UNDERSTANDING THE 6th SCHEDULE IN DEPTH

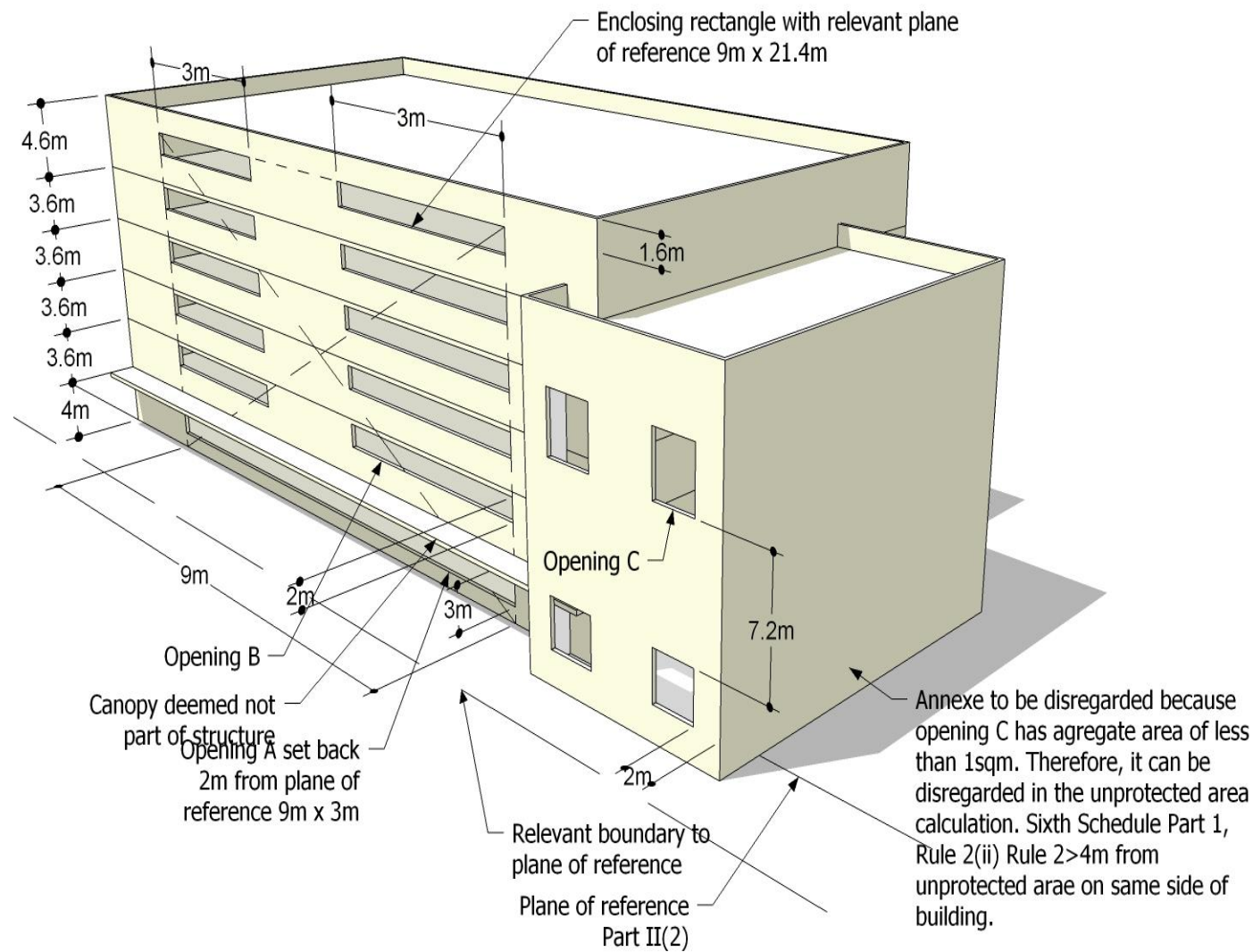# MODULE 3:
USING UBBL SCHEDULE 6

By Ar Ridha & Ar Adrianta

SAMPLE CASE STUDY CALCULATION OF 6TH SCHEDULE AND AGREGATE NOTIONAL AREA

You are given an office façade with 2 different window size opening. Calculate the distance of the allowable relevant boundary and aggregate notional area

Enclosing rectangle with relevant plane of reference 9m x 21.4m

3m

3m

4.6m

3.6m

3.6m

3.6m

3.6m

4m

1.6m

9m

2m

3m

Opening C

7.2m

Opening B

Canopy deemed not part of structure

Opening A set back 2m from plane of reference 9m x 3m

2m

2m

Relevant boundary to plane of reference

Plane of reference Part II(2)

Annexe to be disregarded because opening C has agregate area of less than 1sqm. Therefore, it can be disregarded in the unprotected area calculation. Sixth Schedule Part 1, Rule 2(ii) Rule 2>4m from unprotected arae on same side of building.

WHAT DOES THE QUESTION WANTS?

Objective is to check if the front façade design complies with Sixth Schedule

Compliance to part	Objective
Part II (Rules of Calculation by reference to an Enclosing Rectangle)-	1. To calculate relevant boundary distance 2. to determine limit of un protected opening
Part III (Rules for Calculation by reference to Aggregate Notional area)-	To calculate whether relevant boundary distance comply to aggregate notional area allowed in schedule 1. 210sqm- I.II.III.IV, VII 2. 90 sqm – purpose group V,VI,VIII

GENERAL ASSUMPTION

Design parameter existing & Assumptions made :

1. Purpose Group   : IV (Office)

2. Assume design for : Building façade is 7.5 meter to
                              centre of road

3. Building not compartmented
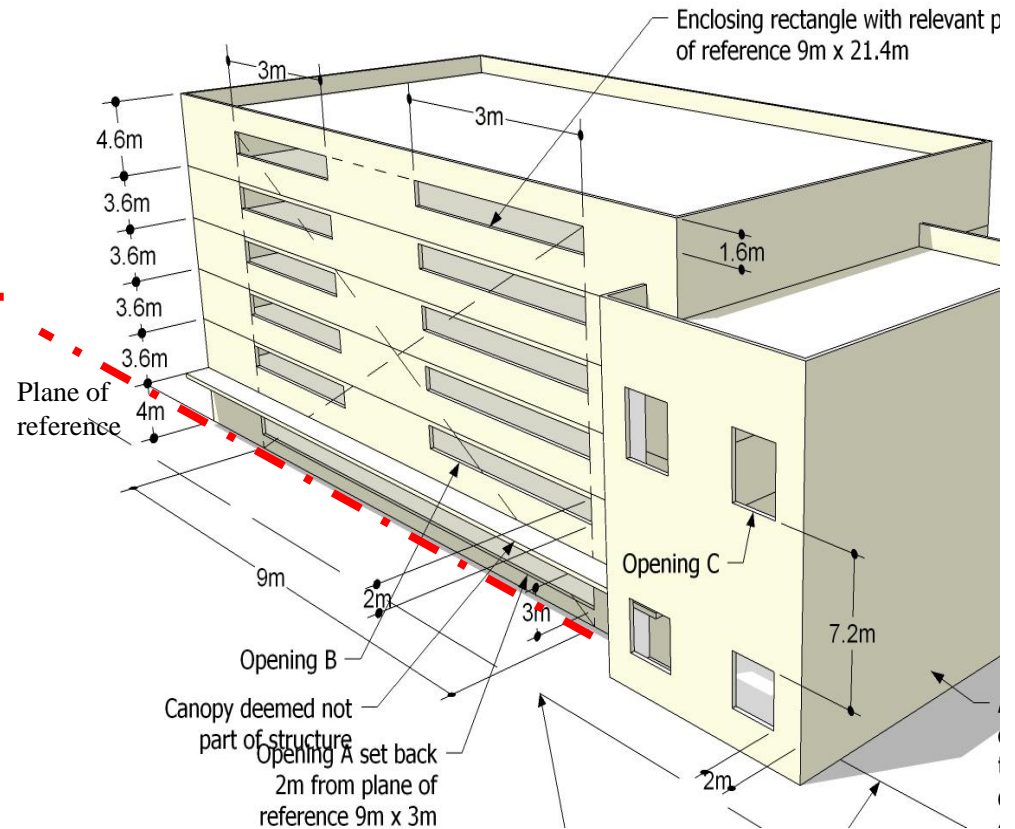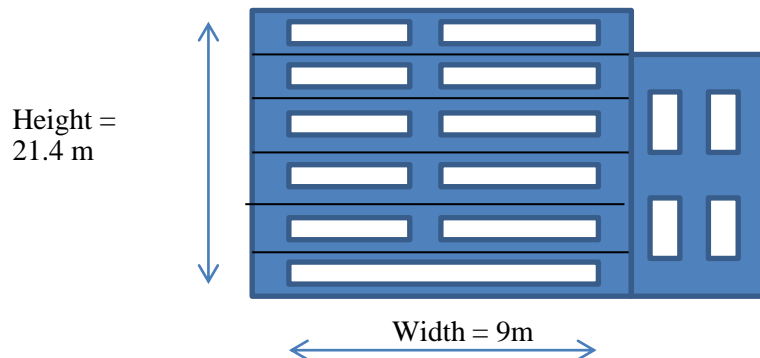
4. Annexe block to be disregarded

Establish a **plane of reference** which is the most favorable for the side of the building under consideration it touches all or part of the side. Normally it will be best for the plane of reference to be roughly parallel to the relevant boundary.

PLAN

OFFICE

Plane of reference

ELEVATION

Height = 21.4 m

Width = 9m

Enclosing rectangle with relevant p of reference 9m x 21.4m

3m

3m

4.6m

3.6m

3.6m

3.6m

3.6m

1.6m

Plane of reference

4m

9m

2m

3m

7.2m

Opening C

Opening B

Canopy deemed not part of structure
Opening A set back 2m from plane of reference 9m x 3m

2m

Enclosing rectangle = area of façade which encloses all unprotected area

DEFINE Enclosing Rectangle

Height = 21.4 m

Width = 9m
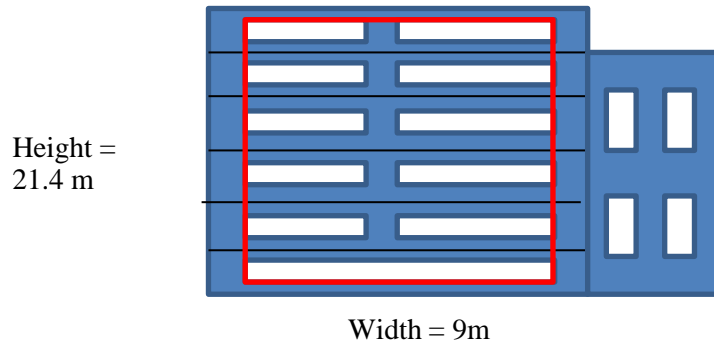
Calculation:

Width façade : 9m

Height Façade : 21.4 m

Enclosing rectangle

= Width X Height

=192.6 sqm

Enclosing rectangle with relevant p of reference 9m x 21.4m

3m

4.6m

3.6m

3.6m

3.6m

4m

Plane of reference

1.6m

Opening C

7.2m

9m

2m

3m

Opening B

Canopy deemed not part of structure

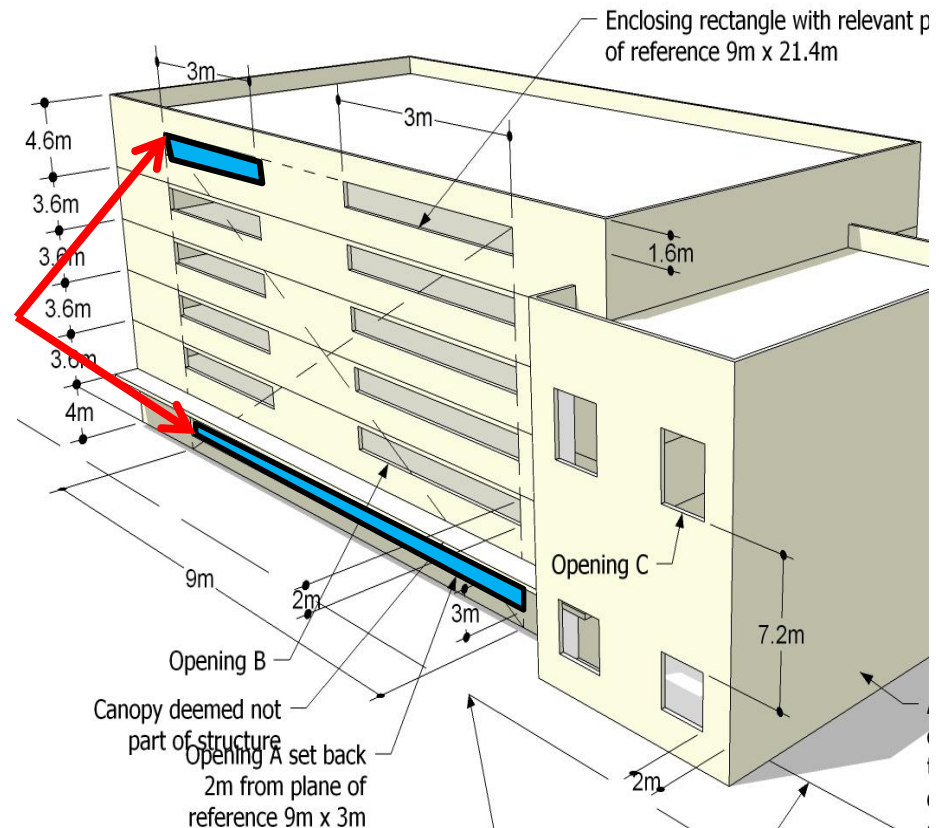Opening A set back 2m from plane of reference 9m x 3m

2m
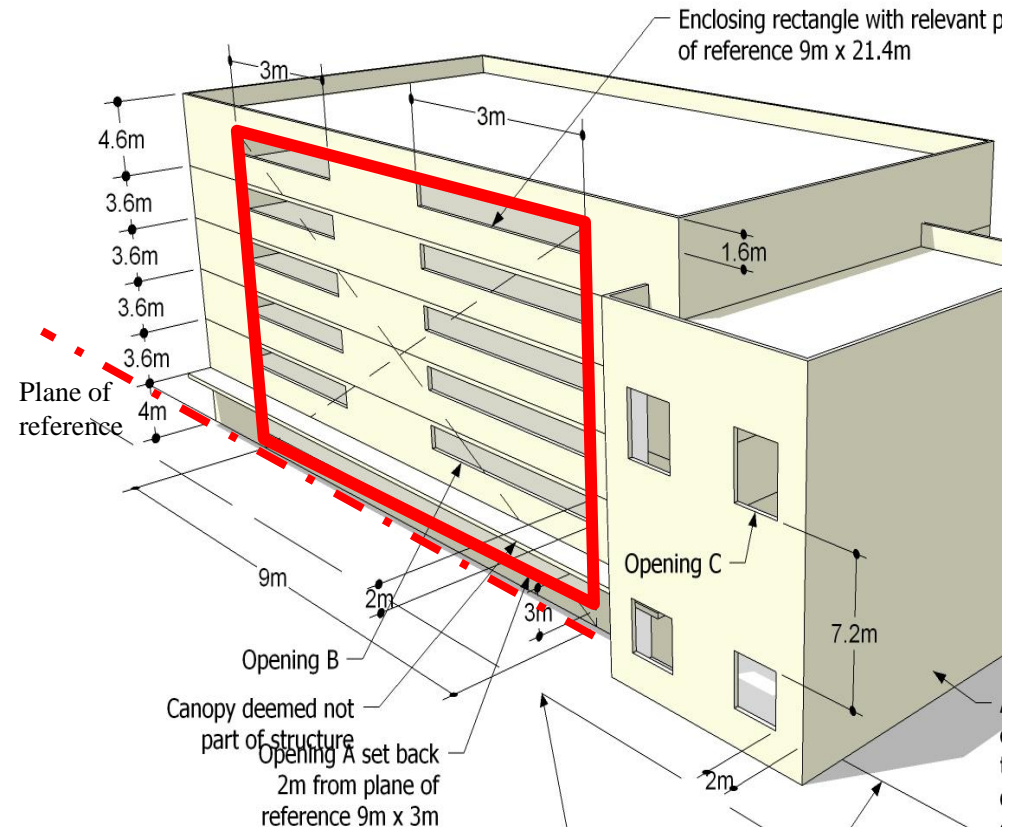
Unprotected Openings = Unprotected Openings such as windows and void openings

Calculation of window openings:

10 nos 3m x 2m windows on upper flrs = 60sm

1 no 9m x 3m window on Grd Level= 27sm

Total Area of Unprotected Openings = 87sm

Enclosing rectangle with relevant p
of reference 9m x 21.4m

3m

3m

4.6m

3.6m

3.6m

1.6m

3.6m

3.6m

4m

9m

2m

3m

Opening C

7.2m

Opening B

Canopy deemed not
part of structure
Opening A set back
2m from plane of
reference 9m x 3m

2m

Percentage of unprotected opening in rectangle =
Percentage ratio of unprotected area on the wall surface

Percentage of Unprotected Opening in Enclosing Rectangle is:

=Total window area devide by total façade area

=87 sqm /192.6sqm

= 45.17%
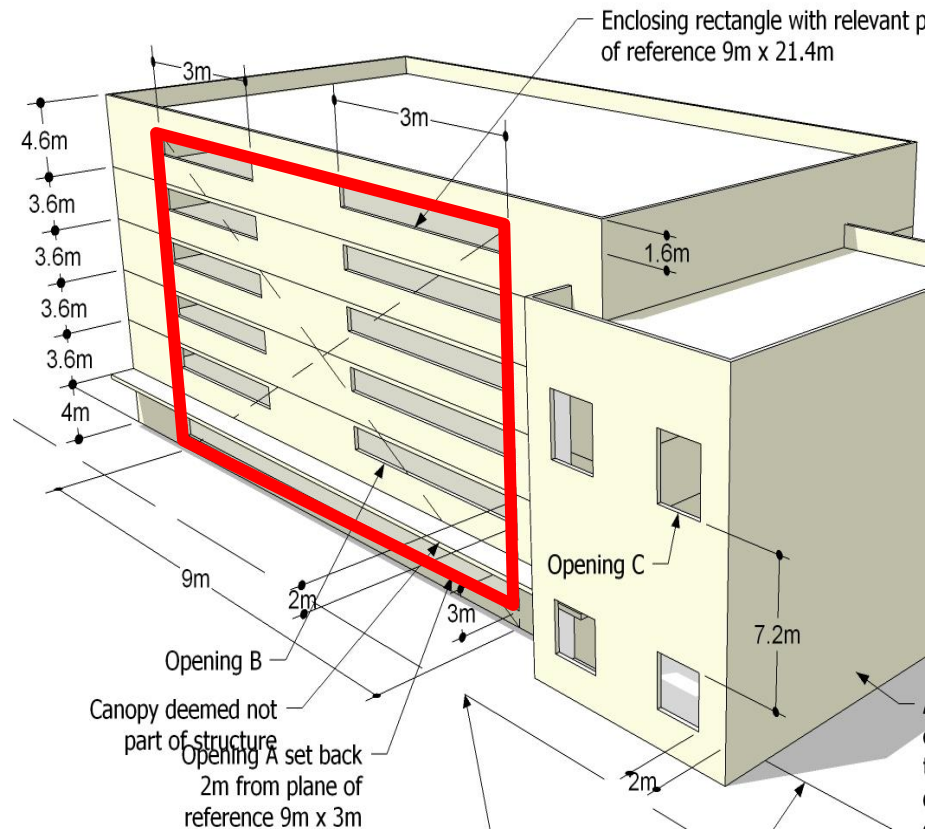
Establish the parameters enclosing Rectangle:

Height = 21.4 m

Percentage unprotected area 45.17%

Width = 9m

Look for relevant Table in schedule 6 at part II-
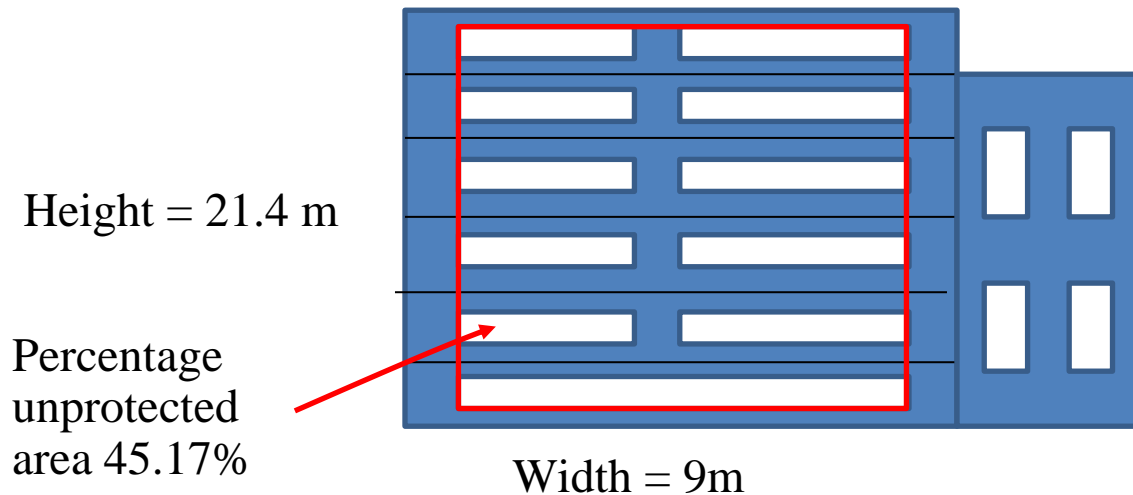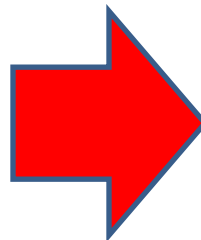
1. Select table for Purpose Groups I (Small Residential), II (Institutional), III (Other Residential), **IV (Office)** and VII (Assembly)

2. Select the next highest height, if 21meters, select 24 meters table

TABLES TO PART II

TABLE I—BUILDINGS OR COMPARTMENTS OF PURPOSE GROUPS

I (Small Residential), II (Institutional), III (Other Residential), IV (Office) and VII (Assembly)

Width of enclosing rectangle in metres	Distance in metres from relevant boundary for unprotected percentage not exceeding								
	20	30	40	50	60	70	80	90	100
Enclosing rectangle 3 m high									
3	1.0	1.0	1.0	1.5	1.5	1.5	2.0	2.0	2.0
6	1.0	1.0	1.5	2.0	2.0	2.0	2.5	2.5	3.0
9	1.0	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.5
12	1.0	1.5	2.0	2.0	2.5	3.0	3.0	3.5	3.5
15	1.0	1.5	2.0	2.5	2.5	3.0	3.5	3.5	4.0
18	1.0	1.5	2.0	2.5	2.5	3.0	3.5	4.0	4.0
21	1.0	1.5	2.0	2.5	3.0	3.0	3.5	4.0	4.5
24	1.0	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.5
27	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.0	4.5
30	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.0	4.5
40	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.0	5.0
No limit	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.0	5.0

TABLES TO PART II

TABLE I—BUILDINGS OR COMPARTMENTS OF PURPOSE GROUPS
I (Small Residential), II (Institutional), III (Other Residential),
IV (Office) and VII (Assembly)

Width of enclosing rectangle in metres	Distance in metres from relevant boundary for unprotected percentage not exceeding								
	20	30	40	50	60	70	80	90	100
Enclosing rectangle 27 m high									
3	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.0	4.5
6	1.5	2.5	3.5	4.5	5.0	6.0	6.5	7.0	7.5
9	2.0	3.5	5.0	6.0	7.0	7.5	8.5	9.5	10.0
12	2.5	4.5	6.0	7.0	8.0	9.0	10.5	11.0	12.0
15	3.0	5.5	7.0	8.5	9.5	10.5	11.5	12.5	13.5
18	3.5	6.0	8.0	9.0	10.5	11.5	12.5	13.5	14.5
21	3.5	6.5	8.5	10.0	11.5	13.0	14.0	15.0	16.0
24	3.5	7.0	9.0	11.0	12.5	13.5	15.0	16.0	17.0
27	4.0	7.5	10.0	11.5	13.0	14.0	16.0	17.0	18.0
30	4.0	8.0	10.0	12.0	13.5	15.0	17.0	18.0	19.0
40	5.0	9.0	11.5	13.0	15.5	17.5	19.0	20.5	22.0
50	5.5	9.5	12.5	15.0	17.0	19.0	21.0	22.5	24.0
60	5.5	10.5	13.5	16.0	18.5	20.5	22.5	24.5	26.5
80	6.0	11.0	14.5	17.5	20.5	22.5	25.0	27.5	29.5
100	6.0	11.0	15.5	19.0	21.5	24.5	27.0	30.0	32.0
120	6.0	11.5	15.5	19.5	22.5	26.0	28.5	32.0	34.0
No limit	6.0	11.5	15.5	20.0	23.5	27.0	29.5	33.0	35.0

TABLE 2—BUILDINGS OR COMPARTMENTS OF PURPOSE GROUPS
V (Shop), VI (Factory) and VIII (Storage and General)

Width of enclosing rectangle in metres	Distance in metres from relevant boundary for unprotected percentage not exceeding								
	20	30	40	50	60	70	80	90	100
Enclosing rectangle 27 m high									
3	2.0	3.0	4.0	4.5	5.5	6.0	6.5	7.0	7.5
6	3.5	5.0	6.5	7.5	8.5	9.5	10.5	11.0	12.0
9	5.0	7.0	8.5	10.0	11.5	12.5	13.5	14.5	15.0
12	6.0	8.0	10.5	12.0	13.5	14.5	16.0	17.0	17.5
15	7.0	9.5	11.5	13.5	15.0	16.5	18.0	19.0	20.0
18	8.0	10.5	12.5	14.5	16.5	17.5	19.5	20.5	21.5
21	8.5	11.5	14.0	16.0	18.0	19.0	21.0	22.5	23.5
24	9.0	12.5	15.0	17.0	19.0	20.5	22.5	24.0	25.5
27	10.0	13.0	16.0	18.0	20.0	22.0	24.0	25.5	27.0
30	10.0	13.5	17.0	19.0	21.0	23.0	25.0	26.5	28.0
40	11.5	15.5	19.0	22.0	24.5	26.5	29.0	30.5	32.5
50	12.5	17.0	21.0	24.0	27.0	29.5	32.0	34.5	36.0
60	13.5	18.5	22.5	26.5	29.5	32.0	35.0	37.0	39.0
80	14.5	20.5	25.0	29.5	33.0	36.5	39.5	42.0	44.0
100	15.5	21.5	27.0	32.0	36.5	40.5	43.0	46.5	48.5
120	15.5	22.5	28.5	34.0	39.0	43.0	46.5	50.5	53.0
No limit	15.5	23.5	29.5	35.0	40.5	44.5	48.5	52.0	55.5

1. Maximum table height is for less than 27m height enclosing rectangle.
2. Any more higher will be calculate as compartment floors as referred to by law 137

STEP 6 : Determination of boundary Distance
Go to Table with enclosing rectangle 24m high (next higher from 21m) ,

UNIFORM BUILDING BY-LAWS

Width of enclosing rectangle in metres	Distance in metres from relevant boundary for unprotected percentage not exceeding								
	20	30	40	50	60	70	80	90	100
Enclosing rectangle 24 m high									
3	0.5	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.5
6	1.5	2.5	3.5	4.5	5.0	5.5	6.0	7.0	7.0
9	2.0	3.5	5.0	5.5	6.5	7.5	8.0	9.0	9.5
12	2.5	4.5	6.0	7.0	8.0	8.5	9.5	10.5	11.5
15	3.0	5.0	6.5	8.0	9.0	10.0	11.0	12.0	13.0
18	3.0	5.5	7.5	8.5	10.0	11.0	12.0	13.0	14.0
21	3.5	6.0	8.0	9.5	10.5	12.0	13.0	14.0	15.0
24	3.5	6.5	8.5	10.0	11.5	12.5	14.0	15.0	16.0
27	4.0	7.0	9.0	11.0	12.5	13.5	15.0	16.0	17.0
30	4.0	7.5	9.5	11.5	13.0	14.0	15.5	17.0	18.0
40	4.5	8.5	11.0	13.0	14.5	16.0	18.0	19.0	20.5
50	5.0	9.0	12.0	14.0	16.0	17.5	19.5	21.0	22.5
60	5.0	9.5	12.5	15.0	17.0	19.0	21.0	23.0	24.5
80	5.0	10.0	13.5	16.5	18.5	21.0	23.5	25.5	27.5
100	5.0	10.0	13.5	17.0	20.0	22.5	25.0	27.5	29.5
120	5.5	10.0	13.5	17.5	20.5	23.5	26.5	29.0	21.0
No limit	5.5	10.0	13.5	18.0	21.0	24.0	27.5	30.0	32.5

Read the following

1. Row : 9meter Width Enclosing Rectangle

2. Column : Select percentage of unprotected area 50% (next higher from 45.17% to check compliance

UNIFORM BUILDING BY-LAWS

Width of enclosing rectangle in metres	Distance in metres from relevant boundary for unprotected percentage not exceeding								
	20	30	40	50	60	70	80	90	100
Enclosing rectangle 24 m high									
3	0.5	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.5
6	1.5	2.5	3.5	4.5	5.0	5.5	6.0	7.0	7.0
9	2.0	3.5	5.0	5.5	6.5	7.5	8.0	9.0	9.5
12	2.5	4.5	6.0	7.0	8.0	8.5	9.5	10.5	11.5
15	3.0	5.0	6.5	8.0	9.0	10.0	11.0	12.0	13.0
18	3.0	5.5	7.5	8.5	10.0	11.0	12.0	13.0	14.0
21	3.5	6.0	8.0	9.5	10.5	12.0	13.0	14.0	15.0
24	3.5	6.5	8.5	10.0	11.5	12.5	14.0	15.0	16.0
27	4.0	7.0	9.0	11.0	12.5	13.5	15.0	16.0	17.0
30	4.0	7.5	9.5	11.5	13.0	14.0	15.5	17.0	18.0
40	4.5	8.5	11.0	13.0	14.5	16.0	18.0	19.0	20.5
50	5.0	9.0	12.0	14.0	16.0	17.5	19.5	21.0	22.5
60	5.0	9.5	12.5	15.0	17.0	19.0	21.0	23.0	24.5
80	5.0	10.0	13.5	16.5	18.5	21.0	23.5	25.5	27.5
100	5.0	10.0	13.5	17.0	20.0	22.5	25.0	27.5	29.5
120	5.5	10.0	13.5	17.5	20.5	23.5	26.5	29.0	21.0
No limit	5.5	10.0	13.5	18.0	21.0	24.0	27.5	30.0	32.5

Width →

Reading from the 9m Row,

Permitted minimum: For 50% Unprotected Opening, the distance to Relevant boundary should not be less than 5.5m

Design for: Distance to Relevant Boundary = 7.5m (set back from relevant boundary) is more then what requires of 5.5 meters

Therefore Façade complies with Sixth Schedule Part II

UNIFORM BUILDING BY-LAWS

Width of enclosing rectangle in metres	Distance in metres from relevant boundary for unprotected percentage not exceeding								
	20	30	40	50	60	70	80	90	100
Enclosing rectangle 24 m high									
3	0.5	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.5
6	1.5	2.5	3.5	4.5	5.0	5.5	6.0	7.0	7.0
9	2.0	3.5	5.0	5.5	6.5	7.5	8.0	9.0	9.5
12	2.5	4.5	6.0	7.0	8.0	8.5	9.5	10.5	11.5
15	3.0	5.0	6.5	8.0	9.0	10.0	11.0	12.0	13.0
18	3.0	5.5	7.5	8.5	10.0	11.0	12.0	13.0	14.0
21	3.5	6.0	8.0	9.5	10.5	12.0	13.0	14.0	15.0
24	3.5	6.5	8.5	10.0	11.5	12.5	14.0	15.0	16.0
27	4.0	7.0	9.0	11.0	12.5	13.5	15.0	16.0	17.0
30	4.0	7.5	9.5	11.5	13.0	14.0	15.5	17.0	18.0
40	4.5	8.5	11.0	13.0	14.5	16.0	18.0	19.0	20.5
50	5.0	9.0	12.0	14.0	16.0	17.5	19.5	21.0	22.5
60	5.0	9.5	12.5	15.0	17.0	19.0	21.0	23.0	24.5
80	5.0	10.0	13.5	16.5	18.5	21.0	23.5	25.5	27.5
100	5.0	10.0	13.5	17.0	20.0	22.5	25.0	27.5	29.5
120	5.5	10.0	13.5	17.5	20.5	23.5	26.5	29.0	21.0
No limit	5.5	10.0	13.5	18.0	21.0	24.0	27.5	30.0	32.5

Using the same 9m W x 24m H

Enclosing Rectangle, if one uses the

Permitted   : 45.17% permitted opening refer to 50% , 5.5m from relevant boundary

Design for : For 7.5m distance to Relevant Boundary as the basis, reading upwards,
            one finds that the maximum percentage of unprotected opening is 70%,

therefore, the façade design satisfies Part II of the Sixth Schedule and designer have an option to add more openings
        from 45.17% to 50%.

UNIFORM BUILDING BY-LAWS

Width of enclosing rectangle in metres	Distance in metres from relevant boundary for unprotected percentage not exceeding								
	20	30	40	50	60	70	80	90	100
Enclosing rectangle 24 m high									
3	0.5	1.5	2.0	2.5	3.0	3.5	3.5	4.0	4.5
6	1.5	2.5	3.5	4.5	5.0	5.5	6.0	7.0	7.0
9	2.0	3.5	5.0	5.5	6.5	7.5	8.0	9.0	9.5
12	2.5	4.5	6.0	7.0	8.0	8.5	9.5	10.5	11.5
15	3.0	5.0	6.5	8.0	9.0	10.0	11.0	12.0	13.0
18	3.0	5.5	7.5	8.5	10.0	11.0	12.0	13.0	14.0
21	3.5	6.0	8.0	9.5	10.5	12.0	13.0	14.0	15.0
24	3.5	6.5	8.5	10.0	11.5	12.5	14.0	15.0	16.0
27	4.0	7.0	9.0	11.0	12.5	13.5	15.0	16.0	17.0
30	4.0	7.5	9.5	11.5	13.0	14.0	15.5	17.0	18.0
40	4.5	8.5	11.0	13.0	14.5	16.0	18.0	19.0	20.5
50	5.0	9.0	12.0	14.0	16.0	17.5	19.5	21.0	22.5
60	5.0	9.5	12.5	15.0	17.0	19.0	21.0	23.0	24.5
80	5.0	10.0	13.5	16.5	18.5	21.0	23.5	25.5	27.5
100	5.0	10.0	13.5	17.0	20.0	22.5	25.0	27.5	29.5
120	5.5	10.0	13.5	17.5	20.5	23.5	26.5	29.0	21.0
No limit	5.5	10.0	13.5	18.0	21.0	24.0	27.5	30.0	32.5

In UK they have updated their UBBL, If add sprinkler, 2 options

1. Relevant boundary can be half of what is given- example 7.5 become 3.25 or,
2. If already comply with the relevant boundary distance, can double the unprotected area – example 87sqm becomes 174 sqm, become 90% and relevant boundary 9 meters

Source: **The Building Regulations 2000: approved document, B: Fire safety ..., Volume 2** By Stationery Office, Great Britain

In UBBL Malaysia, this is not captured in the by laws.

Relevant boundary distance establish in design : 7.5 meter
Check table to get the factor

TABLE OF FACTORS

Distance of unprotected area from vertical datum in metres		Factor
Not less than	Less than	
1	1.2	80
1.2	1.8	40
1.8	2.7	20
2.7	4.3	10
4.3	6.0	4
6.0	8.5	2
8.5	12.0	1
12.0	18.5	0.5
18.5	27.5	0.25
27.5	50	0.1
50	No limit	0

7.5m

Table of factors for distance to vertical datum between 6.0 to 8.5m is 2

Total Area of Unprotected Opening is 87sm for office building (purpose group IV)

Aggregate Notional Area is :

area of Unprotected Opening   X   Factor in table factor PART III schedule 6

87 sqm X 2 = 174 sqm

Part III Rule 1 says aggregate notional area at side building must not exceed

1. 210sqm- I.II.III.IV, IV
2. 90 sqm – purpose group V,VI,VIII

Therefore, façade of office building with 187 sqm which is less than 210 sqm satisfies Part III Rule 1(a) of Sixth Schedule

10 STEPS TO CALCULATE SCHEDULE 6

STEP 1: Establish Plane of reference

STEP 2 : Determination the area of exposure of fire - Establish Enclosing Rectangle Size

STEP 3: Determining Unprotected Area - Calculate Area of Unprotected Openings and smallest enclosing wall of opening

STEP 4: Determining Unprotected Area- Calculate Percentage of Unprotected Openings

STEP 5 : For Compliance with Schedule 6 Part II –Establish parameters of the enclosing rectangle : Height, width, percentage of unprotected openings.

STEP 6 : Determination of Relevant boundary Distance- Go to Table for related purpose group with enclosing rectangle required high and width.

STEP 7 : For Compliance with Part II – check relevant boundary permitted

STEP 8 : For Compliance with Part II – check your design for any adjustments

STEP 9 : Determine factor in Part III- Distance of Relevant boundary will determine factor to be use

STEP 10 : Calculation compliance to aggregate notional area

THANK YOU