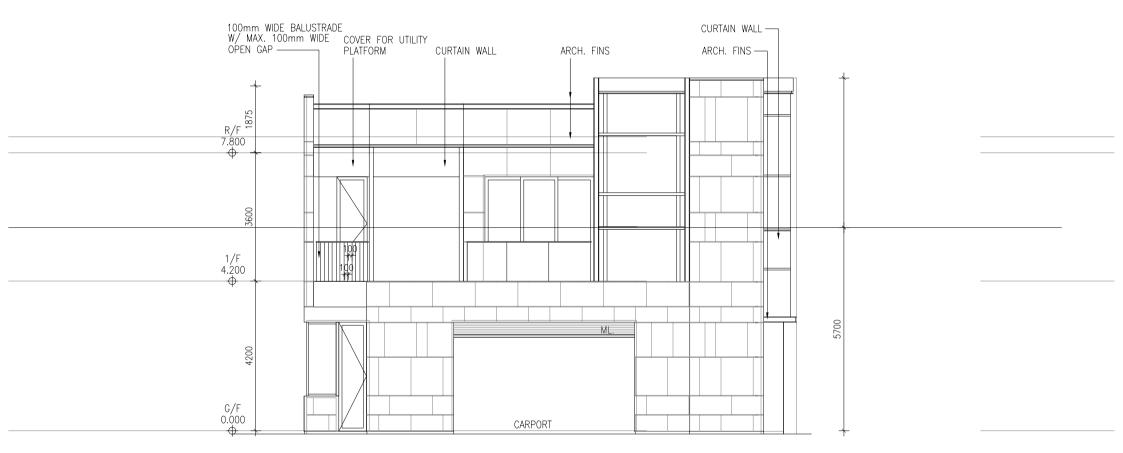


DRAWING TITLE: HOUSE 16 GROUND FLOOR PLAN SCALE: 1:150@A4

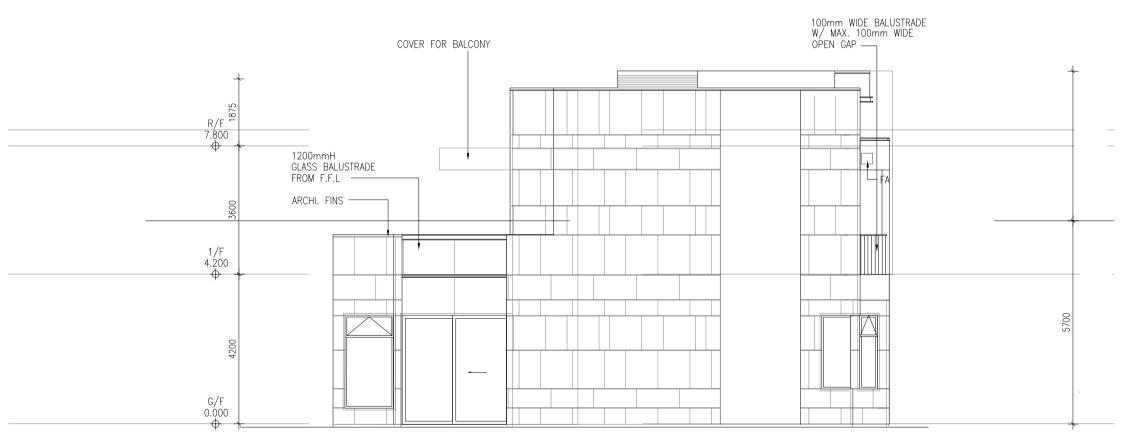




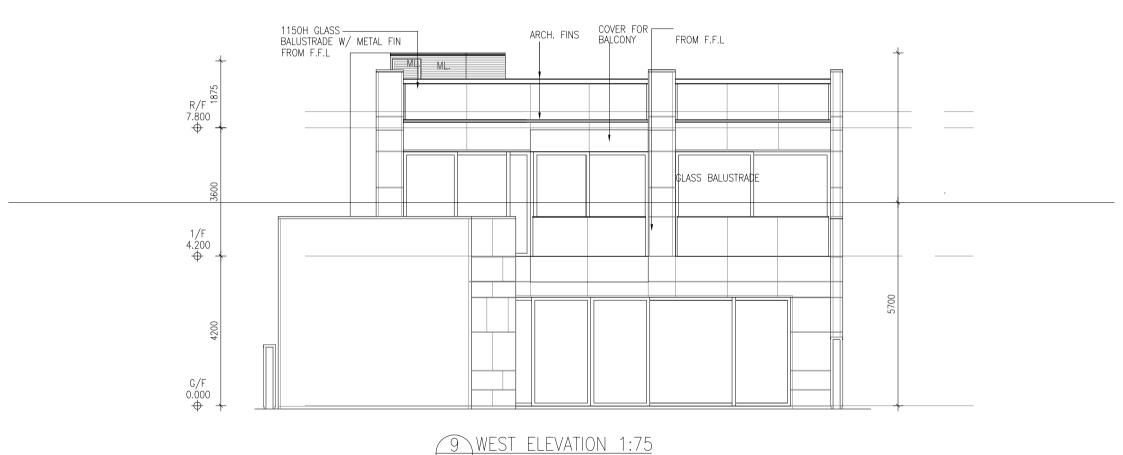
DRAWING TITLE: HOUSE 16 ROOF FLOOR PLAN SCALE: 1:150@A4



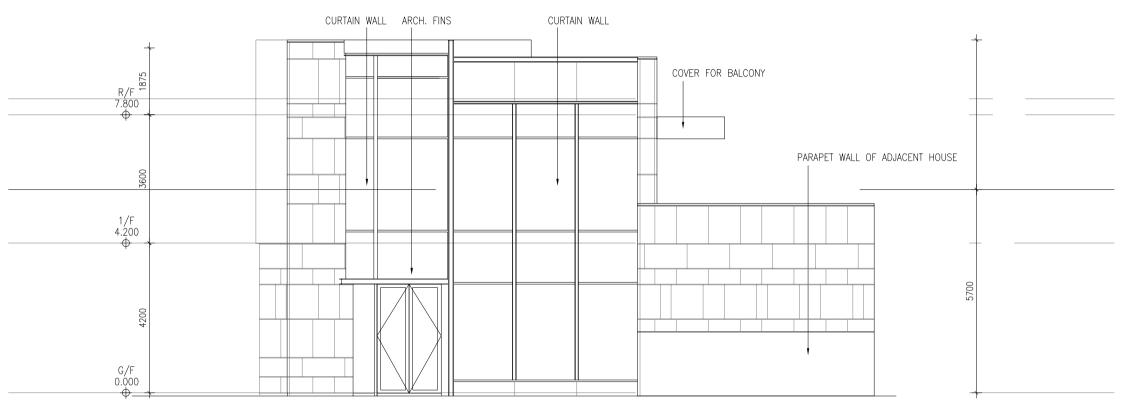
1 EAST ELEVATION 1:75 HOUSE 16



7 SOUTH ELEVATION 1:75
- HOUSE 16

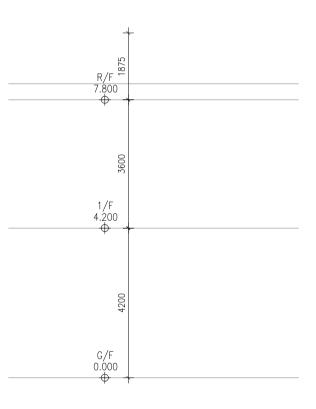


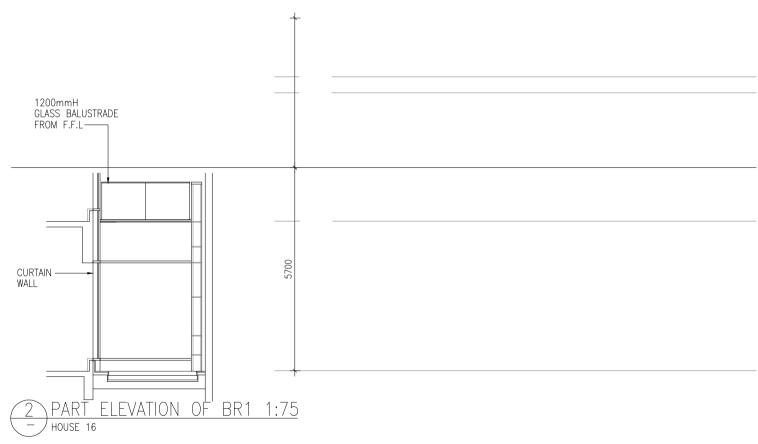
HOUSE 16

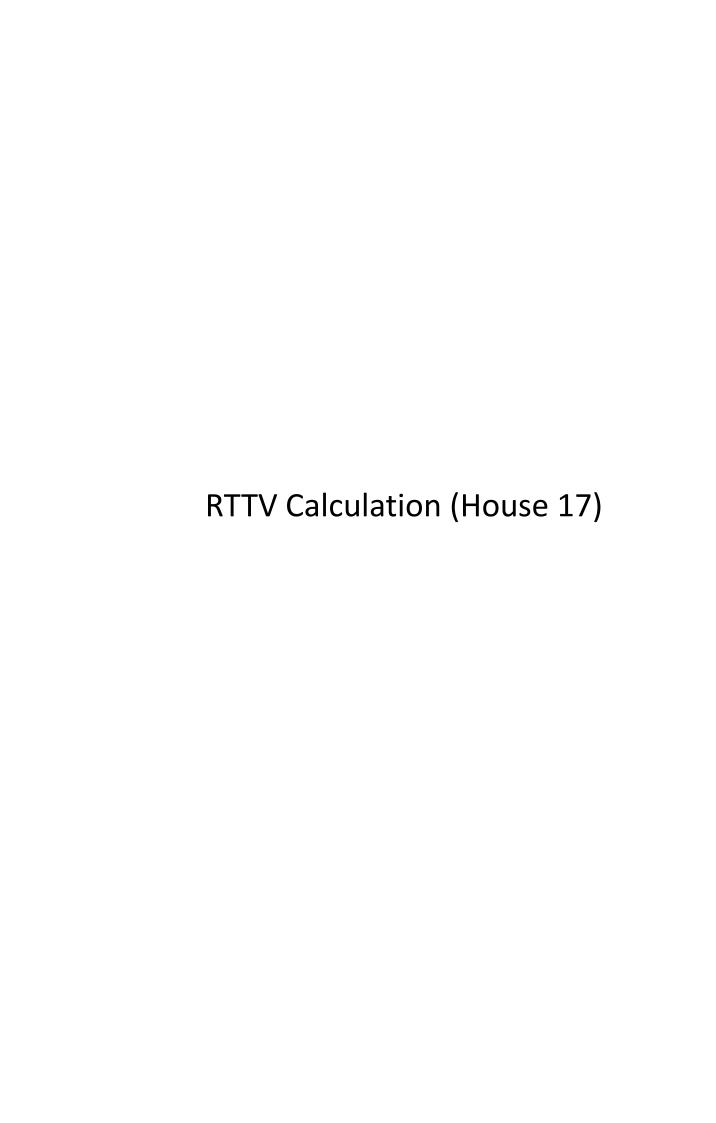


8 NORTH ELEVATION 1:75

- HOUSE 6







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Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                          Sheet no. 1
                                                                                 Storey heights (Residential Units):
                                                                                 G/F
                                                                                                                       4.20 m
                                                                                                                                     1 storey)
                                                                                 1/F
                                                                                                                       3.60 m
                                                                                                                                  ( 1 storey)
                                                                                 R/F
                                                                                                                       1.90 m
                                                                                                                                   ( 1 storey)
West Elevations (House 17) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                                                )x 4.20 x 1 =
                                                                                    8.40 \times 4.20 \times 1 =
                                                                                                                      35.28 m<sup>2</sup>
1/F
                                  2.50 + 3.70
                                                                )x 3.60 x 1 =
                                                                                    6.20 x
                                                                                               3.60 \times 1 =
                                                                                                                      22.32 m<sup>2</sup>
R/F
                                                                )x 1.90 x 1 =
                                                                                    0.00 \times 1.90 \times 1 =
                                                                                                                       0.00 m<sup>2</sup>
                                                                                                                      Gross Wall Areas
                                                                                                                                            57.60 m<sup>2</sup>
North Elevations (House 17) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                 ( 4.80
                                                                )x 4.20 x 1 =
                                                                                  4.80 \times 4.20 \times 1 =
                                                                                                                      20.16 m<sup>2</sup>
1/F
                                 (3.50 + 1.00)
                                                                )x 3.60 x 1 =
                                                                                    4.50 \times 3.60 \times 1 =
                                                                                                                      16.20 m<sup>2</sup>
R/F
                                                                )x 1.90 x 1 =
                                                                                   0.00 \times 1.90 \times 1 =
                                                                                                                       0.00 m<sup>2</sup>
                                                                                                                      Gross Wall Areas
                                                                                                                                             36.36 m<sup>2</sup>
East Elevations (House 17) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                 (1.10 + 1.90)
                                                                )x 4.20 x 1 =
                                                                                    3.00 x
                                                                                               4.20 \times 1 =
                                                                                                                      12.60 m<sup>2</sup>
1/F
                                 (2.50 + 2.15)
                                                                )x 3.60 x 1 =
                                                                                    4.65 x
                                                                                               3.60 \times 1 =
                                                                                                                      16.74 m<sup>2</sup>
R/F
                                                                )x 1.90 x 1 =
                                                                                    0.00 \times 1.90 \times 1 =
                                                                                                                       0.00 m<sup>2</sup>
                                                                                                                      Gross Wall Areas
                                                                                                                                            29.34 m<sup>2</sup>
South Elevations (House 17) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                (6.25 + 2.00)
                                                                )x 4.20 x 1 =
                                                                                    8.25 \times 4.20 \times 1 =
                                                                                                                      34.65 m<sup>2</sup>
1/F
                                                                )x 3.60 x 1 =
                                                                                               3.60 x 1 =
                                 (1.80 + 4.00)
                                                                                    5.80 x
                                                                                                                      20.88 m<sup>2</sup>
R/F
                                                                )x 1.90 x 1 = 0.00 x 1.90 x 1 =
                                                                                                                       0.00 m<sup>2</sup>
                                                                                                                      Gross Wall Areas
                                                                                                                                             55.53 m<sup>2</sup>
```

Total Gross Wall Areas 178.83 m²

Glazing heights (Residential Units):

G/F (Window GL02) - A = 3.05 m (1 storey) 1/F (Window GL02) - B = 2.64 m (1 storey)

West Elevations (House 17) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys

G/F (Window GL02) - A (8.00)x 3.05 x 1 = 8.00 x 3.05 x 1 = 24.36 m² 1/F (Window GL02) - B (2.45 + 2.15)x 2.64 x 1 = 4.60 x 2.64 x 1 = 12.12 m²

Gross Glazing Areas 36.48 m²

Sheet no. 2

North Elevations (House 17) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys

Gross Glazing Areas 0.00 m²

East Elevations (House 17) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys

G/F (Window GL02) - A (1.80)x 3.05 x 1 = 1.80 x 3.05 x 1 = 5.48 m² 1/F (Window GL02) - B (2.50 + 2.10)x 2.64 x 1 = 4.60 x 2.64 x 1 = 12.12 m²

Gross Glazing Areas 17.60 m²

South Elevations (House 17) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys

Gross Glazing Areas 0.00 m²

Total Gross Glazing Areas 54.08 m²

West Elevations (House 17)

Window to Wall Ratio (WWF =

Gross Wall Areas 57.60 m² (Opaque Walls + Glazing Areas) (Ao) at West Elevations (House 17) West Elevations (House 17) 36.48 m² Glazing Areas at **Breakdown of Glazing Areas Glazing Areas** Unshaded (**W-F1**) = 19.46 m² ECS = 1.000 **Glazing Areas** Shaded by Cover of Balcony (W-F2) = 9.76 m² Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.20 x 3.05 G/F 9.76 m² OPF 1.50 / 3.05 = 0.49 **ECS** = 0.714 **Glazing Areas** Shaded by Built-Fin (Projection on Right) W-F3 7.26 m² Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 1/F 2.75 x 2.64 7.26 m² SPF 2.13 / 2.28 = 0.94 **ECS** = 0.971 **Opaque Wall Areas at** West Elevations (House 17) 21.12 m² **Breakdown of Opaque Wall Areas RC Wall Areas** (W-W1) 21.12 m²

36.48

57.60

0.63

	_
Sheet no.	2
SHEELIIU.	- J

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 17)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (Refer \ to \ Table \ 5)$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

W-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	/	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	/	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	4	BD Ref No.	BD 2/9179/15			
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 17)					
	•					
Facade Orientation Facing	West	Gross Wall Area (Ao) =	57.60			
Window to Wall Ratio (WWR)	0.63	Wall Orientation Factor (Gw) =	1.131			

Part 1 - Calculation of Heat Con							
Components / Details			Code No.				
Description	Units	W-W1					
External Finish Material		30mm Stone cladding					
Conductivity	W/mK	2.90					
Thickness	m	0.030					
Average Absorptivity (awi)	(a)	0.890					
Intermediate component		12mm cement/ sand render					
Conductivity	W/mK	0.72					
Thickness	m	0.01					
Intermediate component		200mm concrete wall					
Conductivity	W/mK	2.16					
Thickness	m	0.20					
Intermediate component							
Conductivity							
Thickness							
Intermediate component							
Conductivity							
Thickness							
Internal Finish Material		10mm AGT Tile					
Conductivity	W/mK	1.10					
Thickness	m	0.01					
U-value of Opaque Area (Uwi)	W/m²K	3.42					
Opaque Wall Area (Awi)	m²	21.12					
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	4.50					

Heat Conduction through Opaque Walls	3 =	3.57(Awi/Ao) Uwi a	иi Gw	where i= 1, 2,, n
	=	4.50	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing					
Components / Details		Code No.			
Description	Units	W-F1	W-F2	W-F3	
Glazing Type		Tinted	Tinted	Tinted	
Thickness	m	0.01	0.01	0.01	
Glazing Area (Afi)	m²	19.46	9.76	7.26	
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.43	0.21	0.16	

 $\begin{array}{ll} \mbox{Heat Conduction through Glazing} & = 0.64 \; (\mbox{Afi/Ao}) \; \mbox{Ufi Gw} & \mbox{where i= 1, 2, ..., n} \\ & = & 0.80 & \mbox{W/m}^2 \\ \end{array}$

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details	Code No.	Code No.				
Description	Units	W-F1	W-F2	W-F3		
Glazing Type		Tinted	Tinted	Tinted		
Thickness	m	0.01	0.01	0.01		
Glazing Area (Afi)	m²	19.46	9.76	7.26		
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43		
Visible Light Transmittance (VLT)	%	53	53	53		
External Reflectance (ER)	%	17	17	17		
External Shading Miltiplier (ESC)		1.00	0.71	0.97		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	6.86	2.46	2.48		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 11.80 W/m^2

Summary of RTTV at West Elevations (House 17)

= 4.50 + 0.80 + 11.80 = 17.10 W/m²

North Elevations (House 17)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 17) = 36.36 m²

Glazing Areas at North Elevations (House 17) = 0.00 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 0.00 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 17) = 36.36 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(N-W1) = 36.36 m²

Window to Wall Ratio (WWR) = 0.00 / 36.36 = 0.00

Sheet no. 5

Wall Orientation Factor Gw = 0.79 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 17)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

 $Uw1 = \frac{1}{0.293}$ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTVwall of Each Facade

Sheet No.	6	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105		
	•		
Facade Orientation Facing	North	Gross Wall Area (Ao) =	36.36
Window to Wall Ratio (WWR)	0.00	Wall Orientation Factor (Gw) =	0.79

Components / Details		Code No.				
Description	Units	N-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	36.36				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.58				

Heat Conduction through Opaque Walls =	onduction through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw					
=	=_	8.58	W/m²			

Components / Details		Code No.	
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	0.00	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.00	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw			where i= 1, 2,, n
	=	0.00 W/n	n²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	N-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	0.00			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	0.00			

Solar Radiation through Glazing	= 41.	75 (Afi/Ao)(SCfi)(ESCwi)Gw	where i= 1, 2,,	n	
	=	0.00	W/m²			
Summary of RTTV	at No	rth Elevat	ions (House 17)			
	=	8.58	+	0.00	+	0.00
	_	0 50	M/m²			

East Elevations (House 17)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 17)

Glazing Areas at East Elevations (House 17) = 17.60 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 17.60 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 17) = 11.74 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (E-W1) = 11.74 m²

Window to Wall Ratio (WWF = 17.60 / 29.34 = **0.60**

Sheet no. 7

Wall Orientation Factor

v = 1.072

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 17)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to **Table 2**)
Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

E-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance	_		Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total	-				0.293

 $Uw1 = \frac{1}{0.293}$ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	8 BD Ref No. BD 2/9179/1			
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 17)			
	•			
Facade Orientation Facing	East	Gross Wall Area (Ao) =	29.34	
Window to Wall Ratio (WWR)	0.60	Wall Orientation Factor (Gw) =	1.072	

Components / Details		Code No.				
Description	Units	E-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (αwi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	11.74				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	4.66				

Heat Conduction through Opaque Wall	s =	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	4.66	W/m²	

Components / Details		Code No.		
Description	Units	E-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	17.60		
U-value of Glazing (Ufi)	W/m²K	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.72		

Heat Conduction through Glazing	= 0.64	(Afi/Ao) l	Jfi Gw	where i= 1, 2,, n
	=	0.72	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	E-F1			
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	17.60			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	11.55			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 11.55 W/m^2

Summary of RTTV at East Elevations (House 17)

South Elevations (House 17)

Gross Wall Areas = 55.53 m²
(Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 17)

Glazing Areas at South Elevations (House 17) = 0.00 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 0.00 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 17) = 55.53 m²

Breakdown of Opaque Wall Areas

RC Wall Areas

(S-W1) = 55.53 m²

Window to Wall Ratio (WWR) = 0.00 / 55.53 = 0.00

Sheet no. 9

Wall Orientation Factor Gw = 0.975 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 17)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ Ri Surface film resistance of internal surface (Refer to **Table 2**) Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

S-W1 Description: RC Wall Areas Wall Material External surface film resistance Ro 0.044 Air space resistanace Ra 0 30mm Stone cladding 0.03 2.9 0.010 0.72 0.017 12mm cement/ sand render 0.012 200mm concrete wall 0.2 2.16 0.093 10mm AGT Tile 0.01 1.1 0.009 Internal surface film resistance Ri 0.12 0.293 Total

 $Uw1 = \frac{1}{0.293}$ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTVwall of Each Facade

Sheet No.	10	10 BD Ref No. BD 2/9179/15			
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 17)				
Facade Orientation Facing	South	Gross Wall Area (Ao) =	55.53		
Window to Wall Ratio (WWR)	0.00	Wall Orientation Factor (Gw) =	0.975		

Components / Details		Code No.				
Description	Units	S-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	55.53				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	10.58				

Heat Conduction through Opaque Wal	ls = 1	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	10.58	W/m²	

Components / Details		Code No.	
Description	Units	S-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	0.00	
U-value of Glazing (Ufi)	W/m²K	1.65	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.00	

Heat Conduction through Glazing	=	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n
	=	0.00 W/n	n²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details		Code No.				
Description	Units	S-F1				
Glazing Type		Tinted				
Thickness	m	0.01				
Glazing Area (Afi)	m²	0.00				
Shading Coefficient of Glazing (SCf)		0.43				
Visible Light Transmittance (VLT)	%	53				
External Reflectance (ER)	%	17				
External Shading Miltiplier (ESC)		1.00				
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	SCwi)Gw	0.00				

Solar Radiation through Glazing	= 41	.75 (Afi/Ao)(SCfi)(ESCwi)Gw	where i= 1, 2,	, n	
	=_	0.00	W/m²			
Summary of RTTV	at So	uth Eleva	tions (House 17)			
	=	10.58	+	0.00	+	0.00
	=	10.58	W/m²			

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 17)		

Overall Gross Wall Area [a] 178.83 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	57.60	4.50	0.80	11.80	17.10	5.51
North	36.36	8.58	0.00	0.00	8.58	1.74
East	29.34	4.66	0.72	11.55	16.92	2.78
South	55.53	10.58	0.00	0.00	10.58	3.29

Overall RTTVwall = 13.31 W/m²

< 14 W/m²

OK

_	^	^	٧.

Breakdown of Opaque Roof Areas

RC Roof Areas

Upper Roof

1/F Roof

Sheet no	12

Gross Roof Areas (Opaque Walls + Sk	xylight Areas) (Aro) at		Roof				=	84.37 m ²
Skylight Areas at	Roof						=	0.00 m ²
Breakdown of Skyli	ight Areas							
Skylight Areas	Unshaded	(S1)			=	0.00 m ²
OpaqueAreas at	Roof						=	84.37 m ²
Breakdown of Opac	que Roof Areas	,	D4	,			_	77 77 ²
RC Roof Areas 1/F		(R1) =		m²	=	77.77 m ²
Roof				=	47.87			
Upper Roof				=	29.90			

Roof Orientation Factor	Gs =	2.16	(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

Roof

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8

Average Absorptivity =

0.896

'U' value of Opaque Roof Areas

6.60 m²

6.60 m²

U = $1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$

 $where \ \ Ri \qquad \hbox{Surface film resistance of internal surface (Refer to \ \textbf{Table 2})}$

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
			•		
Tota					1.858

$$Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$$

R2	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
Т	otal				1.836

$$Uw1 = \frac{1}{1.836}$$
 = 0.54 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. BD	2/9179/15
Building Address	Lot 2115, D.D. 105, No	gau Tam Mei, Yuen Long (House 17)	
Roof Orientation Facing	Flat	Gross Roof Area (Aro) =	84.37
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) =	2.16

Components / Details			Code No.					
Description	Units	R1	R2	R2				
External Finish Material		25mm Unglazed Porcelain Tiles (Grey)	10mm AGT Tile (Brown)					
Conductivity	W/mK	1.10	1.10					
Thickness	m	0.025	0.010					
Average Absorptivity	(a)	0.9	0.8					
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed					
Conductivity	W/mK	0.72	0.72					
Thickness	m	0.050	0.050					
Intermediate component		50mm expanded polystyrene						
Conductivity	W/mK	0.034	0.034					
Thickness	m	0.05	0.05					
Intermediate component		150mm concrete slab	150mm concrete slab					
Conductivity	W/mK	2.16	2.16					
Thickness	m	0.15	0.15					
Intermediate component								
Conductivity	W/mK							
Thickness	m							
Internal Finish Material								
Conductivity	W/mK	0.38	0.38					
Thickness	m	0.01	0.01					
U-value of the Roof (Uri)	W/m²K	0.53	0.53					
Opaque Roof Area (Ari)	m²	77.77	6.60					
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.30	0.25					

Heat Conduction through Opaque Roo	f = 3.47	(Ari/Aro) Uri	ari Gs	where i= 1, 2,,
	=	3.54	W/m²	

Part 2 - Calculation of Heat Conduction through Skylight							
Components / Details		Code No.					
Description	Units	S1					
Skylight Glazing Type		-					
Thickness	m	-					
Skylight Area (Asi)	m²	0.00					
U-value of Skylight Glazing (Usi)	W/m²K	-					
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00					

Heat Conduction through Skylight =	where i= 1, 2,, n			
=	:	0.00	W/m²	

Part 3 - Calculation of Solar Radiation through Skylight								
Components / Details		Code No.						
Description	Units	Jnits S1						
Skylight Glazing Type		-						
Thickness	m	-						
Skylight Area (Asi)	m²	0.00						
Shading Coefficient of Skylight Glazing (SCr)		-						
Visible Light Transmittance (VLT)		-						
External Reflectance (ER)		-						
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00						

Solar Radiation th	rough	Skylight	= 41.10 (A	si/Aro) (SCri) Gs	where i= 1, 2,	, n
			= 0.00)W/m²		
Summary of RTTV	at Ro	of				
	=	3.54	+	0.00	+	0.00
	=	3.54	W/m²			

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. <u>BD 2/9179/15</u>	
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 17)		

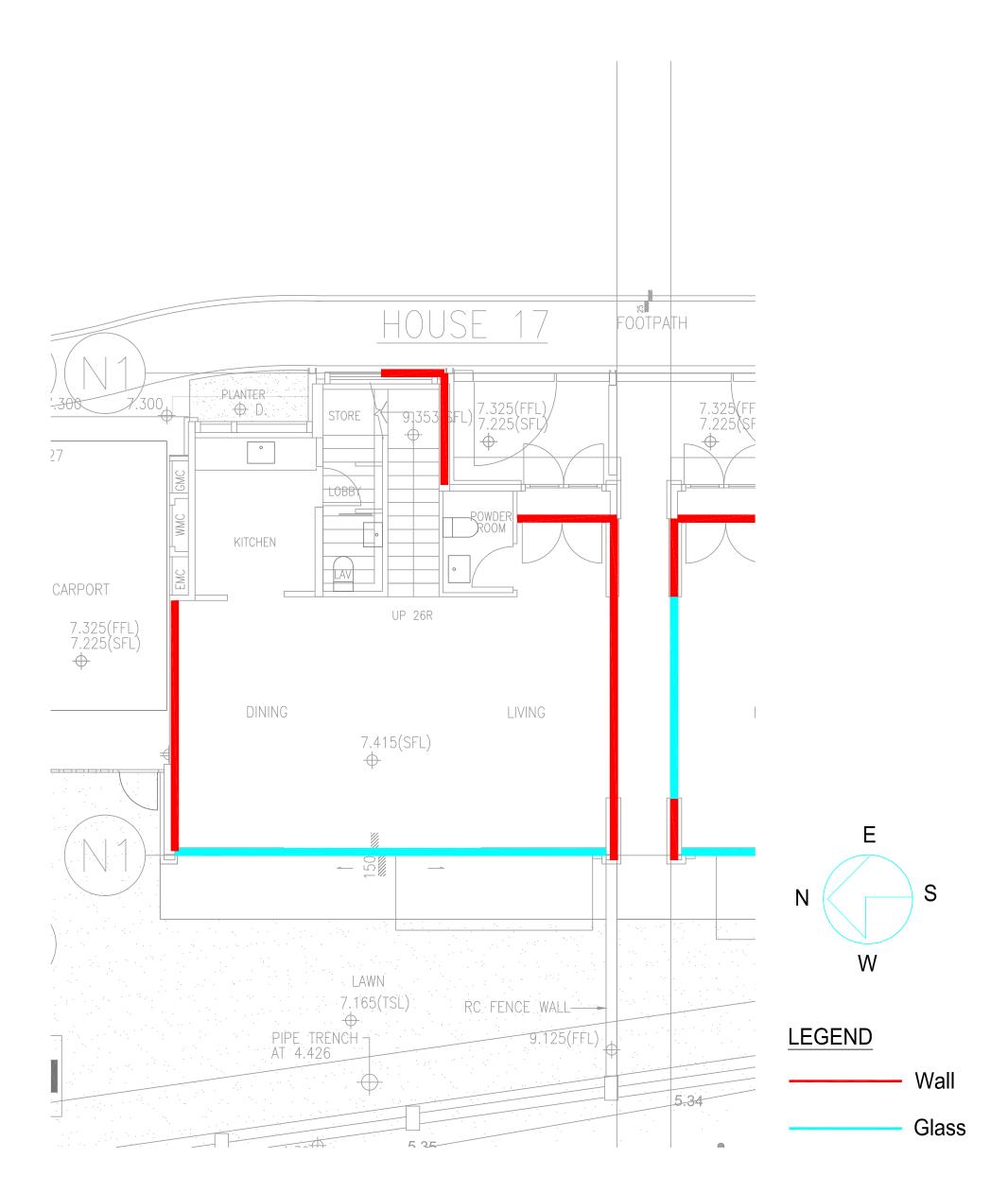
Overall Roof Area [a] 84.37 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
Flat Roof	84.37	3.54	0.00	0.00	3.54	3.54

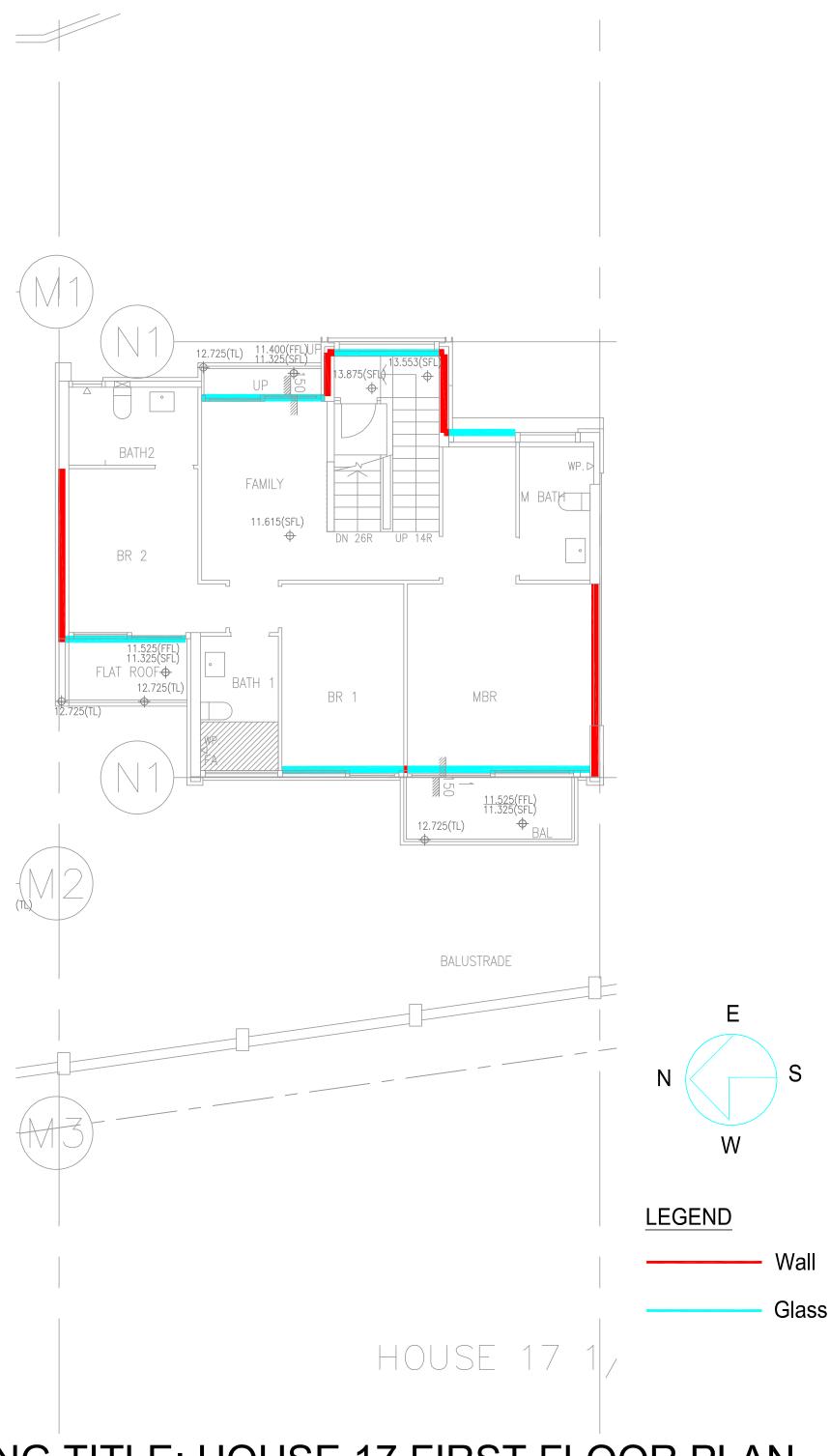
Overall RTTVroof =	3.54	W/m²	
<	4	W/m²	Ok

RTTV Summary Sheet

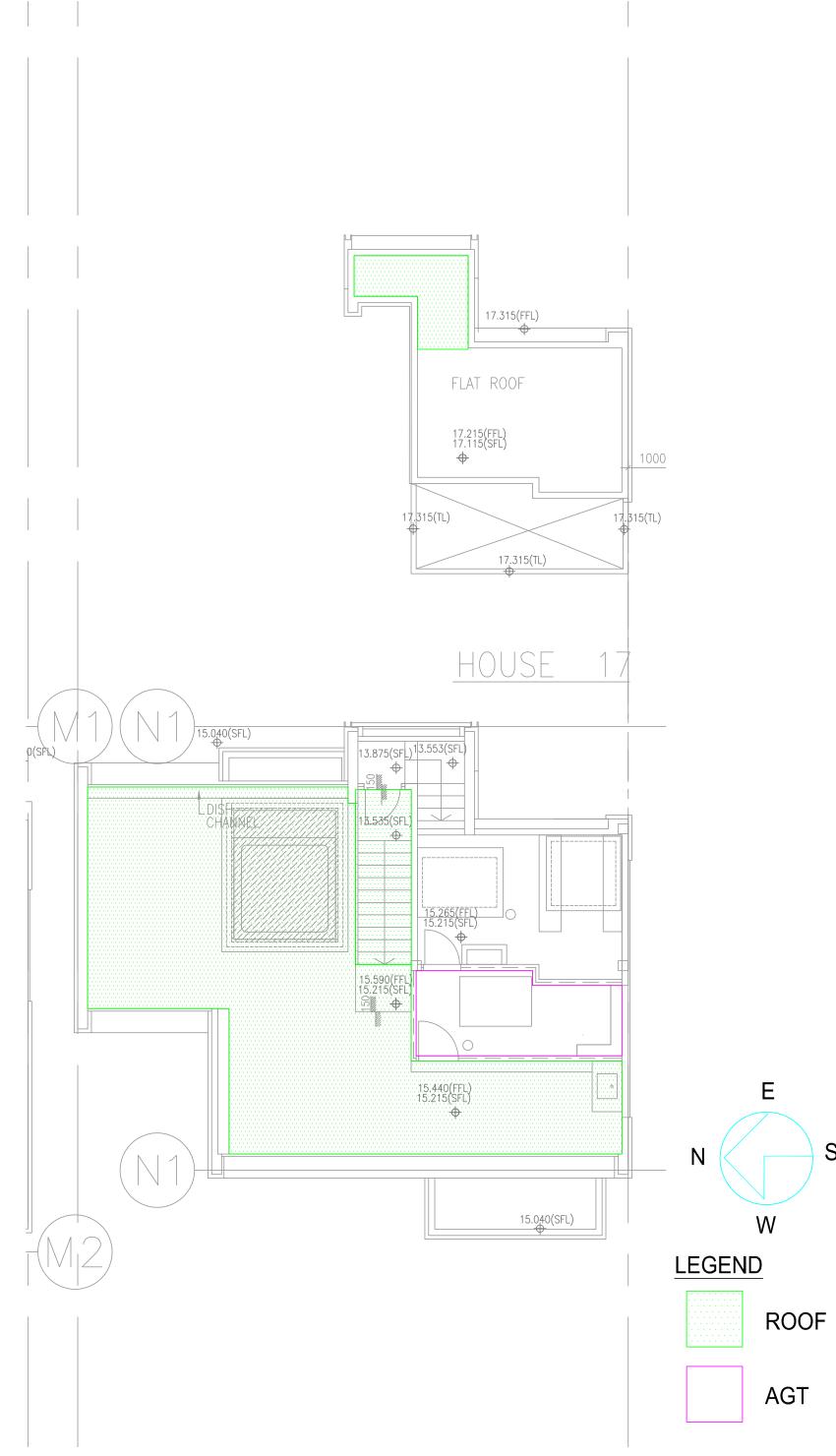
Address:	Lot 2115, D.D. 1	05, Ngau Ta	ım Mei, Yue	n Long ((House 1	7)															BD Ref. No.
n m]	BD 2/9179/15
Building Type:		Residential					0.70	~													
RTTV Calculat	ted by:		egistered Pro	essiona		Thomas Anderson	& Partners	Consulting l	Engineers l	Ltd.											
			chitect																		
		3. Ot	hers, please	specify:-																	
No. of Storeys (Residential Un	nits)	2																			
Table 1																					
									Deem	ed to Sati	sfy RTTV _{Wall}	1									
Facade Orientat	tion Facing		West			North		East			South	Т									
Average Absorp	ptivity		0.795			0.795		0.795			0.795	1								1	
Average Windo	ow to Wall Ratio		0.71			0		0.15			0	T									
Shading Coeffic	cient of Glazing		0.43					0.43				T									
Average Shadin	ng Coefficient of		0.43					0.43				T									
Facade																					
Visable Light T	ransmittance		53	%		%		53	%		%				%		%			%	%
External Reflec	tance		17	%		%		17	%		%				%		%			%	%
Table 2					- 1					ı		-								-	
										RTTV	Wall										
Facade Orientat	tion Facing	West					North					E	East					South			
Wall Orientation	n Factor			1.13	1				0.79			1			1.072					0.975	
Total External V (Residential Un			67.0	m	² Windo	ow to Wall Ratio		49.2	m ²	Window	to Wall Ratio			42.6	m ²	Windo	w to Wall Ratio		33.2	m ²	Window to Wall Ratio
Total Window	Area		47.61	m	2 =	0.71		0.00	m ²	=	0.00	H		6.59	m ²	=	0.03		0.00	m ² =	= 0.00
Heat	Opaque Wall		4.50			W/m ²		8.58		V	V/m ²	+		4.66			W/m ²		10.58		W/m ²
0 1 2	Window		0.80			W/m ²		0.00			V/m ²	+		0.72			W/m ²		0.00		W/m ²
Window	Glass Type		Area =	SC		VLT = %		Area =	SC		T = %	+		Area =	SC	I	VLT = %		Area =	SC	VLT = %
		n a a	m^2	=		ER = %	Reflective	m^2	=	ER		D.	Reflective	m^2	=	L	ER = %	Reflective		=	ER = %
		/ Tinted	Area = 4	7.61 SC	0.43		☐ Tinted	Area =	SC		T = %		Tinted	Area = 6.5	9 SC		VLT = 53 %	☐ Tinted	Area =	SC	VLT = %
		Z 1ea	m ²	=	0112	ER = 17 %		m ²	=	ER				m ²	=		ER = 17 %	-	m ²	=	ER = %
		Clear	Area =	SC		VLT = %	Clear	Area =	SC		T = %		Clear	Area =	SC		VLT = %	☐ Clear	Area =	SC	VLT = %
			m ²	=		ER = %		m ²	=	ER		_		m ²	=	L	ER = %		m ²	=	ER = %
	Double	Z Yes		No			✓ Yes] No		. ,,		/ Yes	N	lo.	ļ.		✓ Yes	1	No.	
	Glazing	2 140					2 100		, 1.0			-									
	External	Overhang	✓ Yes		No		Overhang	Yes	□ N	lo.		0	Overhang	Yes	N [0		Overhang	Yes	☐ No	
	Shading	Sidefin	✓ Yes		No		Sidefin	Yes	□ N				Sidefin	Yes	∠ N			Sidefin	Yes	□ No	
Solar Radiation	through		11.80			W/m ²		0.00			V/m ²	Ŧ		11.55			W/m ²		0.00		W/m ²
Gazing	· ·					***************************************					******						***************************************				*******
Average Absorp	otivity			0.79	5				0.8			+			0.8					0.8	
RTTV _{wall} at each			17.10			W/m ²		8.58		v	V/m ²	+		16.92			W/m ²		10.58		W/m ²
Overall RTTV _v						***************************************					13.31		W/m ²				**/111				***************************************
Table 3													******								
										RTTV	Poof										
Roof Orientatio	on Factor		2.16								11001										
Total Roof Area			84.37		m^2																
Units)			رج																		
Total Skylight A	Area		<u>_</u>	_	m ²																
Heat	Roof	(3.54	7	W/m ²	2															
Conduction	Skylight	_	La	\mathcal{I}	W/m ²																
	Glass Type	Reflecti	ive Ar	ea =	,,,,,,			m ² SC	2 =					VLT	=			%	ER =		%
		Tinted		ea =					C =					VLT				%	ER =		%
		☐ Clear		ea =					2=					VLT				%	ER =		- π - π
ar r.i.								m ² SC	_=					VLI				70	EK =		70
Skylight	Double Glazing	Yes Yes	Ш	No																	
				N.T.																	
	External Shading	☐ Yes	Ц	No																	
0.1 D :: :	-					1															
	through Gazing		~ <u>^</u>		W/m ²	•															
Average Absorp		1	0.8	\		1															
Overall RTTV _R	ROOF		3.54		W/m ²	-															
			\mathcal{L}																		



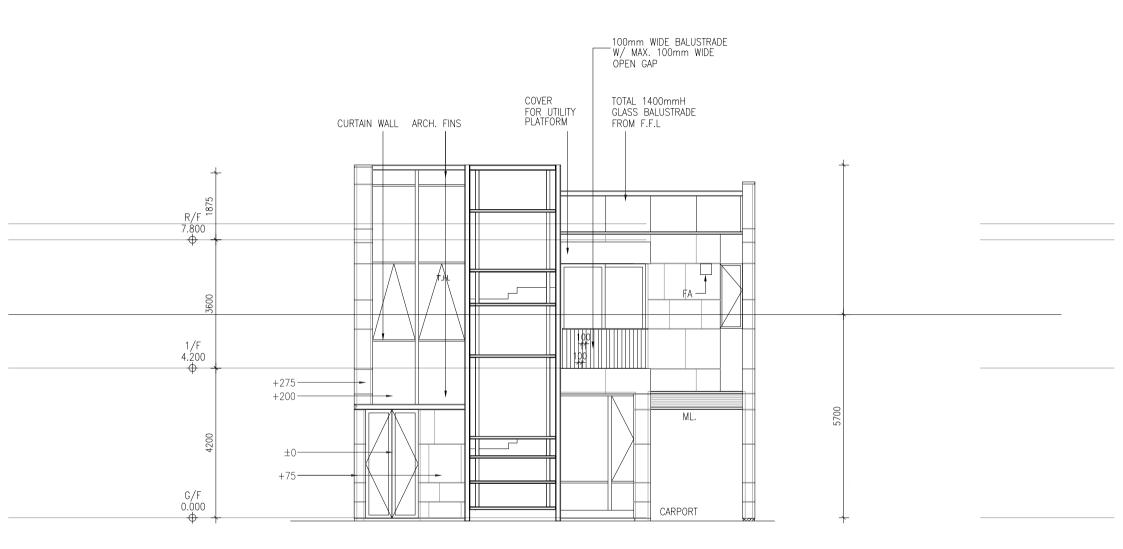
DRAWING TITLE: HOUSE 17 GROUND FLOOR PLAN SCALE: 1:150@A4

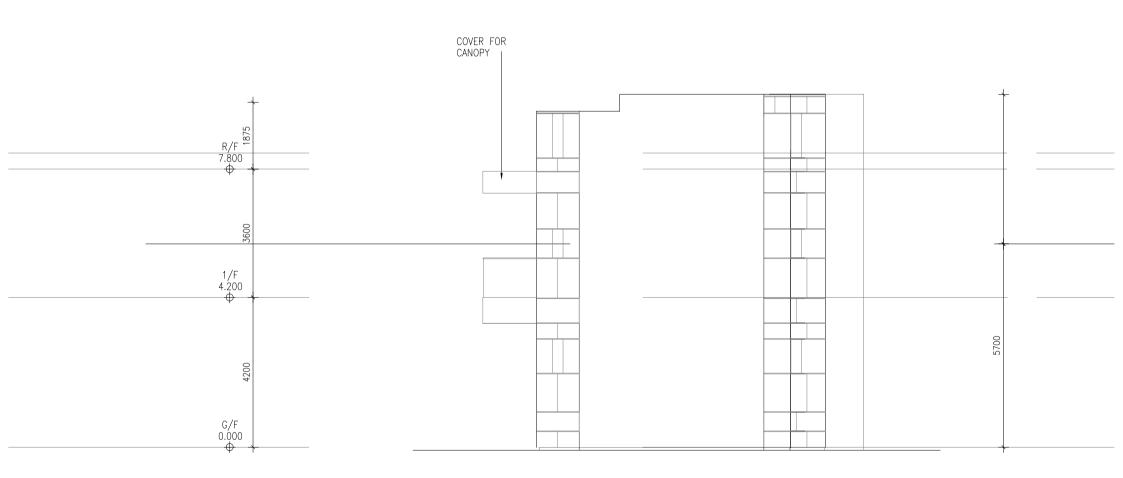


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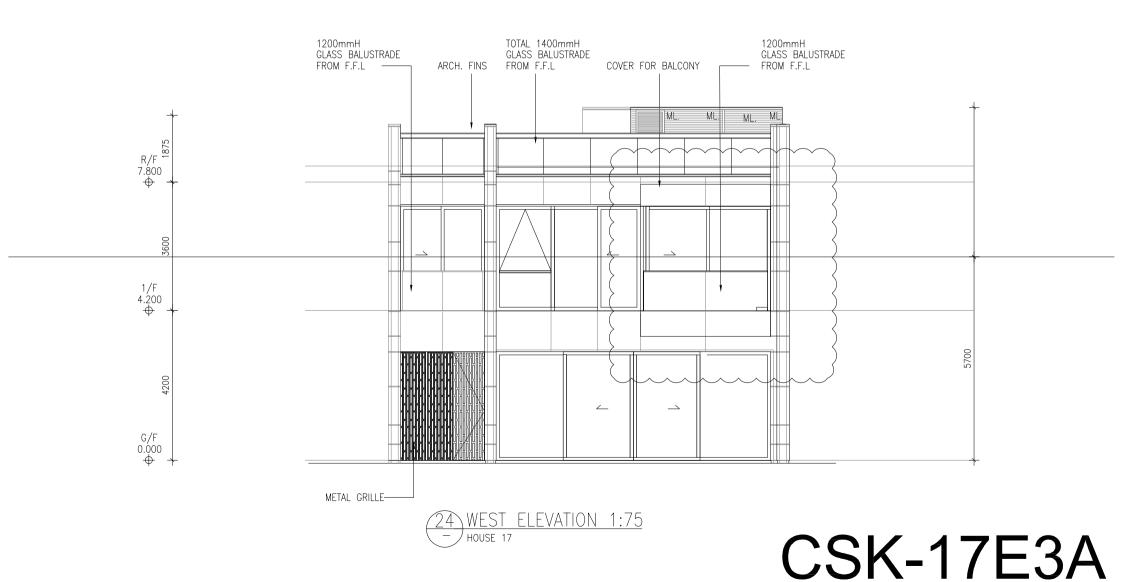
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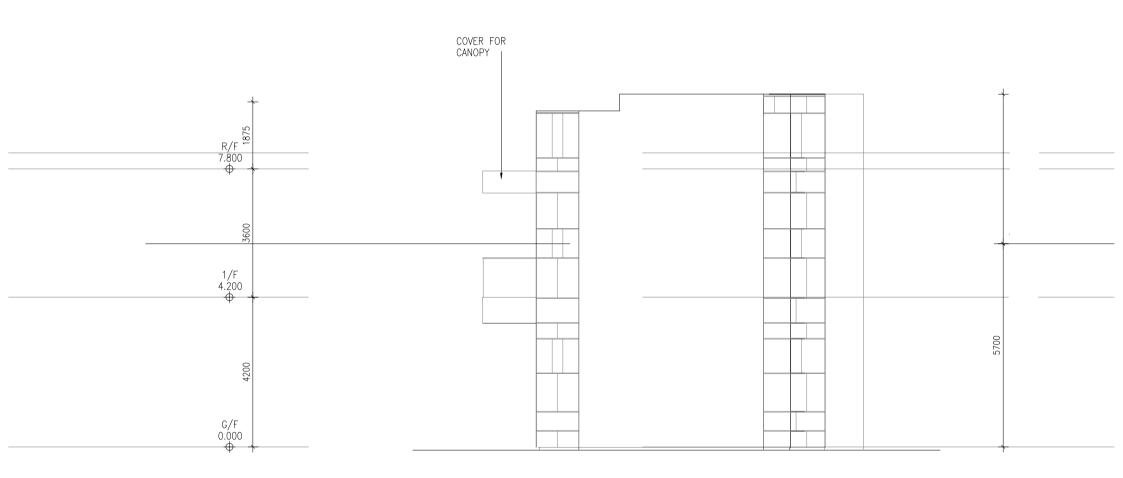




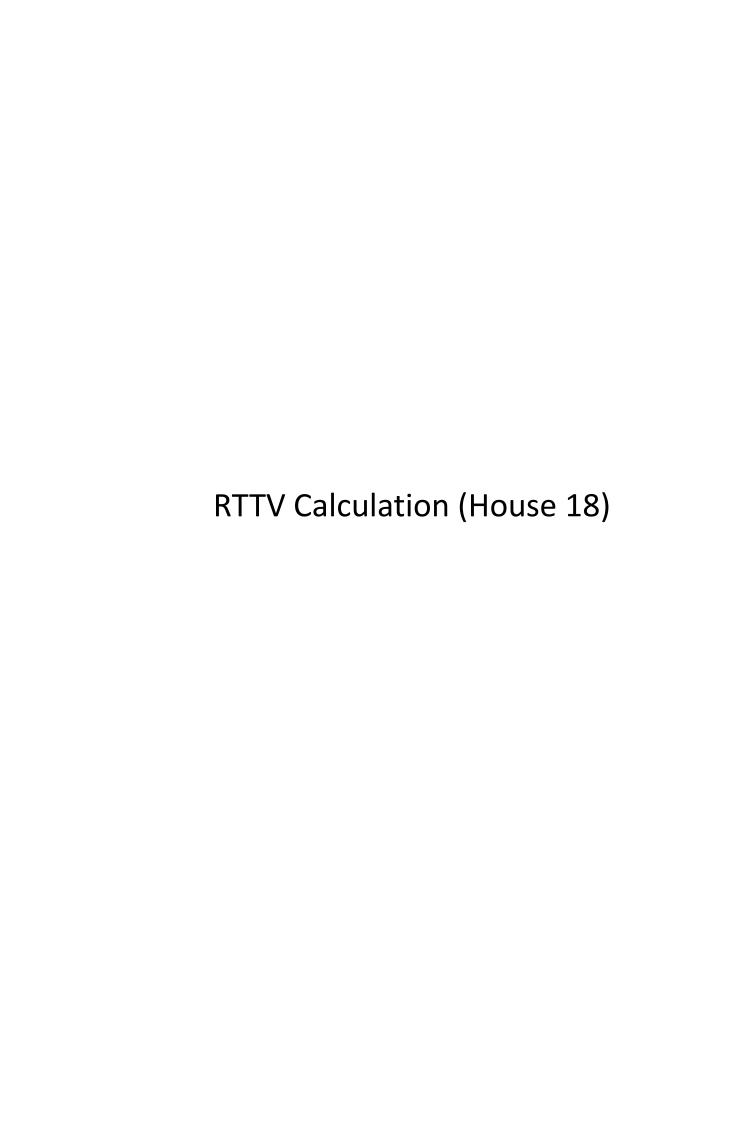
26 SOUTH ELEVATION 1:75
HOUSE 17

CSK-17E2





SOUTH ELEVATION 1:75
CSK-17E2



```
Gross Wall Area (Opaque walls + Glazing Areas) Calculation
                                                                                                                                            Sheet no. 1
                                                                                   Storev heights (Residential Units):
                                                                                   G/F
                                                                                                                         4.20 m
                                                                                                                                           storey)
                                                                                   1/F
                                                                                                                         3.60 m
                                                                                                                                           storey)
                                                                                   R/F
                                                                                                                         1.90 m
                                                                                                                                           storey)
West Elevations (House 18)
                                   Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                                                  )x 4.20 x 1 =
                                                                                     8.00 \times 4.20 \times 1 =
                                                                                                                        33.60 m<sup>2</sup>
1/F
                                   (6.35 + 2.50)
                                                                  )x 3.60 x 1 =
                                                                                     8.85 x
                                                                                                 3.60 \times 1 =
                                                                                                                        31.86 m<sup>2</sup>
R/F
                                                                  )x 1.90 x 1 =
                                                                                     0.00 \times 1.90 \times 1 =
                                                                                                                         0.00 \text{ m}^2
                                                                                                                        Gross Wall Areas
                                                                                                                                               65.46 m<sup>2</sup>
North Elevations (House 18) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                                                  )x 4.20 x 1 = 8.30 x 4.20 x 1 =
G/F
                                  (2.10 + 6.20)
                                                                                                                        34.86 m<sup>2</sup>
1/F
                                  (1.90 + 4.00)
                                                                 )x 3.60 x 1 =
                                                                                     5.90 \times 3.60 \times 1 =
                                                                                                                        21.24 m<sup>2</sup>
R/F
                                                                  )x 1.90 x 1 =
                                                                                     0.00 \times 1.90 \times 1 =
                                                                                                                         0.00 m<sup>2</sup>
                                                                                                                        Gross Wall Areas
                                                                                                                                               56.10 m<sup>2</sup>
East Elevations (House 18)
                                   Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
                                                                  )x 4.20 x 1 =
                                                                                     3.90 \times 4.20 \times 1 =
G/F
                                  (2.20 + 1.70)
                                                                                                                        16.38 m<sup>2</sup>
1/F
                                  (2.15 + 2.50)
                                                                  )x 3.60 x 1 =
                                                                                     4.65 x 3.60 x 1 =
                                                                                                                        16.74 m<sup>2</sup>
R/F
                                                                  )x 1.90 x 1 =
                                                                                     0.00 \times 1.90 \times 1 =
                                                                                                                         0.00 \text{ m}^2
                                                                                                                        Gross Wall Areas
                                                                                                                                               33.12 m<sup>2</sup>
South Elevations (House 18) Gross Wall Area = Total Length of Opaque Walls & Glazing x Storey Height x No. of Storeys
G/F
                                  ( 4.70
                                                                  )x 4.20 x 1 =
                                                                                     4.70 \times 4.20 \times 1 =
                                                                                                                        19.74 m<sup>2</sup>
1/F
                                  ( 3.45
                                                                  )x 3.60 x 1 =
                                                                                     3.45 \times 3.60 \times 1 =
                                                                                                                         12.42 m<sup>2</sup>
R/F
                                                                  )x 1.90 x 1 =
                                                                                     0.00 \times 1.90 \times 1 =
                                                                                                                         0.00 m<sup>2</sup>
                                                                                                                        Gross Wall Areas
                                                                                                                                               32.16 m<sup>2</sup>
```

Total Gross Wall Areas

186.84 m²

Total Glazing Area (W	indow + Balco	ony) Calculation

Glazing heights (Residential Units):

G/F (Window Gl 02) - A = 3.05 m

G/F (Window GL02) - A = 3.05 m (1 storey) 1/F (Window GL02) - B = 2.64 m (1 storey)

West Elevations (House 18) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys

Gross Glazing Areas 40.70 m²

Sheet no. 2

North Elevations (House 18) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys

G/F (Window GL02) - A (3.75)x 3.05 x 1 = 3.75 x 3.05 x 1 = 11.42 m²

Gross Glazing Areas 11.42 m²

East Elevations (House 18) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys

G/F (Window GL02) - A ()x 3.05 x 1 = 0.00 x 3.05 x 1 = 0.00 m² 1/F (Window GL02) - B (0.00 x 0.00 x

Gross Glazing Areas 5.67 m²

South Elevations (House 18) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys

Gross Glazing Areas 0.00 m²

Total Gross Glazing Areas 57.78 m²

West Elevations (House 18)

Window to Wall Ratio (WWF =

Gross Wall Areas (Opaque Walls + Gla	= azing Areas) (Ao) at West Elevations (House 18)	65.46 m²
Glazing Areas at	West Elevations (House 18)	40.70 m ²
Breakdown of Glazi Glazing Areas	Unshaded (W-F1) =	23.68 m²
Glazing Areas G/F	Shaded by Cover of Balcony (W-F2) = Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.20 x 3.05 = 9.76 m²	9.76 m²
Glazing Areas	OPF 1.50 / 3.05 = 0.49 ECS = 0.714 Shaded by Built-Fin (Projection on Right) (W-F3) = Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 2.75 x 2.64 = 7.26 m ²	7.26 m²
in	SPF 2.13 / 2.28 = 0.94 ECS = 0.971	
Opaque Wall Areas	at West Elevations (House 18) =	24.76 m²
Breakdown of Opaq RC Wall Areas	ue Wall Areas (W-W1) =	24.76 m²

40.70

65.46

0.62

Sheet no.	3

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 18)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (Refer \ to \ Table \ 5)$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ Ri Surface film resistance of internal surface (Refer to **Table 2**) Ro Surface film resistance of external surface (Refer to **Table 2**) Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

W-W1	Description:	RC Wall Areas		eas		
Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

 $Uw1 = \frac{1}{0.000}$ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	4	BD Ref No.	BD 2/9179/15
Building Address			
Facade Orientation Facing	West	Gross Wall Area (Ao) =	65.46
Window to Wall Ratio (WWR)	0.62	Wall Orientation Factor (Gw) =	1.131

Components / Details		Cod	de No.
Description	Units	W-W1	
External Finish Material		30mm Stone cladding	
Conductivity	W/mK	2.90	
Thickness	m	0.030	
Average Absorptivity (awi)	(a)	0.890	
Intermediate component		12mm cement/ sand render	
Conductivity	W/mK	0.72	
Thickness	m	0.01	
Intermediate component		200mm concrete wall	
Conductivity	W/mK	2.16	
Thickness	m	0.20	
Intermediate component			
Conductivity			
Thickness			
Intermediate component			
Conductivity			
Thickness			
Internal Finish Material		10mm AGT Tile	
Conductivity	W/mK	1.10	
Thickness	m	0.01	
U-value of Opaque Area (Uwi)	W/m²K	3.42	
Opaque Wall Area (Awi)	m²	24.76	
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	4.64	

Heat Conduction through Opaque Walls	s =	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	4.64	W/m²	

Part 2 - Calculation of Heat Conduction through Glazing						
Components / Details		Code No.	Code No.			
Description	Units	W-F1	W-F2	W-F3		
Glazing Type		Tinted	Tinted	Tinted		
Thickness	m	0.01	0.01	0.01		
Glazing Area (Afi)	m²	23.68	9.76	7.26		
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.46	0.19	0.14		

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n	
	=_	0.78	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing						
Components / Details		Code No.				
Description	Units	W-F1	W-F2	W-F3		
Glazing Type		Tinted	Tinted	Tinted		
Thickness	m	0.01	0.01	0.01		
Glazing Area (Afi)	m²	23.68	9.76	7.26		
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43		
Visible Light Transmittance (VLT)	%	53	53	53		
External Reflectance (ER)	%	17	17	17		
External Shading Miltiplier (ESC)		1.00	0.71	0.97		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	Cwi)Gw	7.34	2.16	2.19		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 11.69 W/m^2

Summary of RTTV at West Elevations (House 18)

= 4.64 + 0.78 + 11.69 = 17.12 W/m²

North Elevations (House 18)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 18)

Glazing Areas at North Elevations (House 18) = 11.42 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (N-F1) = 11.42 m²

ECS = 1.000

Opaque Wall Areas at North Elevations (House 18) = 44.68 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (N-W1) = 44.68 m²

Window to Wall Ratio (WWR) = 11.42 / 56.10 = 0.00

Sheet no. 5

Wall Orientation Factor

Gw = 0.79

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 18)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$ where

Surface film resistance of internal surface (Refer to **Table 2**)

Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

 $k \qquad \qquad \text{Thermal conductivity of building materials (Refer to \textbf{Table 1})} \\$

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total	·				0.293

Uw1 = ____1 = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	6	BD Ref No.	BD 2/9179/15		
Building Address	Lot 2115, D.D. 105	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 18)			
	•				
Facade Orientation Facing	North	Gross Wall Area (Ao) =	56.10		
Window to Wall Ratio (WWR)	0.00	Wall Orientation Factor (Gw) =	0.79		

Components / Details		Code No.			
Description	Units	N-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	44.68			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	6.83	_		

Heat Conduction through Opaque Wal	ls = 3	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=_	6.83	W/m²	

Components / Details		Code No.	
Description	Units	N-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	11.42	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.18	

Heat Conduction through Glazing	=	0.64 (Afi/Ao)	Ufi Gw	where i= 1, 2,, n
	=	0.18	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	escription Units				
Glazing Type		Tinted			
Thickness	m	0.01			
Glazing Area (Afi)	m²	11.42			
Shading Coefficient of Glazing (SCf)		0.43			
Visible Light Transmittance (VLT)	%	53			
External Reflectance (ER)	%	17			
External Shading Miltiplier (ESC)		1.00			
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	2.89			

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 2.89 W/m²

Summary of RTTV at North Elevations (House 18)

East Elevations (House 18)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 18)

Glazing Areas at East Elevations (House 18) = 5.67 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (E-F1) = 5.67 m²

ECS = 1.000

Opaque Wall Areas at East Elevations (House 18) = 27.45 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (E-W1) = 27.45 m²

Window to Wall Ratio (WWF = 5.67 / 33.12 = **0.17**

Sheet no. 7

Wall Orientation Factor

w = 1.072

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 18)

External Wall Material (Colour/Finish)	% of wall area	α Absorptivity (Refer to Table 5)
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials
 k Thermal conductivity of building materials (Refer to Table 1)

E-W1 Description: RC Wall Areas

Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

 $Uw1 = \frac{1}{0.000}$ = 3.42 W/m²K

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTV_{wall} of Each Facade

Sheet No.	8	BD Ref No.	BD 2/9179/15	
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 18)			
			_	
Facade Orientation Facing	East	Gross Wall Area (Ao) =	33.12	
Window to Wall Ratio (WWR)	0.17	Wall Orientation Factor (Gw) =	1.072	

Components / Details		Code No.			
Description	Units	E-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	27.45			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	9.65			

Heat Conduction through Opaque Wall	Dpaque Walls = 3.57(Awi/Ao) Uwi αwi Gw			where i= 1, 2,, n
	=	9.65	W/m²	

Components / Details		Code No.	
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	5.67	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.20	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n	
	=	0.20	N/m²	

Part 3 - Calculation of Solar Radiation th	rough Glazing			
Components / Details		Code No.		
Description	Units	E-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	5.67		
Shading Coefficient of Glazing (SCf)		0.53		
Visible Light Transmittance (VLT)	%	53		
External Reflectance (ER)	%	17		
External Shading Miltiplier (ESC)		1.00		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	Cwi)Gw	4.06		

Solar Radiation through Glazing	= 4	41.75 (Afi/Ao)(SCfi)(ESCwi)Gw	where i= 1, 2,, n
	=_	4.06	W/m²	
Summary of RTTV	at l	East Elevation	ns (House 18)	

South Elevations (House 18)

Gross Wall Areas (Opaque Walls + Glazing Areas) (Ao) at South Elevations (House 18)

Glazing Areas at South Elevations (House 18) = 0.00 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded (S-F1) = 0.00 m²

ECS = 1.000

Opaque Wall Areas at South Elevations (House 18) = 32.16 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (S-W1) = 32.16 m²

Window to Wall Ratio (WWR) = 0.00 / 32.16 = 0.00

Sheet no. 9

Wall Orientation Factor Gw = 0.975 (Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 18)

External Wall Material (Colour/Finish)	% of wall area	α Absorptivity (Refer to Table 5)
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to$ **Table 2** $)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to$ **Table 2** $)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

S-W1 Description: RC Wall Areas
Wall Material

Trail Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

 $Uw1 = \frac{1}{0.293} = 3.42 \text{ W/m}^2\text{K}$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 1 - Calculation of RTTVwall of Each Facade

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	, Ngau Tam Mei, Yuen Long (House 18)	
Facade Orientation Facing	South	Gross Wall Area (Ao) =	32.16
Window to Wall Ratio (WWR)	0.00	Wall Orientation Factor (Gw) =	0.975

Components / Details		Code No.			
Description	Units	S-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	32.16			
Heat Conduction = 3.57(Awi/Ao)	Uwi αwi Gw	10.58			

Heat Conduction through Opaque Walls	= 1	3.57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, n
	=	10.58	W/m²	

Components / Details	Code No.		
Description	Units	S-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	0.00	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.00	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n	
	=	0.00 W/n	n²	

Part 3 - Calculation of Solar Radiation t	hrough Glazing			
Components / Details		Code No.		
Description	Units	S-F1		
Glazing Type		Tinted		
Thickness	m	0.01		
Glazing Area (Afi)	m²	0.00		
Shading Coefficient of Glazing (SCf)		0.43		
Visible Light Transmittance (VLT)	%	53		
External Reflectance (ER)	%	17		
External Shading Miltiplier (ESC)		1.00		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ES	SCwi)Gw	0.00		

Solar Radiation through Glazing	= 41	.75 (Afi/Ao)	(SCfi)(ESCwi)Gw	where i= 1, 2,,	n	
	=	0.00	W/m²			
Summary of RTTV	at So	uth Elevat	tions (House 18)			
	=	10.58	+	0.00	+	0.00
	=	10.58	W/m²			

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No. BD 2/9179/15
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 18)	

Overall Gross Wall Area [a] 186.84 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	65.46	4.64	0.78	11.69	17.12	6.00
North	56.10	6.83	0.18	2.89	9.90	2.97
East	33.12	9.65	0.20	4.06	13.91	2.47
South	32.16	10.58	0.00	0.00	10.58	1.82

Overall RTTVwall = 13.26 W/m²

< 14 W/m²

OK

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п	_	-
ĸ	n	m

Upper Roof

Sheet no	12

Gross Roof Areas (Opaque Walls + Skylight A	reas) (Aro) at	F	Roof			=	100.57 m ²
Skylight Areas at Roof						=	0.00 m ²
Breakdown of Skylight Are	<u>as</u>						
Skylight Areas Unsha	aded	(S 1)		=	0.00 m ²
OpaqueAreas at Roof						=	100.57 m ²
Breakdown of Opaque Roo	f Avana						
RC Roof Areas	I Aleds	(R1)		=	93.97 m²
1/F Roof				=	27.30 m ² 47.87 m ²		
Upper Roof				=	18.80 m²		
Breakdown of Opaque Roo RC Roof Areas	f Areas	(R2)		=	6.60 m ²
1/F		,	112	=	m²	-	0.00 111
Roof				=	6.60 m ²		

Roof Orientation Factor	Gs	=	2.16	(Refer to Table 9)
Troop of fortunation i dotor	00		2.10	(I tolol to lable o)

Average Absorptivity (a) of the External Opaque Wall at

Roof

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	96%	0.9
AGT Tile (Brown)	4%	0.8

Average Absorptivity =

0.896

'U'	value	of	Opaqu	e Roof	Areas
-----	-------	----	-------	--------	-------

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$

where Ri Surface film resistance of internal surface (Refer to Table 2)

Surface film resistance of external surface (Refer to Table 2)

Ra Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Unglazed Porcelain Tiles (Grey)	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
To	otal				1.858

$$Uw1 = \frac{1}{1.858} = 0.54 \text{ W/m}^2\text{K}$$

R2	Desc	ription:		Roof Area		
Roof Material						
External surface film resistance				Ro	=	0.055
Air space resistanace				Ra	=	0
50mm cement/ sand screed		0.05	1	0.72	=	0.069
50mm expanded polystyrene		0.05	1	0.034	=	1.471
150mm concrete slab		0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.162
						4.000
	Total					1.836

$$Uw1 = \frac{1}{1.936} = 0.54 \text{ W/m}^2\text{K}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. BD 2/9179/	15
Building Address	Lot 2115, D.D. 105,	Ngau Tam Mei, Yuen Long (House 18)	-
Roof Orientation Facing	Flat	Gross Roof Area (Aro) =100.5	
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) = 2.16	6

Components / Details			Code No.	
Description	Units	R1	R2	
External Finish Material		25mm Unglazed Porcelain Tiles (Grey)	10mm AGT Tile (Brown)	
Conductivity	W/mK	1.10	1.10	
Thickness	m	0.025	0.010	
Average Absorptivity	(a)	0.9	0.8	
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed	
Conductivity	W/mK	0.72	0.72	
Thickness	m	0.050	0.050	
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene	
Conductivity	W/mK	0.034	0.034	
Thickness	m	0.05	0.05	
Intermediate component		150mm concrete slab	150mm concrete slab	
Conductivity	W/mK	2.16	2.16	
Thickness	m	0.15	0.15	
Intermediate component				
Conductivity	W/mK			
Thickness	m			
Internal Finish Material				
Conductivity	W/mK	0.38	0.38	
Thickness	m	0.01	0.01	
U-value of the Roof (Uri)	W/m²K	0.53	0.53	
Opaque Roof Area (Ari)	m²	93.97	6.60	
Heat Conduction = 3.47(Ari/A	ro) Uri ari Gs	3.34	0.21	

Heat Conduction through Opaque Roo	f =	3.47(Ari/Aro) Uri ar	i Gs	where i= 1, 2,, n
	=	3.34	W/m²	

Components / Details		Code No.							
Description	Units	S 1							
Skylight Glazing Type		-							
Thickness	m	-							
Skylight Area (Asi)	m²	0.00							
U-value of Skylight Glazing (Usi)	W/m²K	-							
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00							

Heat Conduction through Skylight	= 0.40	(Asi/Aro)	Usi Gs	where i= 1, 2,, n
	=	0.00	W/m²	

Part 3 - Calculation of Solar Radiation through Skylight										
Components / Details		Code No.								
Description	Units	S1								
Skylight Glazing Type		-								
Thickness	m	-								
Skylight Area (Asi)	m²	0.00								
Shading Coefficient of Skylight Glazing (SCr)	-								
Visible Light Transmittance (VLT)		-								
External Reflectance (ER)		-								
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00								

Solar Radiation thro	ough (Skylight	= 41.10 (/	Asi/Aro) (SCri)	Gs where	where i= 1, 2,, n			
			=0.0	00 W/m²					
Summary of RTTV	at Ro	of							
	=	3.34	+	0	.00	+	0.00		
	=	3.34	W/m²						

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

 Sheet No.
 14
 BD Ref No.
 BD 2/9179/15

 Building Address
 Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 18)
 BD Ref No.
 BD 2/9179/15

Overall Roof Area [a] ______ 100.57 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof			
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)			
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]			
Flat Roof	100.57	3.34	0.00	0.00	3.34	3.34			

Overall RTTVroof = 3.34 W/m² < 4 W/m² OK

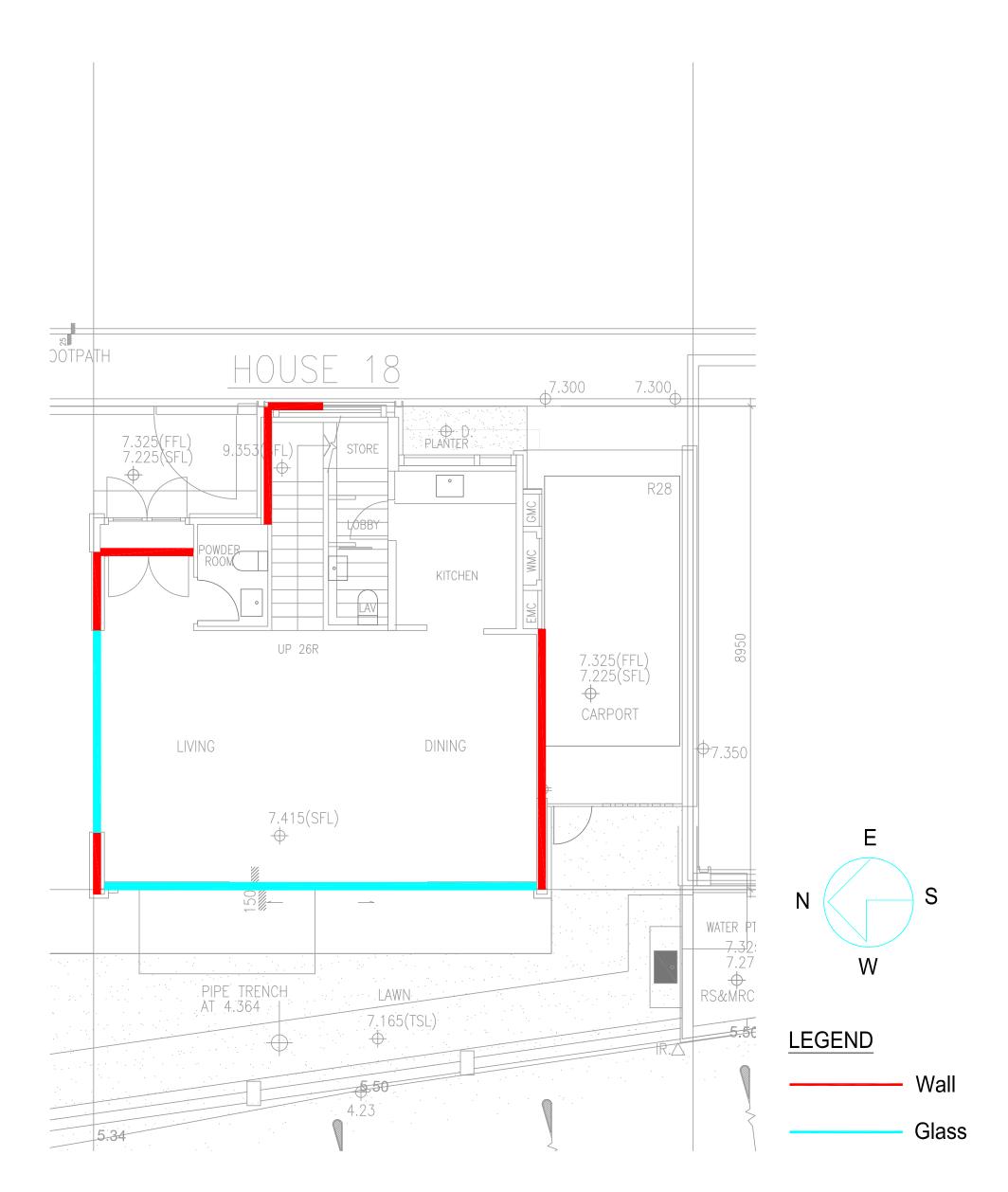
BD Ref. No.

RTTV Summary Sheet

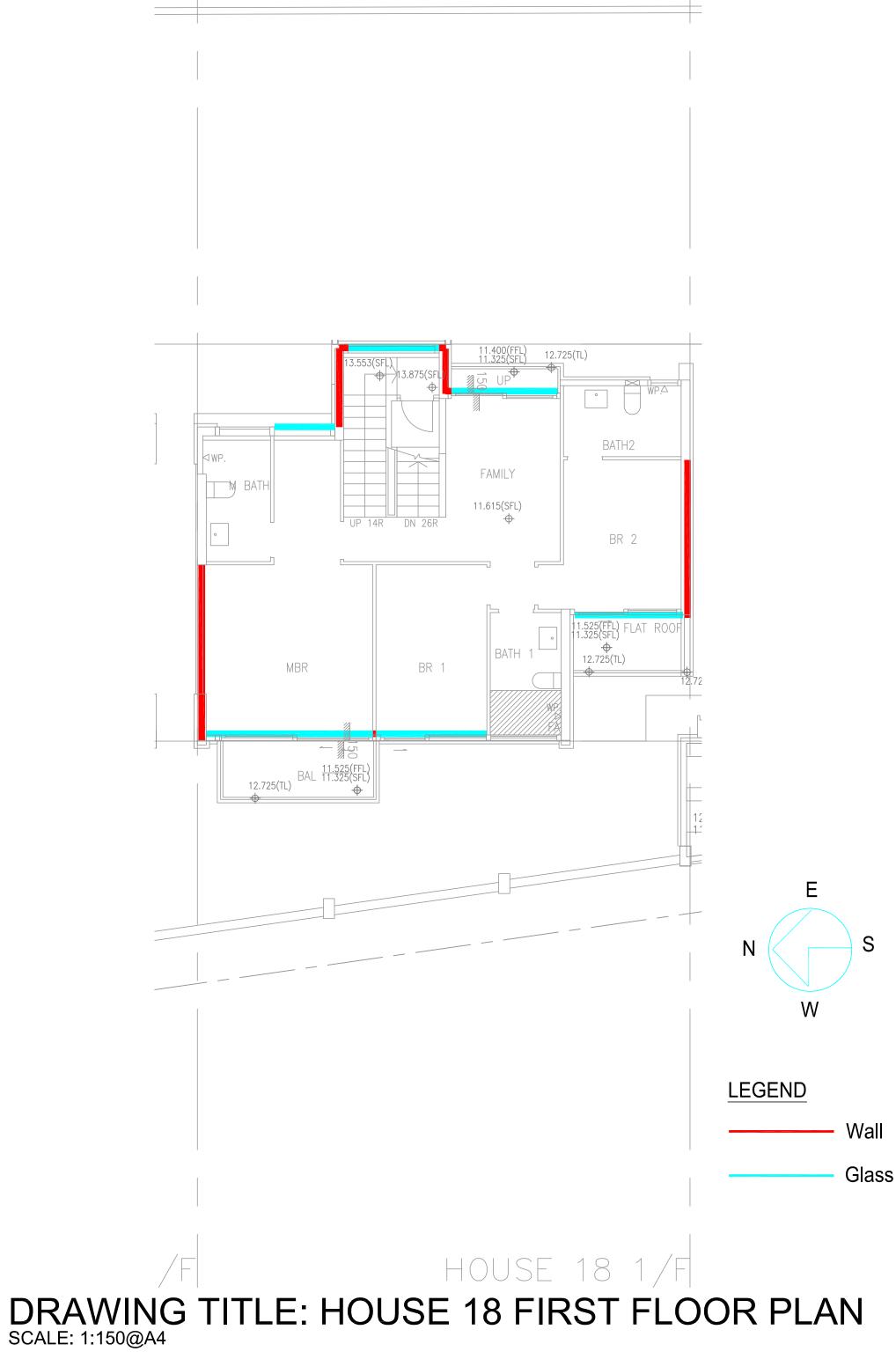
																						BD 2/9179/15	
Building Type:		Residential	l																				
RTTV Calculat	ed by:	Z 1. Re	egistered Pr	rofessional	l	Thomas Anderson	& Partners	Consulting	Engineers I	.td.													
		2. Aı	rchitect																				
		3. O	thers, please	e specify:-																			
No. of Storeys Residential Un	its)	2																					
able 1		l																					
able 1									Deem	ed to Sa	tisfy RTT	ΓV											
acade Orientat	ion Facing	l	West			North		East	Deem	cu to su	South	- ' Wall							1				
Average Absorp			0.795			0.795		0.795			0.795												
	w to Wall Ratio		0.71			0		0.15			0.773												
	cient of Glazing		0.43			0		0.43															
	g Coefficient of		0.43					0.43															
acade																							
isable Light T			53	%	_	%		53	%			%			%			%			%	%	
external Reflec	tance		17	%		%		17	%			%			%			%			%	%	
able 2																							
							1			RT	V _{Wall}								1				
acade Orientat		West					North		0.00				East		1000				South				
Vall Orientatio				1.13					0.79						1.072						0.975		
Total External Wall Area Residential Units)			67.0 m ² Window to Wall Ratio		49.2 m ²		Windov	v to Wall I	Ratio		42.6	m ²	Windo	ow to Wal	l Ratio	33.2		m ²	Window to Wall Ratio				
otal Window Area			47.61 $m^2 = 0.71$		0.00 m ²		m ²	= 0.00			6.59	m ²	=	0.	03	0.00		m ²	= 0.00				
	Opaque Wall		4.64	4		W/m ²		6.83	3	W/m ²			9.65			W/m ²			10.58		W/m ²		
Conduction	Window		0.78	8		W/m ²		0.18	3		W/m ²			0.20			W/m ²			0.00		W/m ²	
Vindow	Glass Type	_ ·	Area =	SC	;	VLT = %	D. d	Area =	SC	V	LT =	%	D. d. stim	Area =	SC		VLT =	%	D. G. stime	Area =	SC	VLT = %	
			m ²	=		ER = %	Reflective	m ²	=	E	R =	%	Reflective	m ²	=		ER =	%	Reflective	m ²	=	ER = %	
		∠ Tinted	Area =		0.43	VLT = 53 %	Tinted		SC	V	LT =	%				0.43	VLT =	53 %	☐ Tinted	Area =	SC	VLT = %	
			m ²	=		ER = 17 %		m ²	=		R =	%		m ²	=		ER =	17 %		m ²	=	ER = %	
		Clear	Area =	SC =		VLT = %	☐ Clear	Area =	SC =		LT =	%	☐ Clear	Area =	SC =	L	VLT =	%	☐ Clear	Area =	SC =	VLT = %	
			m ²			ER = %		m ²		Е	R =	%		m ²			ER =	%		m ²		ER = %	
	Double Glazing	✓ Yes □ No					✓ Yes				Yes No					☑ Yes		No					
																		I					
	External Shading	Overhang			No							Overhang Yes N						□ No					
		Sidefin	✓ Yes		No	2	Sidefin	Yes	□ N				Sidefin Yes No				Sidefin	Yes	☐ No				
olar Radiation Gazing	through		11.6	.9		W/m ²	2.89 W/m ²					4.06 W/m ²					0.00 W/m ²			W/m ²			
Average Absorp	otivity		0.795					0.795						0.795						0.795			
RTTV _{Wall} at ea	ch Facade	17.12 W/m ²				9.90 W/m ²					13.91			W/m ²		10.58 W/m ²			W/m ²				
Overall RTTV _v	Vall						-				13.26		W/m ²						•				
Table 3																							
										RTT	V _{Roof}												
Roof Orientatio			2.16		2																		
otal Roof Area Inits)	(Residential		100.57		m ²																		
			کر	<u> </u>	2																		
otal Skylight				\frown	m ²																		
Conduction	Roof		3.34		W/m																		
	Skylight				W/m															I			
	Glass Type	Reflect		Area =					SC =					VLT					%	ER =		%	
		☐ Tinted Area =							SC =					VLT					%	ER =		%	
		Clear Area =						m ² S	SC =					VLT	`=				%	ER =		%	
	Double Glazing	☐ Yes		☐ No																			
	External Shading	Yes		No																			
olar Radiation	through Gazing		0		W/m	2																	
Average Absorp		 (0.8		74/111																		
Overall RTTV _E		 Y	3.34	'`	W/m	2																	
. 1		i \	V 1	,	,																		

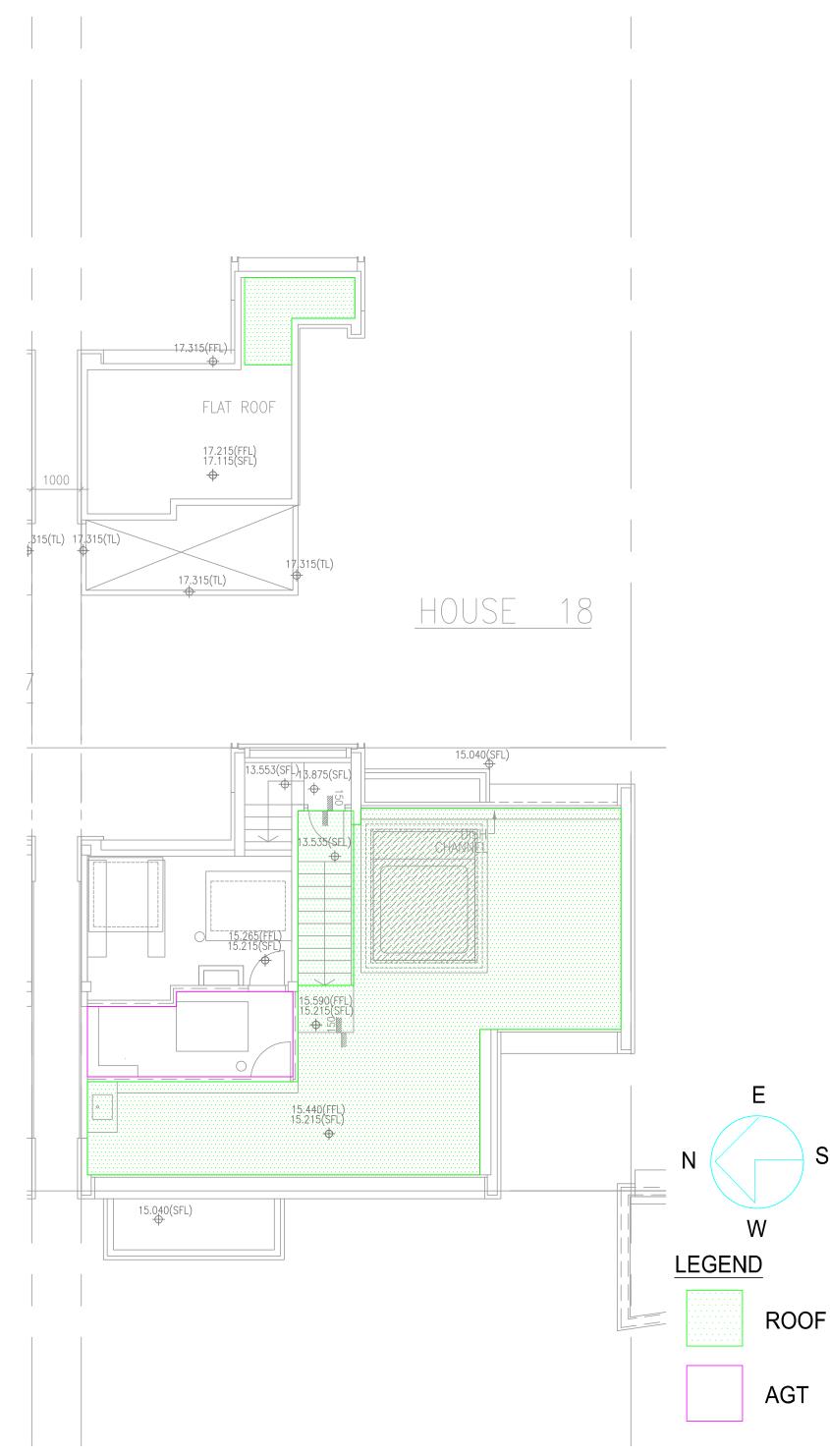
Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 18)

ER = External Reflectance; SC = Shading Coefficient & VLT = Visible Light Transmittance

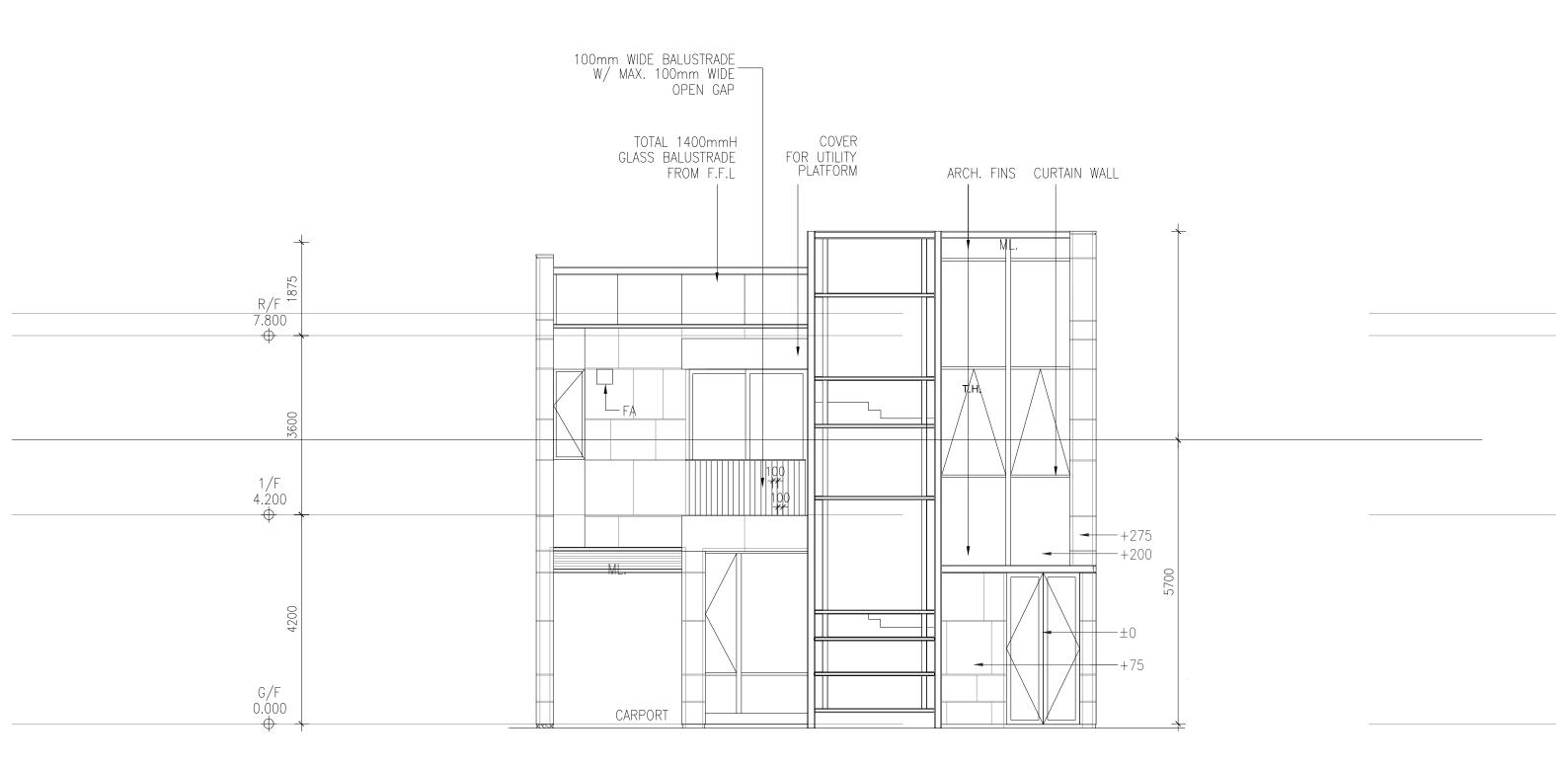


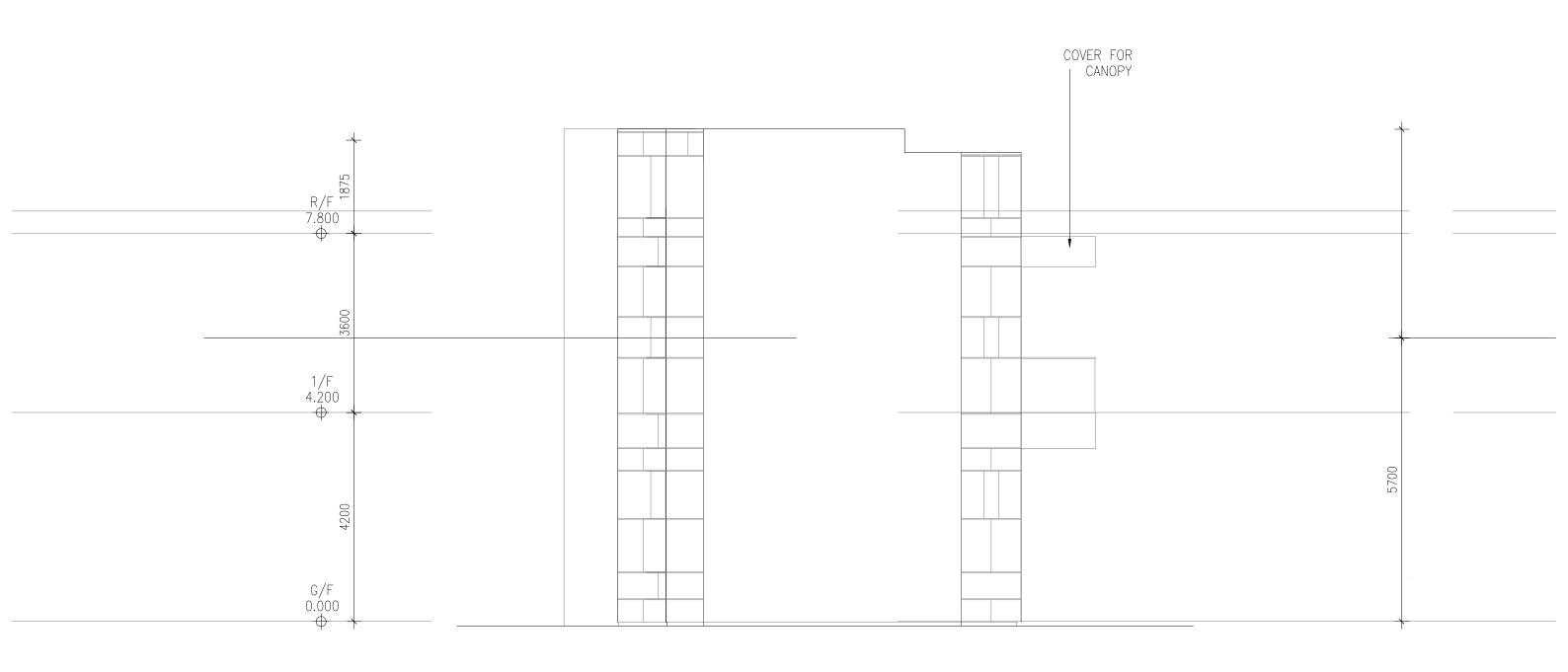
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DRAWING TITLE: HOUSE 18 ROOF FLOOR PLAN SCALE: 1:150@A4

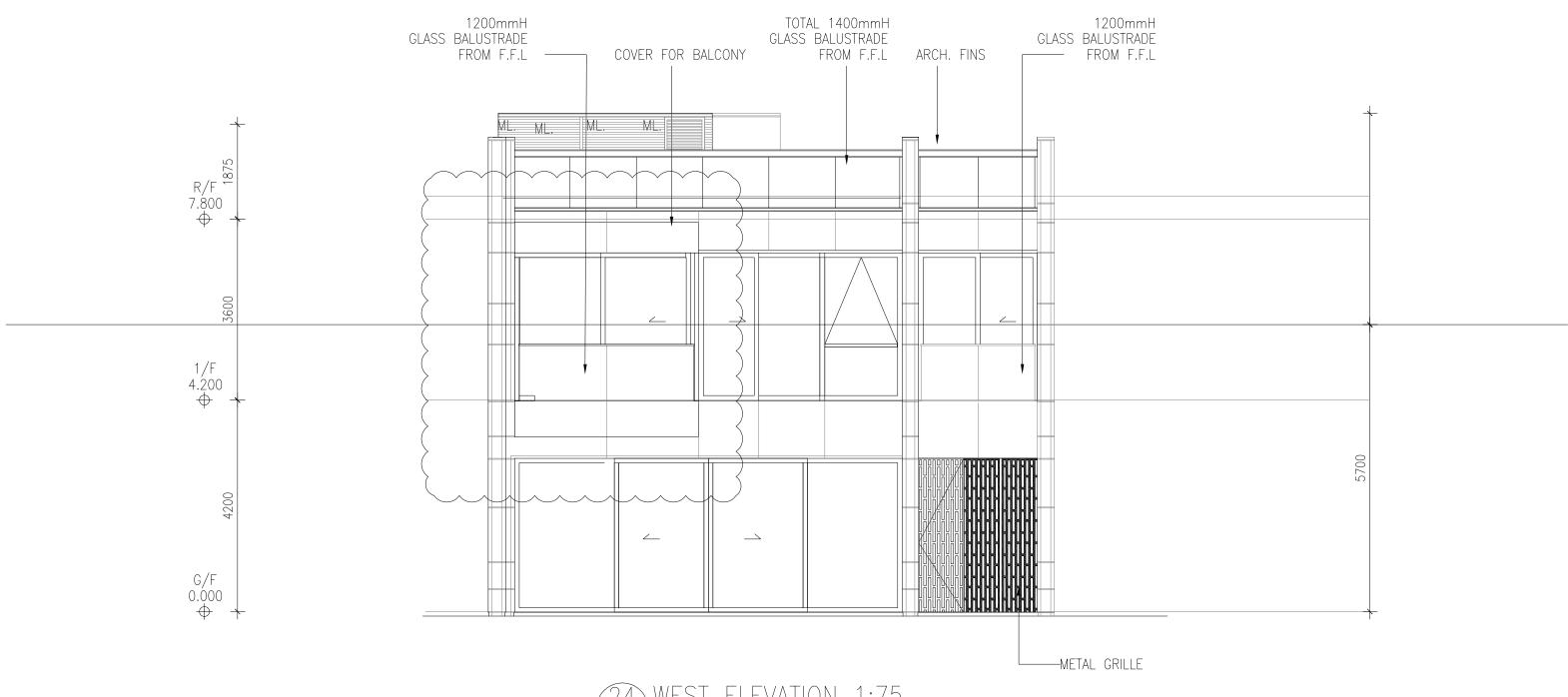




26 SOUTH ELEVATION 1:75

HOUSE 18

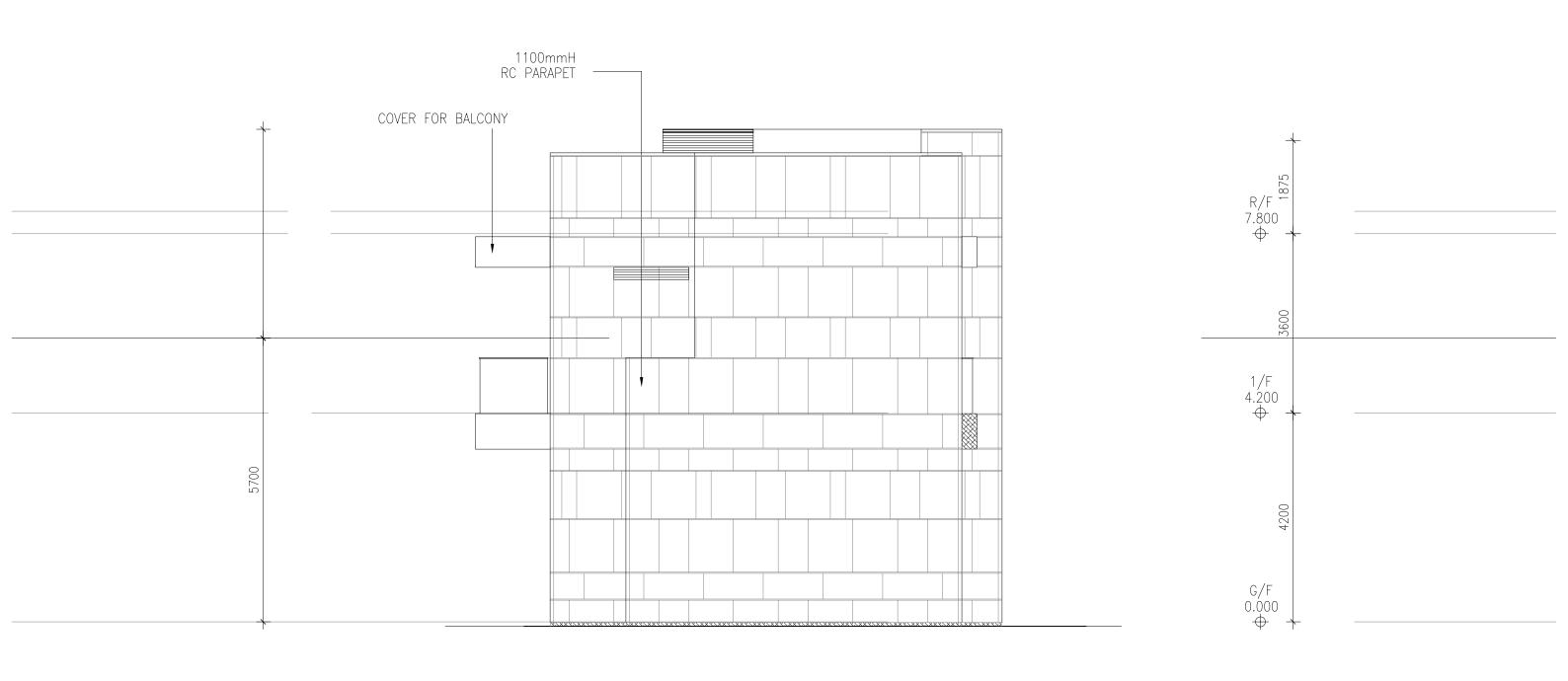
CSK-18E2



WEST ELEVATION 1:75

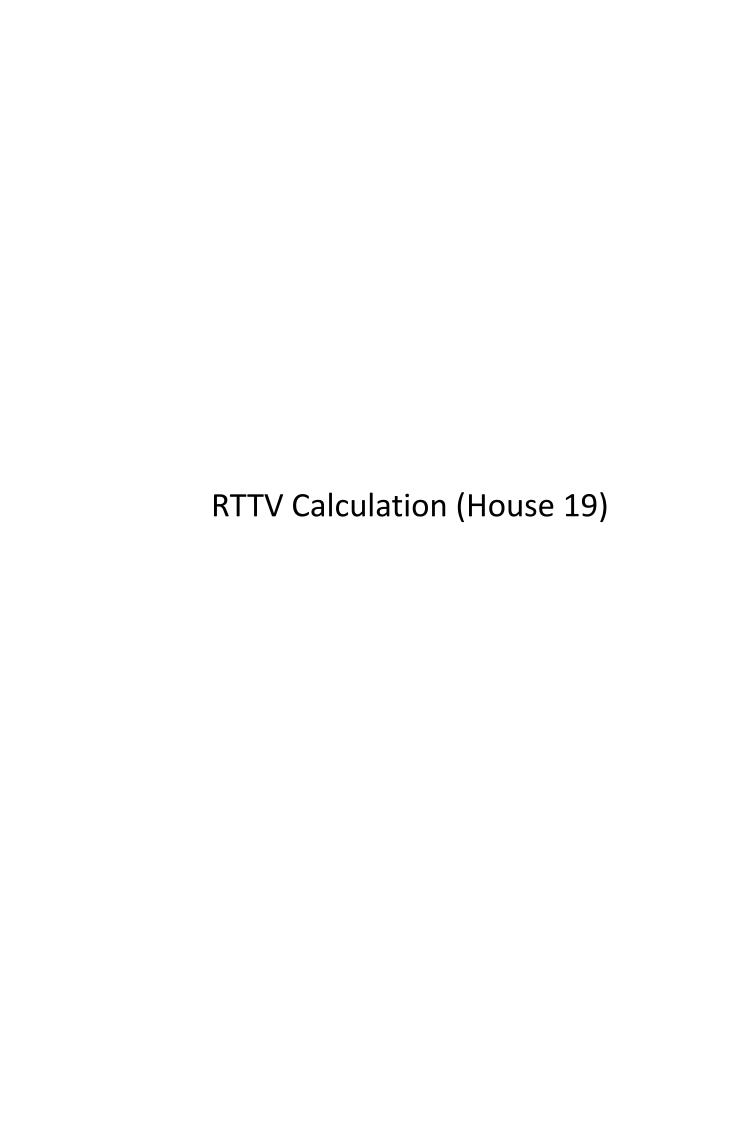
HOUSE 18

CSK-18E3A





CSK-18E4



Total Gross Wall Areas 471.39 m²

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Total Glazing Area (Window + Balcony) Calculation
                                                                                                                                                                                  Sheet no. 2
                                                                                                                        Glazing heights (Residential Units):
                                                                                                                        G/F (Window GL02) - A
                                                                                                                                                              3.05 m
                                                                                                                                                                                storey)
                                                                                                                        G/F (Window GL02) - B
                                                                                                                                                      =
                                                                                                                                                              3.15 m
                                                                                                                                                                                storey)
                                                                                                                        1/F (Window GL02) - C
                                                                                                                                                              2.66 m
                                                                                                                                                                                storey)
                                                                                                                        1/F (Window GL02) - D
                                                                                                                                                              2.74 m
                                                                                                                                                                          ( 1 storey)
West Elevations (House 19) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   4.40 + 7.30
                                                                                                       )x 3.05 x 1 = 11.70 x 3.05 x 1 =
                                                                                                                                                              35.63 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                       )x 3.15 x 1 =
                                                                                                                           0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                  11.50 + 4.30
                                                                                                       )x 2.66 x 1 =
                                                                                                                          15.80 x
                                                                                                                                      2.66 x 1 =
                                                                                                                                                              41.95 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                       )x 2.74 x 1 = 0.00 x 2.74 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                    77.58 m<sup>2</sup>
North Elevations (House 19) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   3.00
                                                                                                        )x 3.05 x 1 =
                                                                                                                           3.00 \times 3.05 \times 1 =
                                                                                                                                                               9.14 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                       )x 3.15 x 1 =
                                                                                                                           0.00 \times 3.15 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                   6.25 +
                                            2.40
                                                                                                       )x 2.66 x 1 =
                                                                                                                           6.25 x
                                                                                                                                      2.66 \times 1 =
                                                                                                                                                              16.59 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                       )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     25.73 m<sup>2</sup>
East Elevations (House 19) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
G/F (Window GL02) - A
                                   1.40 + 3.10 + 4.50 + 1.40
                                                                                                       )x 3.05 x 1 =
                                                                                                                          10.40 x
                                                                                                                                      3.05 \times 1 =
                                                                                                                                                              31.67 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                           0.00 \times 3.15 \times 1 =
                                                                                                       )x 3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
1/F (Window GL02) - C
                                   1.60 +
                                            2.00
                                                                                                       )x 2.66 x 1 =
                                                                                                                           1.60 \times 2.66 \times 1 =
                                                                                                                                                               4.25 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                       )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                                                                          Gross Glazing Areas
                                                                                                                                                                                     35.92 m<sup>2</sup>
South Elevations (House 19) Gross Glazing Area = Total Length of Glazing x Glazing Height x No. of Storeys
                                   4.30 + 2.20
G/F (Window GL02) - A
                                                                                                       )x 3.05 x 1 =
                                                                                                                           6.50 x
                                                                                                                                       3.05 \times 1 =
                                                                                                                                                              19.79 m<sup>2</sup>
G/F (Window GL02) - B
                                                                                                                           0.00 x
                                                                                                                                       3.15 x 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
                                                                                                       )x 3.15 x 1 =
1/F (Window GL02) - C
                                   5.90
                                                                                                       )x 2.66 x 1 =
                                                                                                                           5.90 x
                                                                                                                                       2.66 \times 1 =
                                                                                                                                                              15.66 m<sup>2</sup>
1/F (Window GL02) - D
                                                                                                       )x 2.74 x 1 =
                                                                                                                           0.00 \times 2.74 \times 1 =
                                                                                                                                                               0.00 m<sup>2</sup>
```

Gross Glazing Areas

Total Gross Glazing Areas

35.46 m²

174.68 m²

West Elevations (House 19)

Gross Wall Areas = 196.80 m ² (Opaque Walls + Glazing Areas) (Ao) at West Elevations (House 19)												
Glazing Areas a	t		West I	Eleva	ations	(Hou	se 19)			=	77.58 m²
Breakdown of G Glazing Areas		g Areas Unshade	ed							(W-F1)	=	49.52 m²
										ECS =	1.000	
Glazing Areas G/F		Shaded Glazing A	•				ı x Gl	azing He	eight x =	(W-F2) No. of Storey: 28.06 m ²	=	28.06 m ²
	Left Right		4.30 3.70	<i> </i>	9.20 9.20	=	0.47 0.40 ESC	ECS ECS (total)	= =	0.985 0.988 0.973		

Opaque Wall Areas at	West Elevations (House 19)	=	119.22 m ²

|--|

RC Wall Areas (W-W1) = 119.22 m²

VINDOW TO WAIL RATIO (VVVVR) = (7.30 / 190.00 = 0.39	Window to Wall Ratio (WWR)	=	77.58	1	196.80	=	0.39
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Sheet no. 3

Wall Orientation Factor

Gw = 1.131

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

West Elevations (House 19)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro) \text{ where}$ $Ri \qquad \text{Surface film resistance of internal surface (Refer to Table 2)}$ $Ro \qquad \text{Surface film resistance of external surface (Refer to Table 2)}$

Ra Air space resistance (Refer to **Table 3**)

X Thickness of building materials

 $k \hspace{1cm} \text{Thermal conductivity of building materials (Refer to \textbf{Table 1})} \\$

W-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total					0.293

 $Uw1 = \frac{1}{0.203}$ = 3.42 W/m²K

Sheet No.	4	4 BD Ref No		
Building Address	Lot 2115, D.D. 105			
	•			
Facade Orientation Facing	West	Gross Wall Area (Ao) =	196.80	
Window to Wall Ratio (WWR)	0.39	Wall Orientation Factor (Gw) =	1.131	

Components / Details		Code No.				
Description	Units	W-W1				
External Finish Material		30mm Stone cladding				
Conductivity	W/mK	2.90				
Thickness	m	0.030				
Average Absorptivity (awi)	(a)	0.89				
Intermediate component		12mm cement/ sand render				
Conductivity	W/mK	0.72				
Thickness	m	0.01				
Intermediate component		200mm concrete wall				
Conductivity	W/mK	2.16				
Thickness	m	0.20				
Intermediate component						
Conductivity						
Thickness						
Intermediate component						
Conductivity						
Thickness						
Internal Finish Material		10mm AGT Tile				
Conductivity	W/mK	1.10				
Thickness	m	0.01				
U-value of Opaque Area (Uwi)	W/m²K	3.42				
Opaque Wall Area (Awi)	m²	119.22				
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	7.44				

Heat Conduction through Opaque Walls	=	3.57(Awi/Ao) Uwi a	wi Gw	where i= 1, 2,, n
	=	7.44	W/m²	

Components / Details	Code No.				
Description	Units	W-F1	W-F2		
Glazing Type		Tinted	Tinted		
Thickness	m	0.01	0.01		
Glazing Area (Afi)	m²	49.52	28.06		
U-value of Glazing (Ufi)	W/m²K	1.74	1.74		
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.32	0.18		

Heat Conduction through Glazing	= 0.64	4 (Afi/Ao) I	Jfi Gw	where i= 1, 2,, n
	=	0.50	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing							
Components / Details	Code No.	Code No.					
Description	Units	W-F1	W-F2				
Glazing Type		Tinted	Tinted				
Thickness	m	0.01	0.01				
Glazing Area (Afi)	m²	49.52	28.06				
Shading Coefficient of Glazing (SCf)		0.43	0.43				
Visible Light Transmittance (VLT)	%	53	53				
External Reflectance (ER)	%	17	17				
External Shading Miltiplier (ESC)		1.00	0.97				
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	5.11	2.82				

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 7.93 W/m²

Summary of RTTV at West Elevations (House 19)

Gross Wall Areas = 73.98 m² (Opaque Walls + Glazing Areas) (Ao) at North Elevations (House 19)

Glazing Areas at North Elevations (House 19) = 25.73 m²

Breakdown of Glazing Areas
Glazing Areas Unshaded

Areas Unshaded (N-F1) = 16.58 m^2

ECS = 1.000

Glazing Areas Shaded by side-fin projection on right (N-F2) = 9.15 m² Glazing Area = Length of Glazing x Glazing Height x No. of Storeys $3.00 \times 3.05 = 9.15 \text{ m}^2$

SPF 9.20 / 3.70 = 2.49 **ECS** = 0.977

Opaque Wall Areas at North Elevations (House 19) = 48.25 m²

Breakdown of Opaque Wall Areas

RC Wall Areas (N-W1) = 48.25 m²

Window to Wall Ratio (WWR) = 25.73 / 73.98 = **0.35**

Sheet no. 5

Wall Orientation Factor

Gw = 0.79

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

North Elevations (House 19)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$ where

Surface film resistance of internal surface (Refer to Table 2)

Ro Surface film resistance of external surface (Refer to Table 2)

Ra Air space resistance (Refer to Table 3)

X Thickness of building materials

k Thermal conductivity of building materials (Refer to **Table 1**)

N-W1 Description: RC Wall Areas

Wall Material					
External surface film resistance			Ro	=	0.044
Air space resistanace			Ra	=	0
30mm Stone cladding	0.03	1	2.9	=	0.010
12mm cement/ sand render	0.012	1	0.72	=	0.017
200mm concrete wall	0.2	1	2.16	=	0.093
10mm AGT Tile	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.12
Total			•		0.293

 $Uw1 = \frac{1}{0.293}$ = 3.42 W/m²K

Sheet No.	6	BD 2/9179/15		
Building Address	Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 19)			
Facade Orientation Facing	North	Gross Wall Area (Ao) =	73.98	
Window to Wall Ratio (WWR)	0.35	Wall Orientation Factor (Gw) =	0.79	

Components / Details		Code No.			
Description	Units	N-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	48.25			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	5.59			

Heat Conduction through Opaque Wal	ls =	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, r
	=	5.59	W/m²	

Components / Details		Code No.		
Description	Units	N-F1	N-F2	
Glazing Type		Tinted	Tinted	
Thickness	m	0.01	0.01	
Glazing Area (Afi)	m²	16.58	9.15	
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.20	0.11	

Heat Conduction through Glazing	= 0.64 (Afi/Ao) Ufi Gw		where i= 1, 2,, n	
	=	0.31	W/m²	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details		Code No.			
Description	Units	N-F1	N-F2		
Glazing Type		Tinted	Tinted		
Thickness	m	0.01	0.01		
Glazing Area (Afi)	m²	16.58	9.15		
Shading Coefficient of Glazing (SCf)		0.43	0.43		
Visible Light Transmittance (VLT)	%	53	53		
External Reflectance (ER)	%	17	17		
External Shading Miltiplier (ESC)		1.00	0.98		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	3.18	1.71		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 4.89 W/m²

Summary of RTTV at North Elevations (House 19)

East Elevations (House 19)

Gross Wall Areas 147.45 m² (Opaque Walls + Glazing Areas) (Ao) at East Elevations (House 19) Glazing Areas at East Elevations (House 19) 35.92 m² **Breakdown of Glazing Areas** Glazing Areas Unshaded (E-F1) 26.46 m² ECS = 1.000Glazing Areas Shaded by 2 side-fin projection (W-F2) 9.46 m² Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 3.10 x 3.05 G/F SPF 3.40 / 3.10 = 1.10 **ECS** = 0.970

ESC (total)

0.938

0.908

Opaque Wall Areas at East Elevations (House 19) = 111.53 m²

SPF 1.00 / 3.10 = 0.32 **ECS**

Breakdown of Opaque Wall Areas

RC Wall Areas (E-W1) = 111.53 m²

Window to Wall Ratio (WWR) = 35.92 / 147.45 = 0.24

Sheet no. 7

Wall Orientation Factor

Gw = 1.072

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

East Elevations (House 19)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8

Average Absorptivity = 0.89

'U' value of Opaque Wall Areas

 $U = 1/(Ri+x_1/k_1+x_2/k_2+...+x_n/k_n+Ra+Ro)$ where

Ri Surface film resistance of internal surface (Refer to Table 2)

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to **Table 3**)
Thickness of building materials

k Thermal conductivity of building materials (Refer to Table 1)

E-W1 Description: RC Wall Areas

Wall Material						
External surface film resistance				Ro	=	0.044
Air space resistanace				Ra	=	0
30mm Stone cladding		0.03	1	2.9	=	0.010
12mm cement/ sand render		0.012	1	0.72	=	0.017
200mm concrete wall		0.2	1	2.16	=	0.093
10mm AGT Tile		0.01	1	1.1	=	0.009
Internal surface film resistance				Ri	=	0.12
	Total					0.293

 $Uw1 = \frac{1}{0.303}$ = 3.42 W/m²K

Sheet No.	8 BD Ref No. BD 2/9179/1			
Building Address	Lot 2115, D.D. 105			
	•		_	
Facade Orientation Facing	East	Gross Wall Area (Ao) =	147.45	
Window to Wall Ratio (WWR)	0.24	Wall Orientation Factor (Gw) =	1.072	

Components / Details		Code No.			
Description	Units	E-W1			
External Finish Material		30mm Stone cladding			
Conductivity	W/mK	2.90			
Thickness	m	0.030			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.01			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
U-value of Opaque Area (Uwi)	W/m²K	3.42			
Opaque Wall Area (Awi)	m²	111.53			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	8.80			

Heat Conduction through Opaque Walls	duction through Opaque Walls = 3.57(Awi/Ao) Uwi αwi Gw			
	=	8.80	W/m²	

Components / Details		Code No.	
Description	Units	E-F1	
Glazing Type		Tinted	
Thickness	m	0.01	
Glazing Area (Afi)	m²	35.92	
U-value of Glazing (Ufi)	W/m²K	1.74	
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.29	

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details	Code No.				
Description	Units	E-F1	W-F2		
Glazing Type		Tinted	Tinted		
Thickness	m	0.01	0.01		
Glazing Area (Afi)	m²	26.46	9.46		
Shading Coefficient of Glazing (SCf)		0.43	0.43		
Visible Light Transmittance (VLT)	%	53	53		
External Reflectance (ER)	%	17	17		
External Shading Miltiplier (ESC)		1.00	0.91		
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(ESC	wi)Gw	3.45	1.12		

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 4.57 W/m²

Summary of RTTV at East Elevations (House 19)

South Elevations (House 19)

Window to Wall Ratio (WWR) =

Gross Wall Areas (Opaque Walls + Gla	zing Areas) (Ao) at South Elevations (House 19)	=	53.16 m²
Glazing Areas at	South Elevations (House 19)	=	35.46 m²
Breakdown of Glazin Glazing Areas	ug Areas Unshaded (S-F1) ECS =	= 1.000	2.38 m²
Glazing Areas G/F	Shaded by overhang and projection on left (S-F2) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 4.30 x 3.05 = 13.12 m² SPF 9.30 / 4.40 = 2.11 ECS = 0.816 OPF 1.50 / 4.20 = 0.36 ECS = 0.711 ECS (total) = 0.580	=	13.12 m²
Glazing Areas	Shaded by overhang and projection on left (S-F3) Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 5.90 x 2.66 = 15.69 m² SPF 5.90 / 5.90 = 1.00 ECS = 0.837 OPF 1.60 / 3.60 = 0.44 ECS = 0.671 ECS (total) = 0.562	=	15.69 m²
Glazing Areas G/F	Shaded by Cover of Balcony Glazing Area = Length of Glazing x Glazing Height x No. of Storeys 1.40 x 3.05 = 4.27 m ² OPF 1.10 / 3.05 = 0.36 ECS = 0.711	=	4.27 m²
Opaque Wall Areas a	South Elevations (House 19)	=	17.70 m²
Breakdown of Opaqu RC Wall Areas	ue Wall Areas (S-W1)	=	17.70 m²

35.46

53.16

0.67

Sheet no. 9

W/m²K

Wall Orientation Factor

Gw = 0.975

(Refer to Table 9)

Average Absorptivity (a) of the External Opaque Wall at

South Elevations (House 19)

External Wall Material (Colour/Finish)	% of wall area	$\alpha \ Absorptivity \ \ (\text{Refer to Table 5})$
Stone cladding	90.0%	0.9
Wall Tiles	10.0%	0.8
		_

Average Absorptivity =

'U' value of Opaque Wall Areas

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$ where

Surface film resistance of internal surface (Refer to Table 2) Surface film resistance of external surface (Refer to Table 2)

0.89

Air space resistance (Refer to Table 3) Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

0 Description:

	V 1	Description.			U		
Wall Material							
External surface film resistance					Ro	=	0.044
Air space resistanace					Ra	=	0
30mm Stone cladding			0.03	1	2.9	=	0.010
12mm cement/ sand render			0.012	1	0.72	=	0.017
200mm concrete wall			0.2	1	2.16	=	0.093
10mm AGT Tile			0.01	1	1.1	=	0.009
Internal surface film resistance					Ri	=	0.12
Internal surface film resistance					Ri	=	0.12
	Total						0.369

2.71

Sheet No.	10	BD Ref No.	BD 2/9179/15
Building Address	Lot 2115, D.D. 105	5, Ngau Tam Mei, Yuen Long (House 19)	
	•		
Facade Orientation Facing	South	Gross Wall Area (Ao) =	53.16
Window to Wall Ratio (WWR)	0.67	Wall Orientation Factor (Gw) =	0.975

Components / Details		Code No.			
Description Un		Wall Material			
External Finish Material		12mm cement/ sand render			
Conductivity	W/mK	0.72			
Thickness	m	0.012			
Average Absorptivity (awi)	(a)	0.89			
Intermediate component		200mm concrete wall			
Conductivity	W/mK	2.16			
Thickness	m	0.20			
Intermediate component		10mm AGT Tile			
Conductivity	W/mK	1.10			
Thickness	m	0.01			
Intermediate component					
Conductivity					
Thickness					
Intermediate component					
Conductivity					
Thickness					
Internal Finish Material		Internal surface film resistance			
Conductivity	W/mK	Ri			
Thickness	m	0.00			
U-value of Opaque Area (Uwi)	W/m²K	2.71			
Opaque Wall Area (Awi)	m²	17.70			
Heat Conduction = 3.57(Awi/Ao)	Uwi awi Gw	2.80			

Heat Conduction through Opaque Walls	5 =	3.57(Awi/Ao) Uwi av	vi Gw	where i= 1, 2,, n
	=	2.80	W/m²	

Components / Details	Code No.				
Description	Units	S-F1	S-F2	S-F3	S-F4
Glazing Type		Tinted	Tinted	Tinted	Tinted
Thickness	m	0.01	0.01	0.01	0.01
Glazing Area (Afi)	m²	2.38	13.12	15.69	4.27
U-value of Glazing (Ufi)	W/m²K	1.74	1.74	1.74	1.74
Heat Conduction = 0.64 (Afi/Ao) Uf Gw		0.05	0.27	0.32	0.09

Heat Conduction through Glazing = 0.64 (Afi/Ao) Ufi Gw where i= 1, 2, ..., n = 0.72 W/m²

Part 3 - Calculation of Solar Radiation through Glazing					
Components / Details	Code No.				
Description	Units	S-F1	S-F2	S-F3	S-F4
Glazing Type		Tinted	Tinted	Tinted	Tinted
Thickness	m	0.01	0.01	0.01	0.01
Glazing Area (Afi)	m²	2.38	13.12	15.69	4.27
Shading Coefficient of Glazing (SCf)		0.43	0.43	0.43	0.43
Visible Light Transmittance (VLT)	%	53	53	53	53
External Reflectance (ER)	%	17	17	17	17
External Shading Miltiplier (ESC)		1.00	0.58	0.56	0.71
Solar Radiation = 41.75 (Afi/Ao)(SCfi)(E	SCwi)Gw	0.78	2.51	2.90	1.00

Solar Radiation through Glazing = 41.75 (Afi/Ao)(SCfi)(ESCwi)Gw where i= 1, 2, ..., n = 6.19 W/m^2

Summary of RTTV at South Elevations (House 19)

= 2.80 + 0.72 + 6.19 = 9.71 W/m²

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Wall) 2 - Summary of Overall RTTVwall of Building

Sheet No.	11	BD Ref No. BD 2/9179/15
Building Address	Lot 2115 D.D. 105 Ngau Tam Mei, Yuen Long (House 19)	

Overall Gross Wall Area [a] 471.39 m²

Facade Orientation Facing	Gross Wall Area	Heat Conduction through Opaque Walls	Heat Conduction through Glazing	Solar Radiation through Glazing	RTTVwall at Each Facade	Area-weighted RTTVwall
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]
West	196.80	7.44	0.50	7.93	15.86	6.62
North	73.98	5.59	0.31	4.89	10.79	1.69
East	147.45	8.80	0.29	4.57	13.67	4.28
South	53.16	2.80	0.72	6.19	9.71	1.10
				·	·	

Overall RTTVwall = 13.69 W/m²

< 14 W/m²

OK

Sheet no.	12

(Refer to Table 9)

Gross Roof Areas (Opaque Walls + Sk	ylight Areas) (Aro) at		Roof			=	250.02 m²
Skylight Areas at	Roof					=	0.00 m ²
Breakdown of Skyli	ght Areas						
Skylight Areas	Unshaded	(S1)		=	0.00 m ²
OpaqueAreas at	Roof					=	250.02 m ²
Breakdown of Opaq RC Roof Areas 1/F Roof Upper Roof	<u>ue Roof Areas</u>	(R1) = = =	49.30 m² 132.66 m² 61.92 m²	=	243.88 m ²
Breakdown of Opaq RC Roof Areas 1/F Roof Upper Roof	ue Roof Areas	(R2) = = =	m² 6.14 m² m²	=	6.14 m²

Roof Orientation Factor Gs = 2.16

Average Absorptivity (a) of the External Opaque Wall at

Roof

External Roof Material (Colour/Finish)	% of roof area	α Absorptivity (Refer to Table 5)
Unglazed Porcelain Tiles (Grey)	100%	0.9

Average Absorptivity =

0.9

'U'	value	of	Opaqu	e Roof	Areas
-----	-------	----	-------	--------	-------

 $U = 1/(Ri + x_1/k_1 + x_2/k_2 + ... + x_n/k_n + Ra + Ro)$

where Ri Surface film resistance of internal surface (Refer to Table 2)

Ro Surface film resistance of external surface (Refer to **Table 2**)

Ra Air space resistance (Refer to Table 3)

Thickness of building materials

Thermal conductivity of building materials (Refer to Table 1)

R1	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
25mm Tiles	0.025	1	1.1	=	0.023
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm gypsum plaster	0.01	1	0.38	=	0.026
Internal surface film resistance			Ri	=	0.162
To	otal				1.876

$$Uw1 = \frac{1}{1.876} = 0.53 \text{ W/m}^2\text{K}$$

_R2	Description:		Roof Area		
Roof Material					
External surface film resistance			Ro	=	0.055
Air space resistanace			Ra	=	0
50mm cement/ sand screed	0.05	1	0.72	=	0.069
50mm expanded polystyrene	0.05	1	0.034	=	1.471
150mm concrete slab	0.15	1	2.16	=	0.069
10mm AGT Tile (Brown)	0.01	1	1.1	=	0.009
Internal surface film resistance			Ri	=	0.162
			•		•
	Total				1.836

$$Uw1 = \frac{1}{1.836} = 0.54 \text{ W/m}^2\text{K}$$

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 1 - Calculation of RTTV_{roof}

Sheet No.	13	BD Ref No. BD	2/9179/15
Building Address	Lot 2115, D.D. 105, N	gau Tam Mei, Yuen Long (House 19)	
			_
Roof Orientation Facing	Flat	Gross Roof Area (Aro) =	250.02
Skylight to Roof Ratio (SRR) =	0	Roof Orientation Factor (Gs) =	2.16

Components / Details		Code No.			
Description	Units	R1	R2		
External Finish Material		25mm concrete tile	10mm AGT Tile (Brown)		
Conductivity	W/mK	1.10	1.10		
Thickness	m	0.025	0.010		
Average Absorptivity (awi)	(a)	0.9	0.8		
Intermediate component		50mm cement/ sand screed	50mm cement/ sand screed		
Conductivity	W/mK	0.72	0.72		
Thickness	m	0.050	0.050		
Intermediate component		50mm expanded polystyrene	50mm expanded polystyrene		
Conductivity	W/mK	0.034	0.034		
Thickness	m	0.05	0.05		
Intermediate component		150mm concrete slab	150mm concrete slab		
Conductivity	W/mK	2.16	2.16		
Thickness	m	0.15	0.15		
Intermediate component					
Conductivity	W/mK				
Thickness	m				
Internal Finish Material					
Conductivity	W/mK	0.38	0.38		
Thickness	m	0.01	0.01		
U-value of the Roof (Uri)	W/m²K	0.55	0.53		
Opaque Roof Area (Ari)	m²	243.88	6.02		
Heat Conduction = 3.47(Ari/A	Aro) Uri ari Gs	3.62	0.08		

Heat Conduction through Opaque Roof =	3.47(Ar	ri/Aro) Uri αri	Gs	where i= 1, 2,, n
=		3.70	_W/m²	

Components / Details		Code No.			
Description	Units	S1			
Skylight Glazing Type		-			
Thickness	m	-			
Skylight Area (Asi)	m²	0.00			
U-value of Skylight Glazing (Usi)	W/m²K	-			
Heat Conduction = 0.40 (Asi/Aro) Usi Gs		0.00			

Heat Conduction through Skylight	t = 0.40) (Asi/Aro) Usi Gs	where i= 1, 2,, n
	=	0.00	W/m²	

Part 3 - Calculation of Solar Radiation through Skylight											
Components / Details		Code No.									
Description	Units	S1									
Skylight Glazing Type		-									
Thickness	m	-									
Skylight Area (Asi)	m²	0.00									
Shading Coefficient of Skylight Glazing (SCr)		-									
Visible Light Transmittance (VLT)		-									
External Reflectance (ER)		-									
Solar Radiation = 41.10 (Asi/Aro) (SCri) Gs		0.00									

Solar Radiation through Skylight = 41.10 (Asi/Aro) (SCri) Gs where i= 1, 2, ..., n = 0.00 W/m²

Summary of RTTV at Roof = 3.70 + 0.00 + 0.00 = 3.70 W/m²

Project: Demarcation District No. 105 Ngau Tam Mei, Yuen Long, N.T. Form RTTV (Roof) 2 - Summary of RTTV_{roof} of Building Envelopes

Sheet No.	14	BD Ref No. BD 2/9179/15
Building Address	Lot 2115 D.D. 105 Ngau Tam Mei, Yuen Long (House 19)	

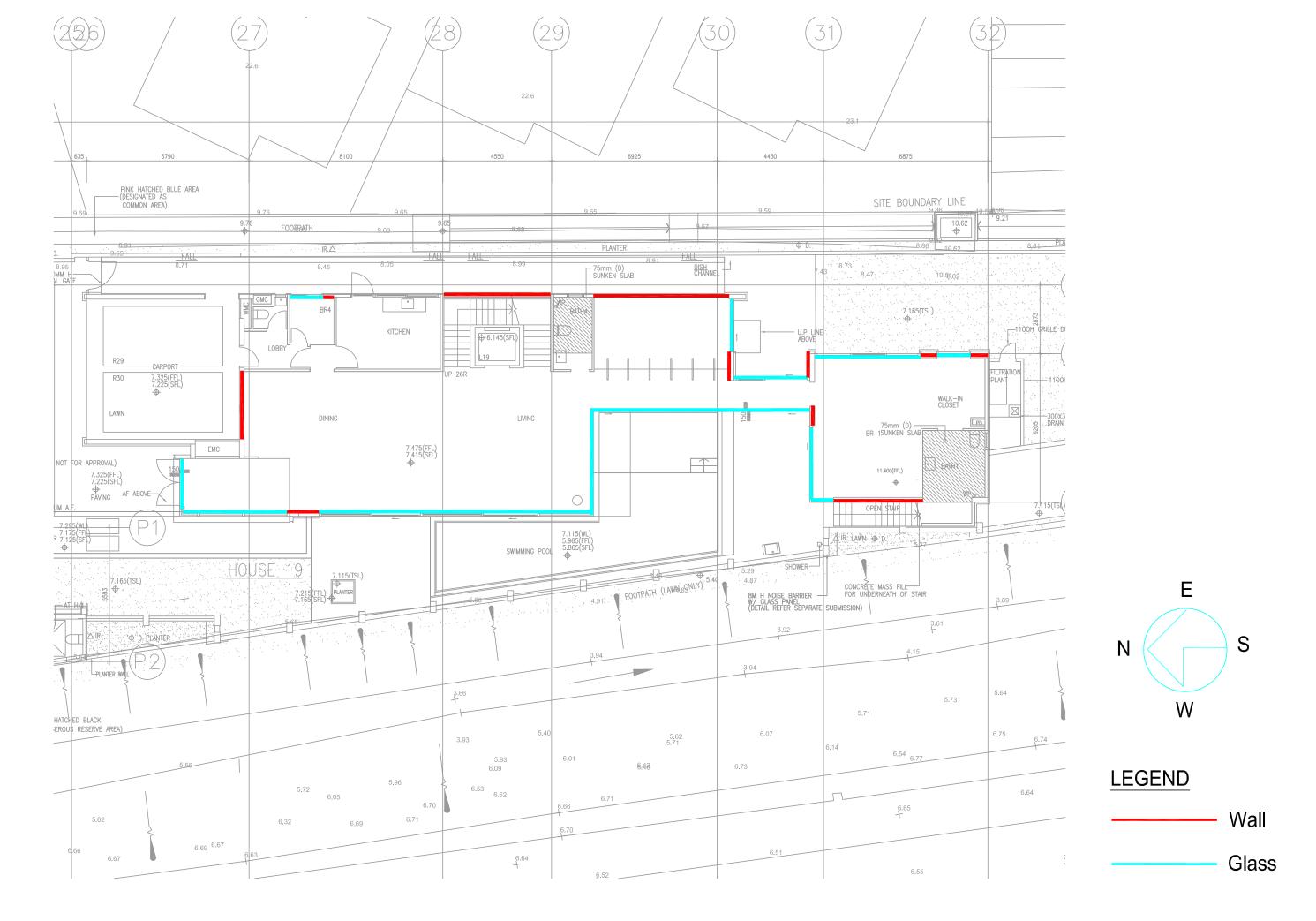
Overall Roof Area [a] 250.02 m²

Roof	Gross Roof Area	Heat Conduction through Opaque Roof	Heat Conduction through Skylight	Solar Radiation through Skylight	RTTVroof at Each Type of Roof	Area-weighted RTTVroof			
	(m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)	(W/m²)			
	[b]	[c]	[d]	[e]	[f]=[c]+[d]+[e]	[g]=[f]x[b]/[a]			
Flat Roof	250.02	3.70	0.00	0.00	3.70	3.70			

Overall RTTVroof = 3.70 W/m² < 4 W/m² OK

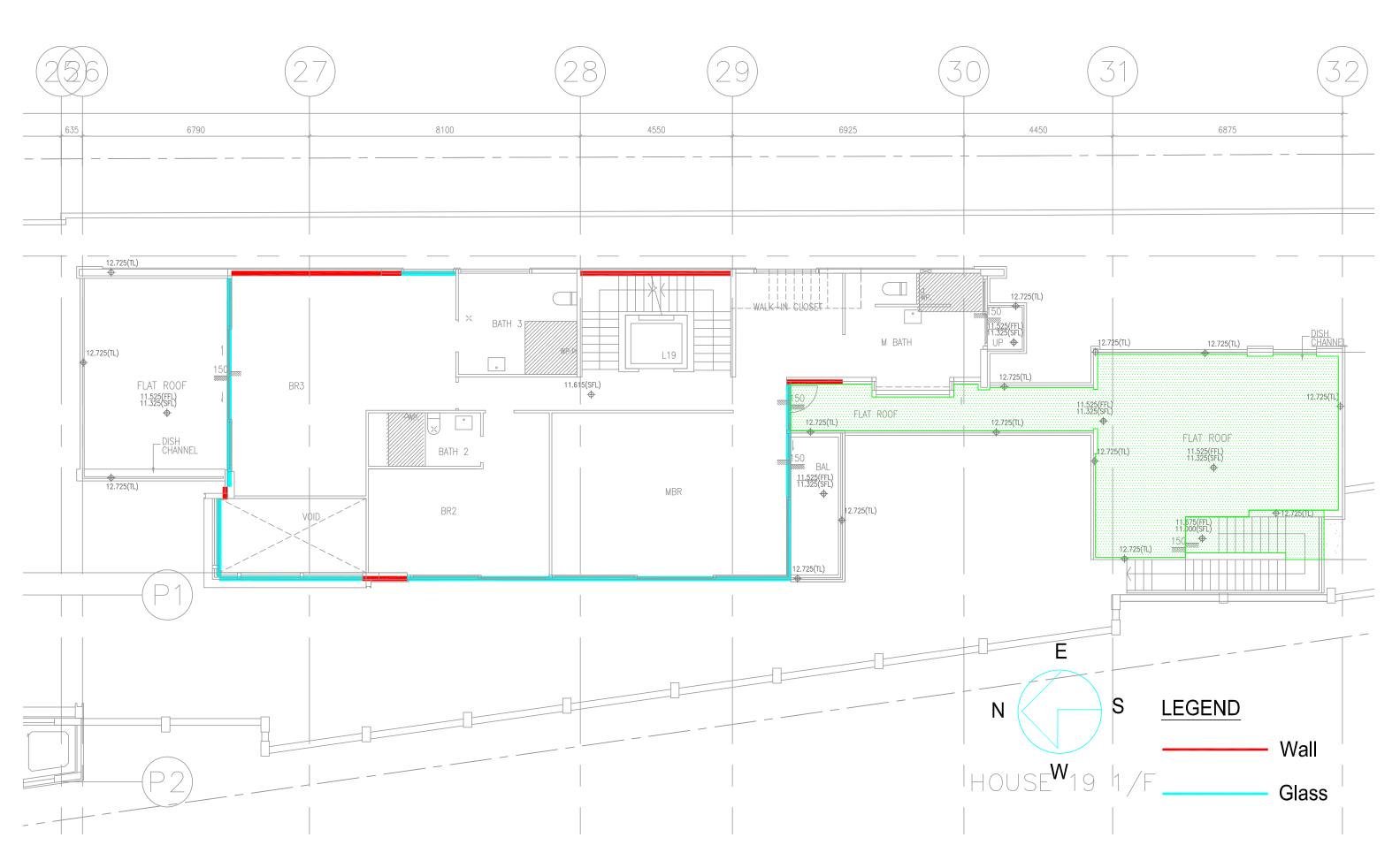
RTTV Summarv Sheet

Address: Lot 2115, D.D. 105, Ngau Tam Mei, Yuen Long (House 19) BD Ref. No. BD 2/9179/15																					
Building Type:																					
RTTV Calculat	ed by:																				
2. Architect							-														
		3. Others, please specify-																			
No. of Storeys																					
(Residential Un	Residential Units)																				
Table 1																				,	
Facade Orientat	i Parine		***		_	N 4		Т	Deen	ied to S	atisfy RTTV _{Wall}	1		-			1		-		
			West North		East 0.8			South 0.8													
Average Absorp			0.795			0.8	0.03		<u> </u>	0.8						1					
Shading Coeffic	w to Wall Ratio		0.36		_	0.36	0.43			0.43											
	g Coefficient of		0.40		-	0.40	0.40		0.40												
Facade	ig Coefficient of		0.40			0.40	0.40		0.40		0.40										
Visable Light T	ransmittance		57	%	ó	57 %	% 57		%	% 57			%		%			%		%	
External Reflec	tance		7	%	ó	7 %		7	%		7 %			%		%			%	%	
Table 2																					
							1			RT	TV _{Wall}										
Facade Orientat	_	West					North					East					South				
Wall Orientation				1.13					0.79					1.072				0.975			
Total External V (Residential Un		1	199.8	1	m ² Wine	dow to Wall Ratio	75.4 m ² W			Windo	Window to Wall Ratio		126.1 m ²		Window to Wall Ratio		62.5 m ²		m ²	Window to Wall Ratio	
Total Window	Area	7	72.17	1	m ² =	0.36		27.22	m ²	=	0.36		4.31	m ²	=	0.03		32.67	m ²	= 0.52	
Heat	Opaque Wall		7.4			W/m ²		5.59			W/m ²		8.80	1	W	m ²		2.80	-	W/m ²	
Conduction	Window		0.5	50		W/m ²		0.31			W/m ²		0.29		W	m ²		0.72		W/m ²	
Window	Glass Type		Area =	S	С	VLT = %		Area =	SC		VLT = %		Area =	SC	VLT	~= %		Area =	SC	VLT = %	
			m ²	-	=	ER = %	Reflective	m ²	=	ŀ	ER = %	Reflective	m ²	=	ER:	= %	Reflective	m ²	=	ER = %	
				72.17 S	C 0.43	VLT = 53 %	∠ Tinted		22 SC	0.43	VLT = 53 %			31 SC	0.43 VLT	= 53 %	Z Tinted		7 SC	0.43 VLT = 53 %	
			m ²	-	=	ER = 17 %		m ²	=		ER = 17 %		m ²	=	ER:	= 17 %		m ²	=	ER = 17 %	
		Clear	Area =	S		VLT = %	Clear	Area =	SC	ľ	VLT = %	Clear	Area =	SC	VLT	~= %	Clear	Area =	SC	VLT = %	
			m ²	=	=	ER = %		m ²	=		ER = %		m ²	=.	ER:	= %		m ²	=	ER = %	
	Double Glazing	☑ Yes		☐ No			☑ Yes	□ N	lo			∠ Yes	1	No			☑ Yes	□ No)		
	External	Overhang	☐ Yes	Z	No		Overhang	Yes	Z	No		Overhang	Yes	Z N	0		Overhang	Yes	Z N)	
	Shading	Sidefin	☐ Yes	Z] No		Sidefin	☐ Yes	Z 1	No		Sidefin	Yes	Z N	0		Sidefin	Yes	Z N	0	
Solar Radiation Gazing	through		7.9	93		W/m ²		4.89			W/m ²		4.57		W	m ²		6.19		W/m ²	
Average Absorp	otivity			0.79	95				0.8					0.8			1		0.8		
RTTV _{Wall} at each			15.8	86		W/m ²		10.79			W/m ²	13.67 W/m ² 9.71 W/m							W/m ²		
Overall RTTV _v	Vall										13.69	W/m ²					1				
Table 3																					
										RT	TV_{Roof}										
Roof Orientatio	n Factor		2.16																		
Total Roof Area	a (Residential	(250.02		m ²																
Units)		7	ک	<u> </u>																	
Total Skylight A			0		m ²																
Heat Conduction	Roof	(3.70	_)	W/m																
Conduction	Skylight				W/m	.2															
	Glass Type	Reflective Area =				m ² SC =					VLT =				%	ER =		%			
		Tinted		Area =				m ² SC =					VLT	`=			%	ER =		%	
		Clear		Area =				m ² SC =					VLT	`=			%	ER =		%	
Skylight	Double Glazing	Yes		☐ No																	
	External Shading	Yes		☐ No																	
Color D - 3:-4:	through Gazing				****	2															
		/	0.8	$\overline{}$	W/m	Į.															
Average Absorp			3.70	-↓-	****	2															
Overan K I I V R	OOF	1	3.70)	W/m	l .															

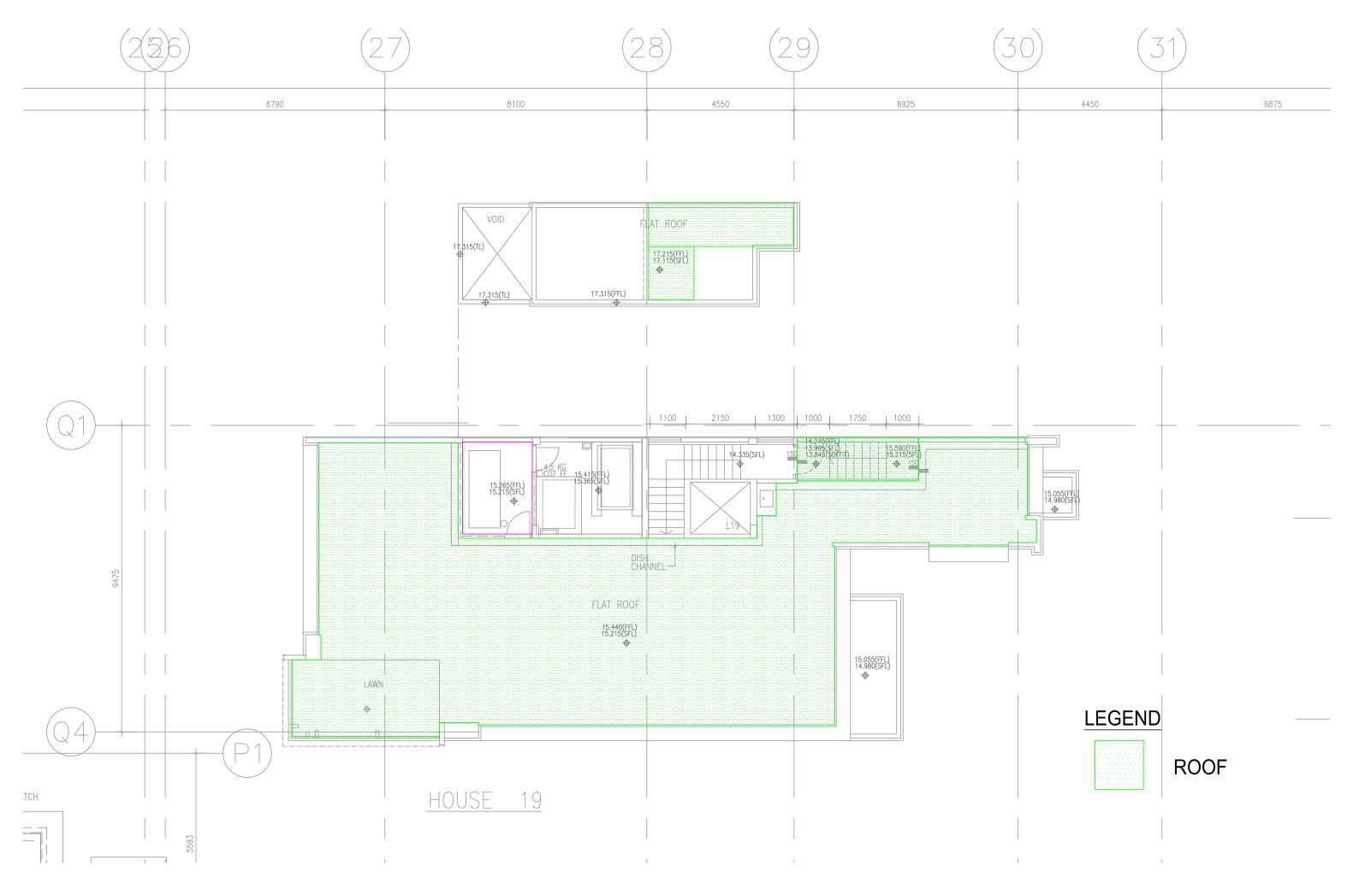


DRAWING TITLE: HOUSE 19 GROUND FLOOR PLAN

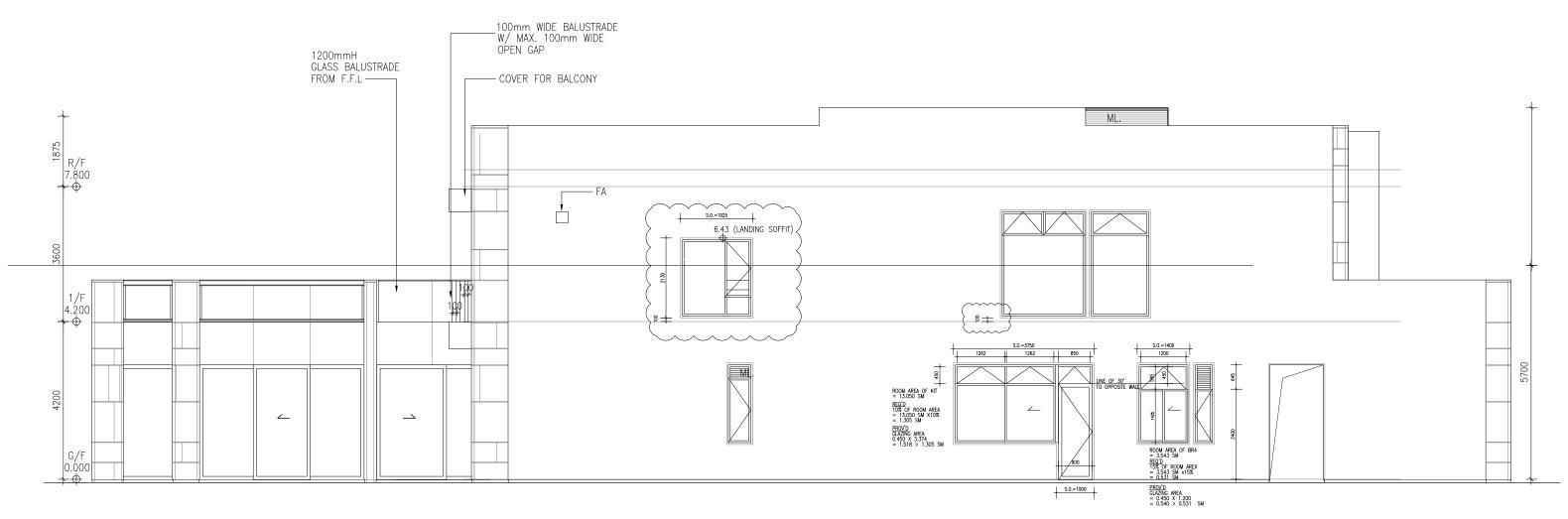
SCALE: 1:150@A4



DRAWING TITLE: HOUSE 19 FIRST FLOOR PLAN SCALE: 1:100@A3

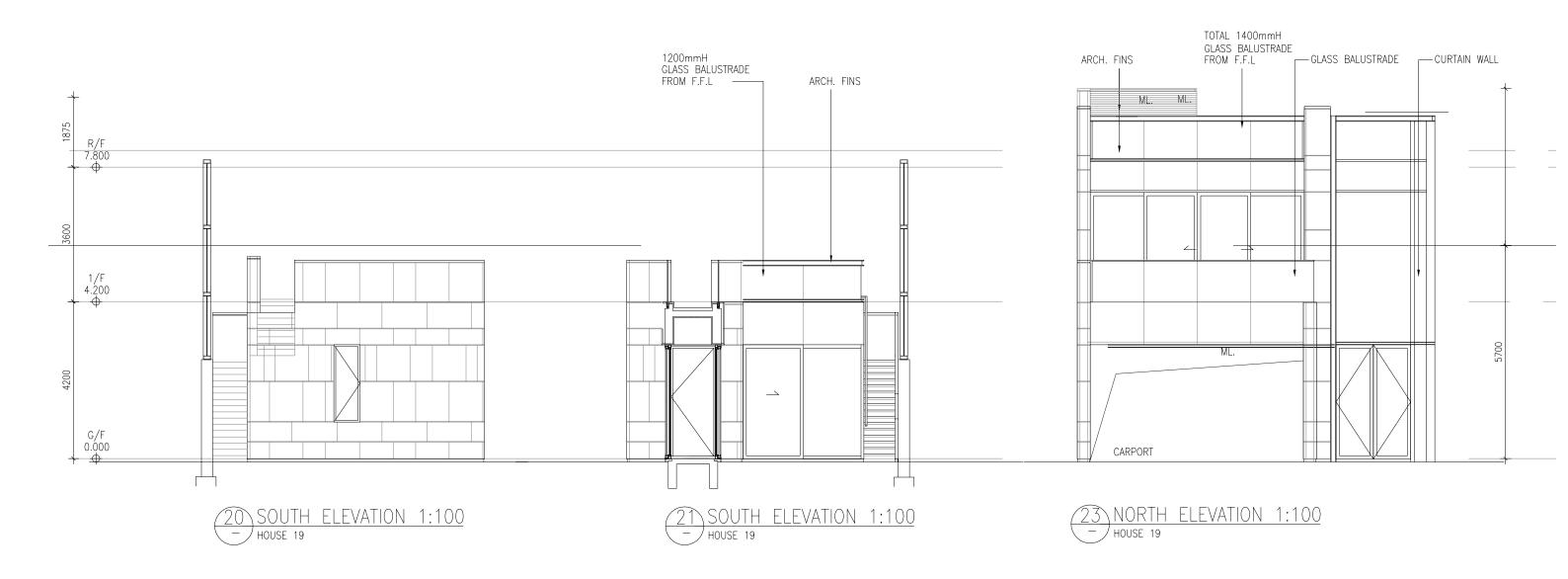


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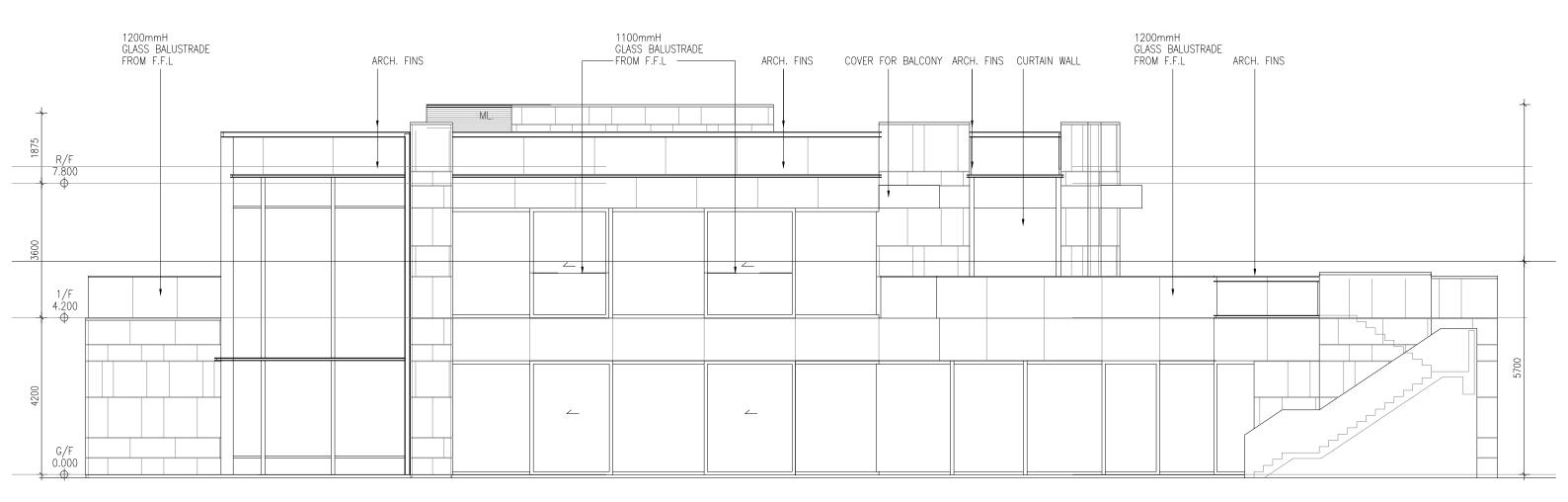




CSK-19E1B



CSK-19E2



19 WEST ELEVATION 1:100 HOUSE 19

CSK-19E3