Annual Fire Safety Engineer (FSE) Dialogue Session

Friday 17 March 2017
3pm to 5pm
SCDF HQ
City Campus Level 3 Lecture Room 1A

Fire Engineering Reports

What is shown during PB presentation:

- Title (Description)
- Introduce the building (Building plans)
- Deviations
- Design fire scenarios
- Mark-up drawings
- Results (Where applicable)

Applies to all **FEDB**/**FER**/**WVR Rpts**

What is shown during PB presentation:

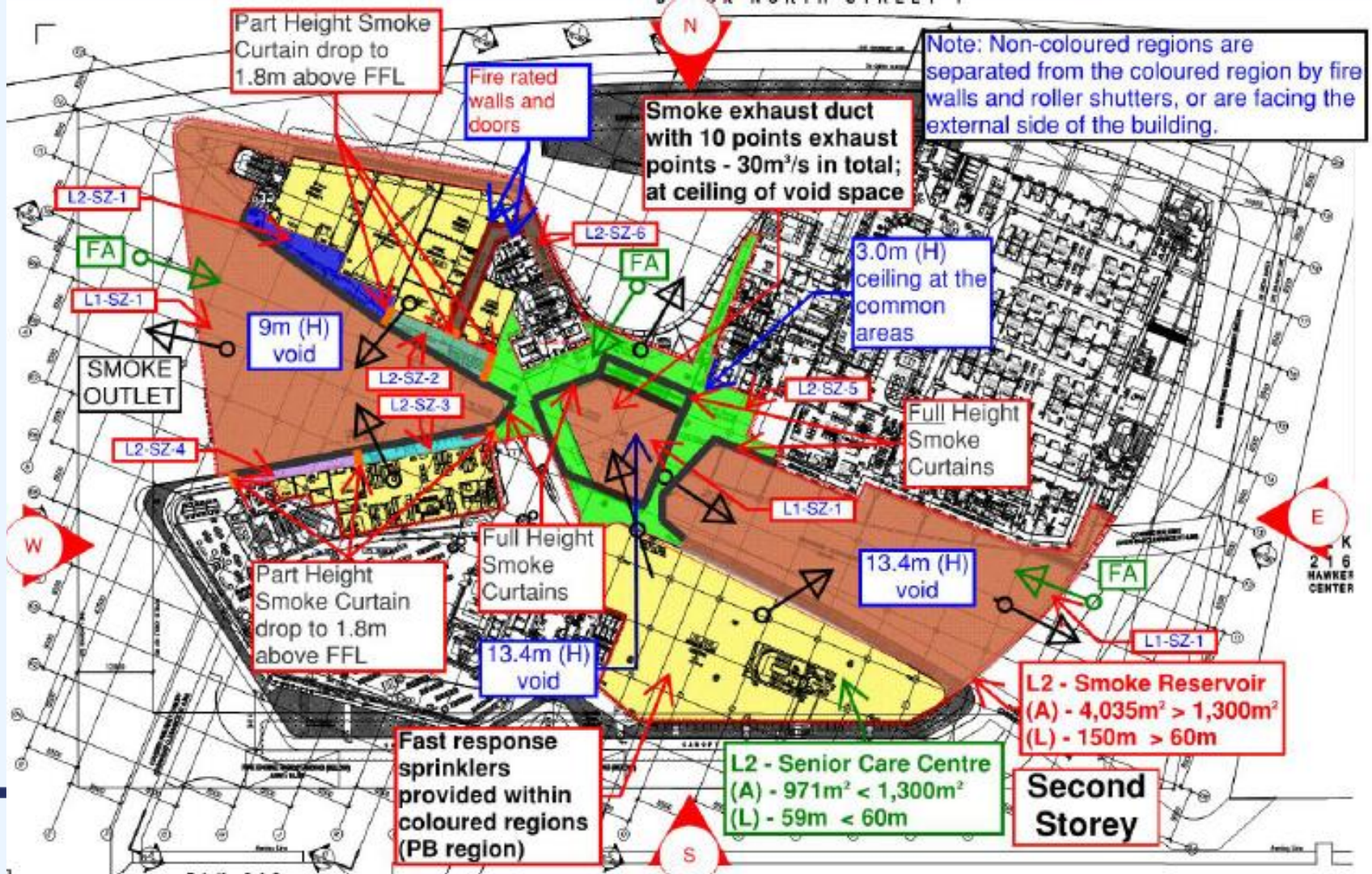
- Title (Description)
  - ✓ Beware spelling errors

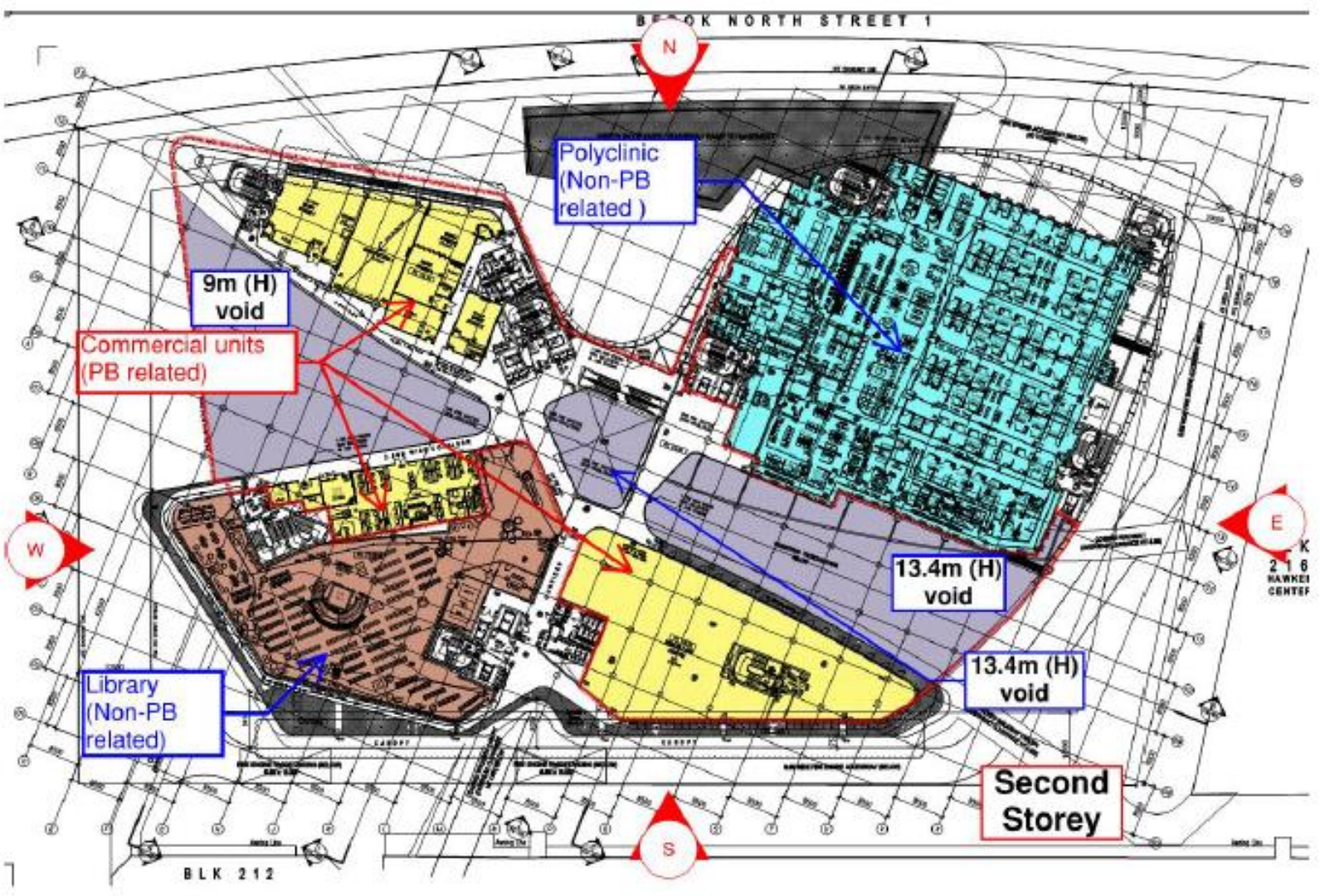
What is shown during PB presentation:

- Introduce the building (Building plans)
  - ✓ Clean set just showing main uses
    - Retail
    - Clinic
    - Car park
    - Library
    - Cinema
    - Etc

What is shown during PB presentation:

- Introduce the building (Building plans)
  - ✓ Indicate PB floors/areas
    - State clearly if floor has no PB issues
  - ✓ Slow location plan and Fire Engine Accessway.
  - ✓ Include photos/pics/3d drawings
  - ✓ Can use deviation set if not too congested.


Part Height Smoke Curtain drop to 1.8m above FFL
Fire rated walls and doors
Smoke exhaust duct with 10 points exhaust points - 30m³/s in total; at ceiling of void space
Note: Non-coloured regions are separated from the coloured region by fire walls and roller shutters, or are facing the external side of the building.
N
L2-SZ-1
FA
L1-SZ-1
9m (H) void
SMOKE OUTLET
L2-SZ-6
FA
3.0m (H) ceiling at the common areas
L2-SZ-2
L2-SZ-3
L2-SZ-4
L2-SZ-5
Full Height Smoke Curtains
W
L1-SZ-1
E
Full Height Smoke Curtains
Part Height Smoke Curtain drop to 1.8m above FFL
13.4m (H) void
13.4m (H) void
FA
L1-SZ-1
L2 - Smoke Reservoir
(A) - 4,035m² > 1,300m²
(L) - 150m > 60m
Fast response sprinklers provided within coloured regions (PB region)
L2 - Senior Care Centre
(A) - 971m² < 1,300m²
(L) - 59m < 60m
Second Storey
S


N
Polyclinic (Non-PB related)
9m (H) void
Commercial units (PB related)
W
E
13.4m (H) void
13.4m (H) void
Library (Non-PB related)
Second Storey
S
BLK 212

What is shown during PB presentation:

- Introduce the building (Building plans)
  - ✓ Projects that need separate introduction set :
    - MBS
    - Our Tampines Hub
    - Bedok Integrated Complex
    - All-in-one buildings

What is shown during PB presentation:

- Deviations (**Tabulate**)
  - ✓ Insert extent where applicable
  - ✓ Highlight key numbers
  - ✓ Presented in single page if possible.

Part(s) of the building affected by performance-based solution	Relevant Prescriptive Clause and Alternative Solutions	Relevant root and sub-objectives	Design solution	Acceptance Criteria
Blk 21 Compartment B, Blk 25 Compartment C and Blk 28 Compartment E	Table 2 of Appendix (4) – for above ground level warehouse, with size more than 400m² to size limit of Table 1, the smoke vent shall be at least 20% of the floor area it served and shall not be more than 12m measure horizontally away from any part of the warehouse. The area of the smoke vents are as followed: - Blk 21 Compartment B, approximately 17.54% of the floor area - Blk 25 Compartment C, approximately 17.54% of the floor area - Blk 28 Compartment E, approximately 18.85% of the floor area	Root objectives R7.1 and R7.2 Sub-objectives: S7.1, S7.2	To use smoke simulation to assess the smoke venting capability of the proposed natural smoke vents for the worst-credible fire scenario	Refer to Section 11 of the report.

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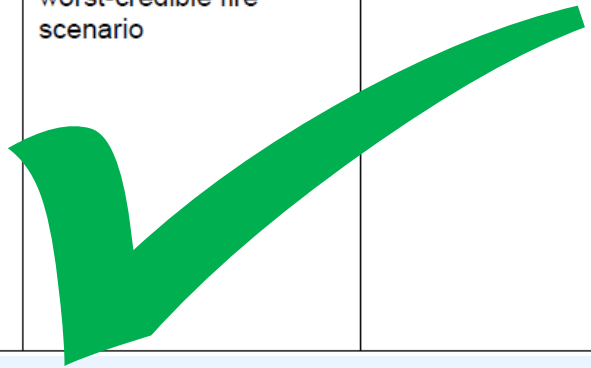
√ Good thing is the extent of deviation is stated.

But how table be improved ?

Part(s) of the building affected by performance-based solution	Relevant Prescriptive Clause and Alternative Solutions	Relevant root and sub-objectives	Design solution	Acceptance Criteria
Blk 21 Compartment B, Blk 25 Compartment C and Blk 28 Compartment E	Table 2 of Appendix (4) – for above ground level warehouse, with size more than 400m² to size limit of Table 1, the **smoke vent** shall be at least **20%** of the floor area it served and shall not be more than 12m measure horizontally away from any part of the warehouse. The area of the smoke vents are as followed: - Blk 21 Compartment B, approximately **17.54% (< 20%)** of the floor area - Blk 25 Compartment C, approximately **17.54% (< 20%)** of the floor area - Blk 28 Compartment E, approximately **18.85% (< 20%)** of the floor area	Root objectives R7.1 and R7.2 Sub-objectives: S7.1, S7.2	To use smoke simulation to assess the smoke venting capability of the proposed natural smoke vents for the worst-credible fire scenario	Refer to Section 11 of the report.



What is shown during PB presentation:

- Design fire scenarios (**Tabulate**)
  - ✓ Name all scenarios (FS1, BC1, SS1a,)
  - ✓ Include soot yield in a column
  - ✓ Highlight clearly what has changed in the Sen Study.
    - Fire size up 20%
    - Vent closed
  - ✓ Present in a single page where possible.

What is shown during PB presentation:

- Mark-up drawings – What needs to be shown.
  - ✓ Deviations
  - ✓ Design fires (Eg : F2 – 10 MW)
  - ✓ Trial design
    - Smoke path for NV/MV
    - Shutter/curtain location (delay ?)
    - Monitor location (rings)
    - Sprinklers, etc

What is shown during PB presentation:

- Mark-up drawings – What needs to be shown.
  - ✓ MV ducts (indicative is fine)
  - ✓ Height (Spell full : Height = 7m)
  - ✓ Fire Engine Accessway
  - ✓ In report vs a separate set

What is shown during PB presentation:

- Mark-up drawings – General principles
  - ✓ Large font. What is important must be large.
  - ✓ Standardize 5,500 m^2 vs 5500 m^2.
  - ✓ **Deviations** and **Design fires**. (Are all deviations analyzed ?)
  - ✓ Contrast

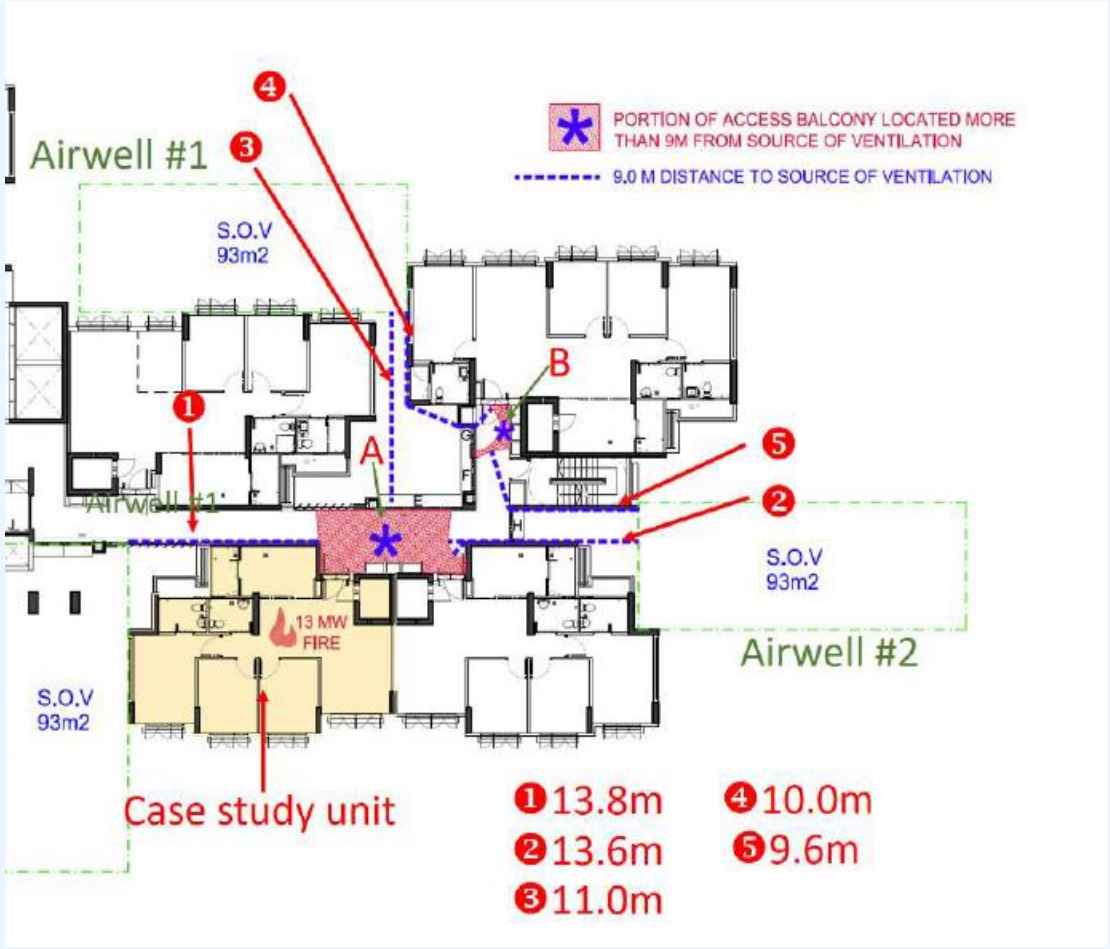
What is shown during PB presentation:

- Mark-up drawings – General principles
  - ✓ Point form/abbreviations gd (Smk res, Sprk, etc)
  - ✓ One zoom (or no zoom). Where are the critical info?
  - ✓ Its alright to split single floor into 2 pages if its too congested but critical info must be found in both
    - Design fire
    - Trial design

What is shown during PB presentation:

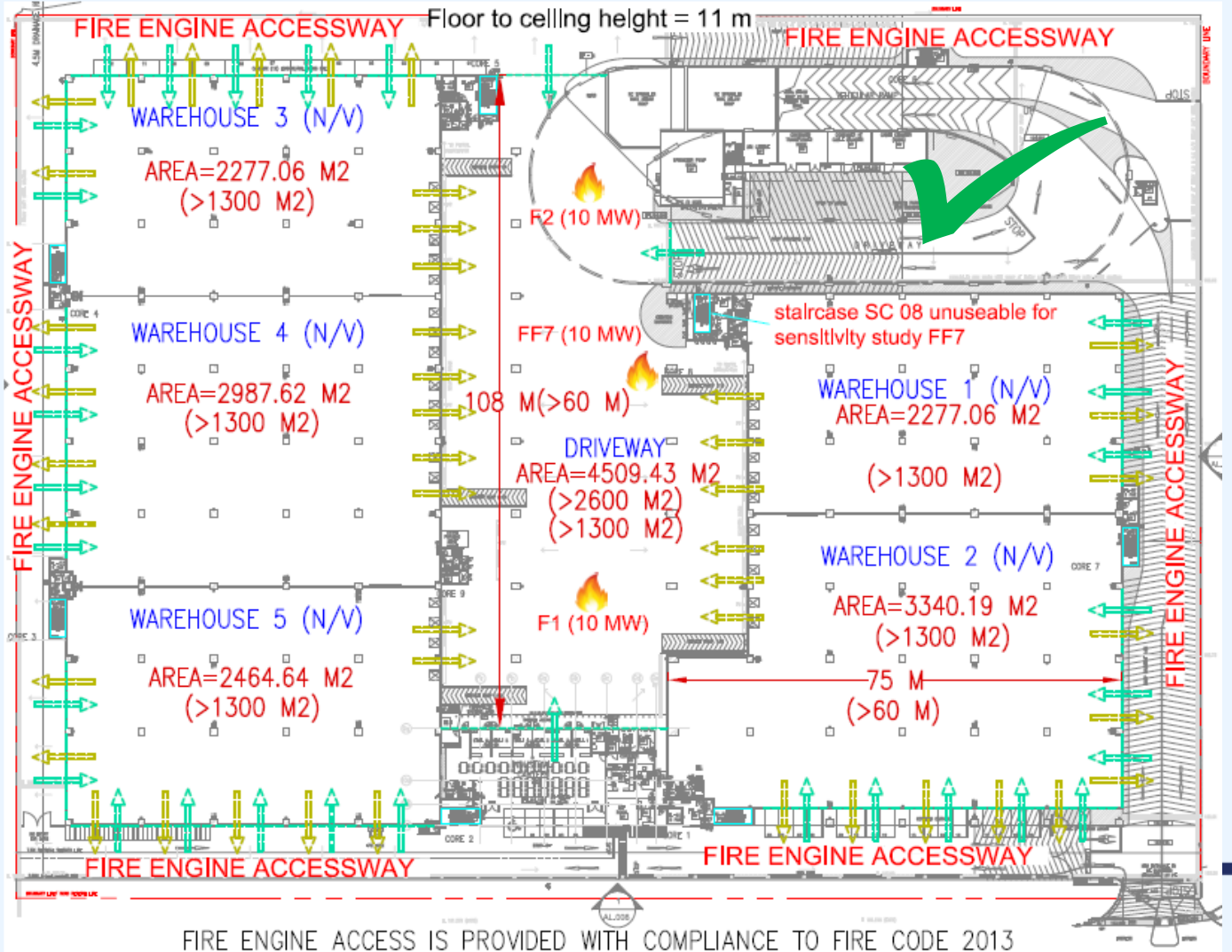
- Mark-up drawings – General principles
  - ✓ DJF pjts, show
    - Jet fan profiles
    - Fan failures
  - ✓ No legends
    - Back and forth
    - Colours run

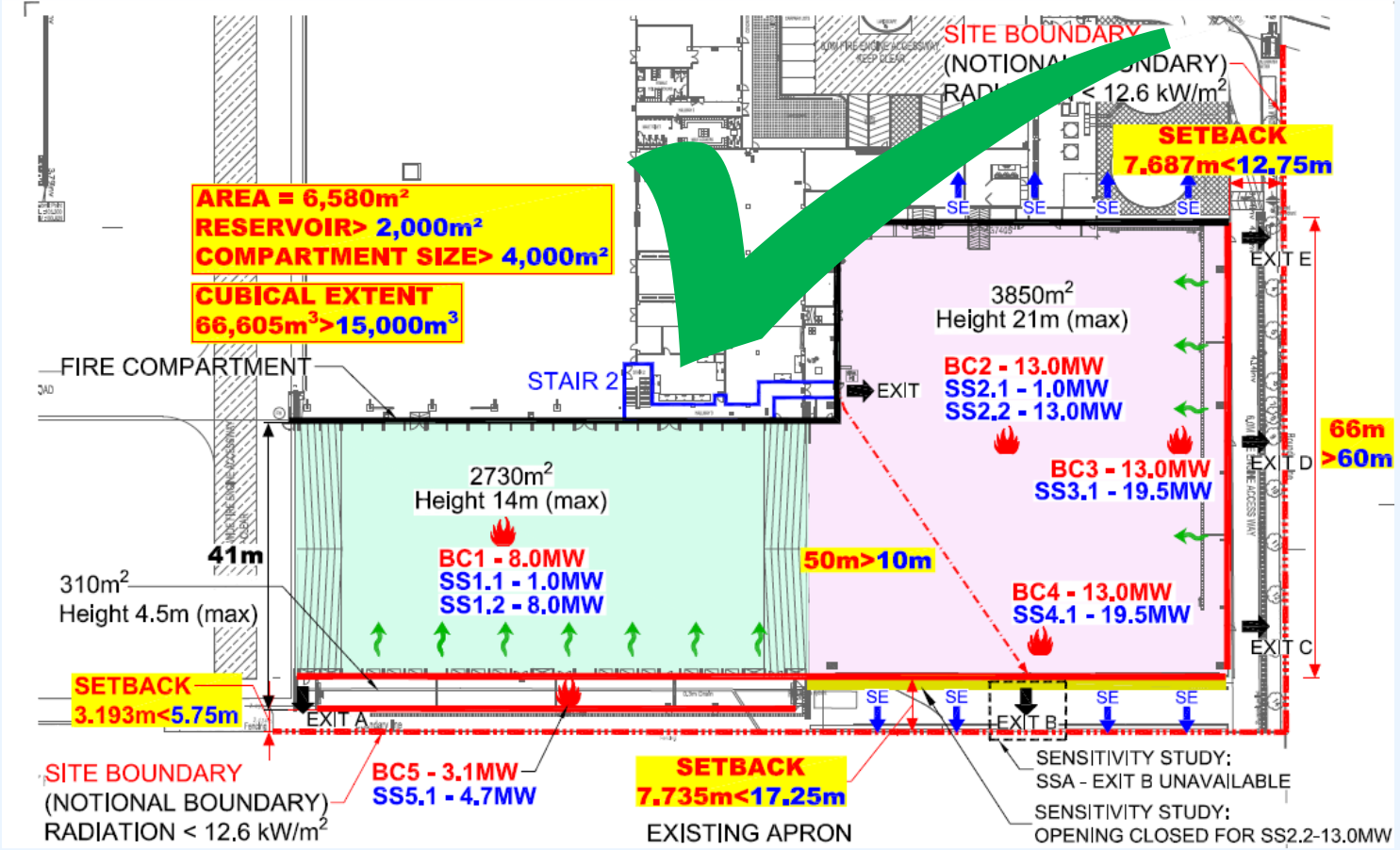
X

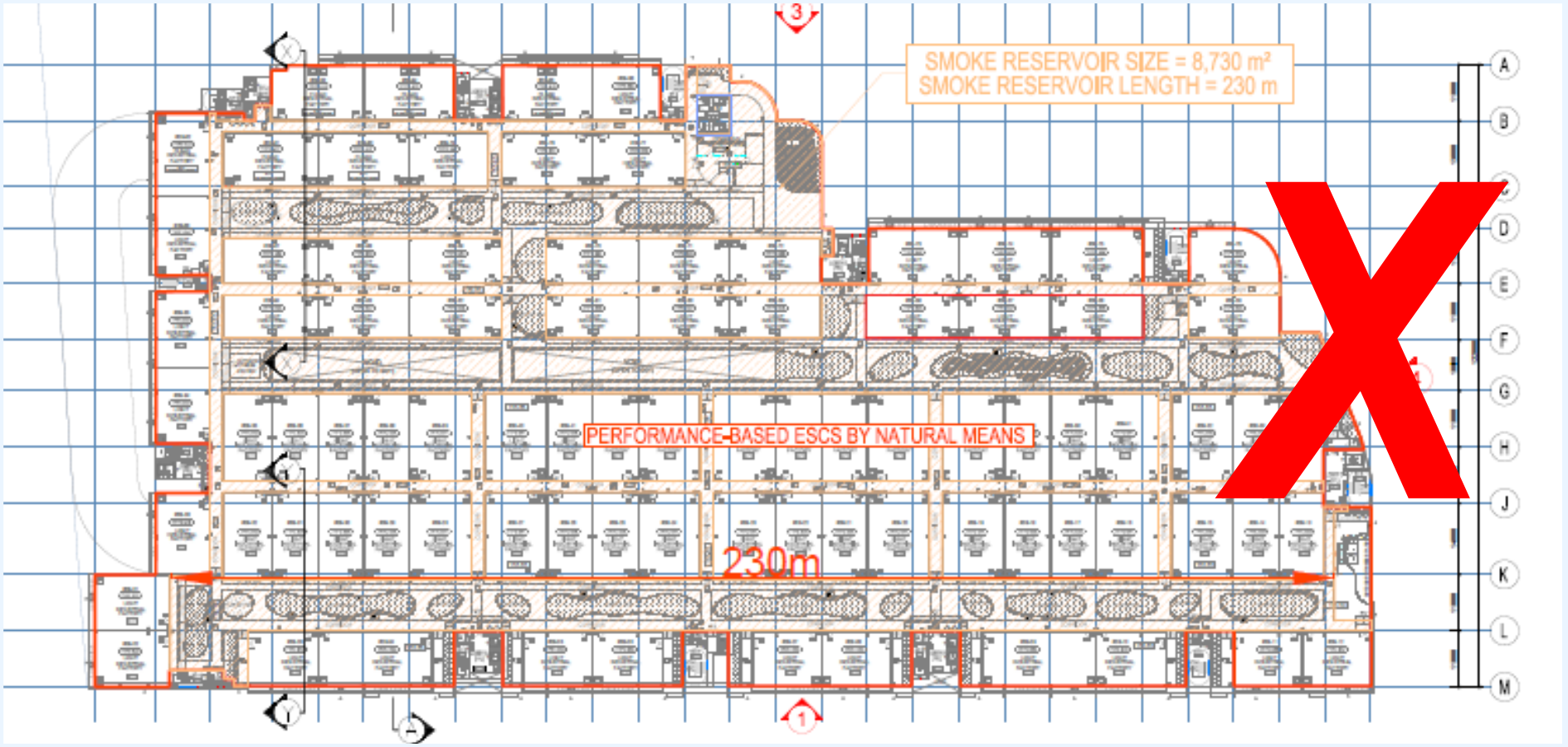

PORTION OF ACCESS BALCONY LOCATED MORE THAN 9M FROM SOURCE OF VENTILATION
9.0 M DISTANCE TO SOURCE OF VENTILATION
Airwell #1
S.O.V 93m2
A
B
S.O.V 93m2
Airwell #2
13 MW FIRE
S.O.V 93m2
Case study unit
❶13.8m
❷13.6m
❸11.0m
❹10.0m
❺9.6m

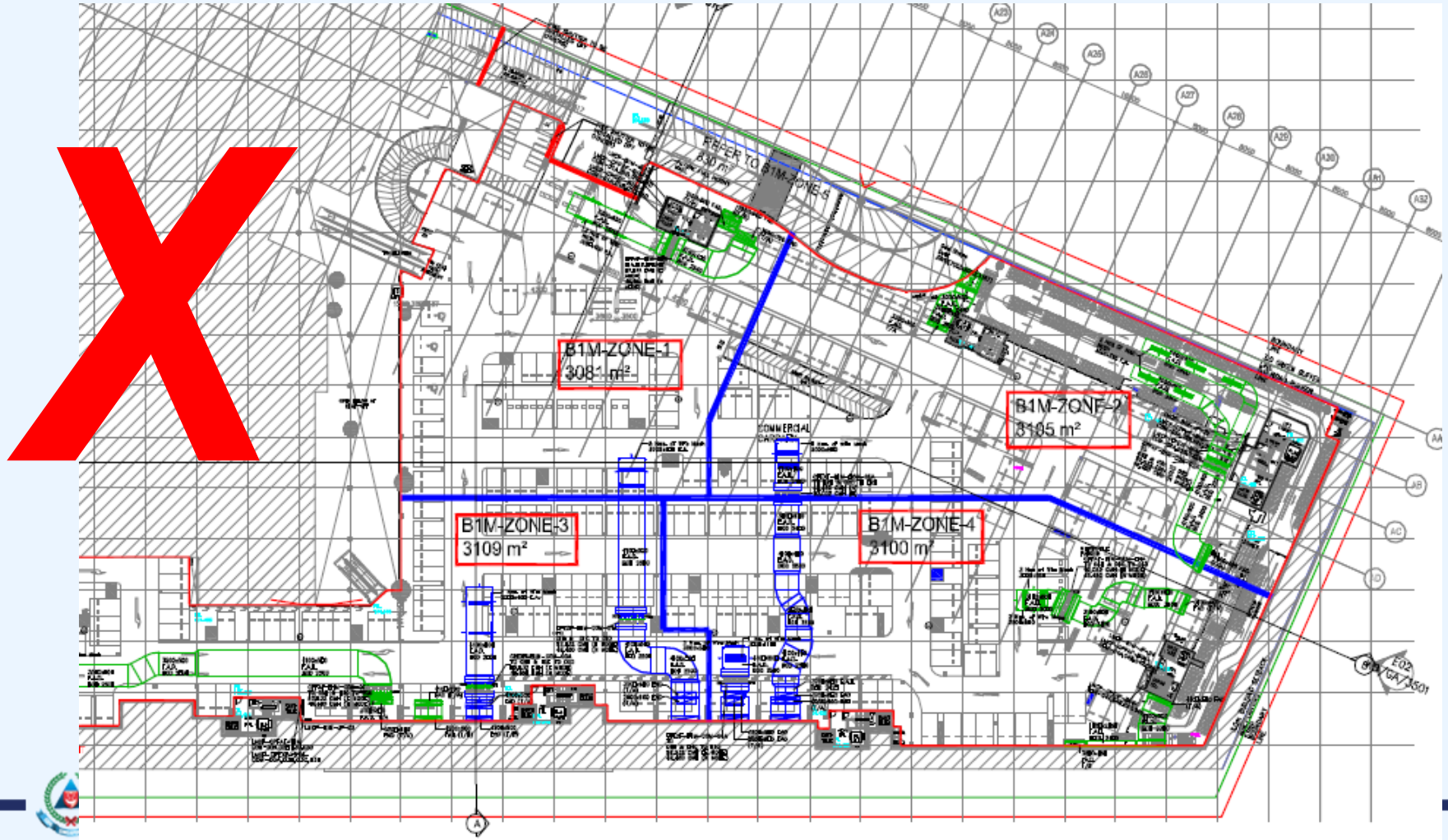
What is shown during PB presentation:

- Mark-up drawings – General principles
  - ✓ Colours must make sense. Each a distinct colour(s) :
    - Deviations
    - Voids
    - Fire separation
    - Smoke separation
    - Escape paths
    - etc


FIRE ENGINE ACCESSWAY
Floor to celling helght = 11 m
FIRE ENGINE ACCESSWAY
WAREHOUSE 3 (N/V)
AREA=2277.06 M2
(>1300 M2)
F2 (10 MW)
FIRE ENGINE ACCESSWAY
WAREHOUSE 4 (N/V)
AREA=2987.62 M2
(>1300 M2)
FF7 (10 MW)
staircase SC 08 unuseable for
sensltlvlty study FF7
108 M(>60 M)
WAREHOUSE 1 (N/V)
AREA=2277.06 M2
(>1300 M2)
DRIVEWAY
AREA=4509.43 M2
(>2600 M2)
(>1300 M2)
WAREHOUSE 2 (N/V)
AREA=3340.19 M2
(>1300 M2)
WAREHOUSE 5 (N/V)
AREA=2464.64 M2
(>1300 M2)
F1 (10 MW)
75 M
(>60 M)
FIRE ENGINE ACCESSWAY
FIRE ENGINE ACCESSWAY
FIRE ENGINE ACCESSWAY
FIRE ENGINE ACCESS IS PROVIDED WITH COMPLIANCE TO FIRE CODE 2013

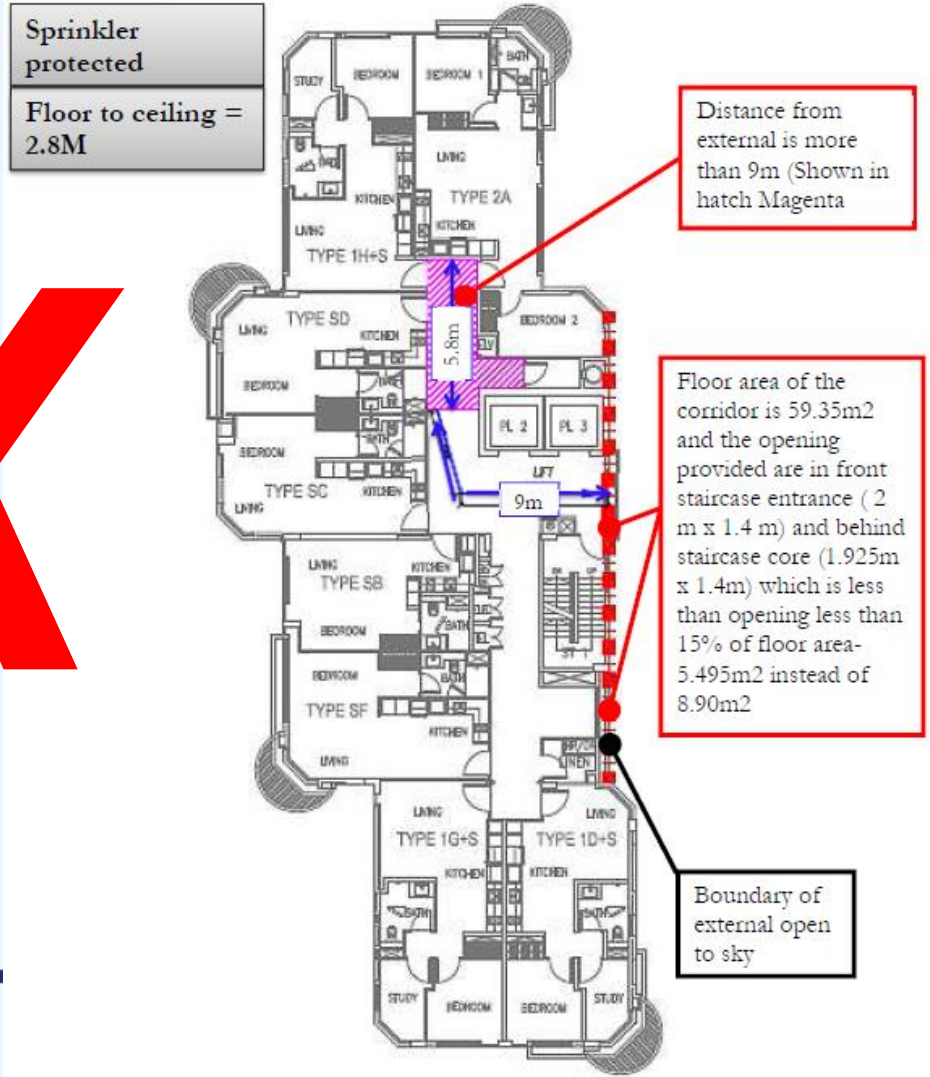

SITE BOUNDARY
(NOTIONAL BOUNDARY)
RADIATION < 12.6 kW/m²
SETBACK
7.687m<12.75m
AREA = 6,580m²
RESERVOIR> 2,000m²
COMPARTMENT SIZE> 4,000m²
CUBICAL EXTENT
66,605m³>15,000m³
FIRE COMPARTMENT
STAIR 2
EXIT
3850m²
Height 21m (max)
BC2 - 13.0MW
SS2.1 - 1.0MW
SS2.2 - 13.0MW
BC3 - 13.0MW
SS3.1 - 19.5MW
BC4 - 13.0MW
SS4.1 - 19.5MW
2730m²
Height 14m (max)
BC1 - 8.0MW
SS1.1 - 1.0MW
SS1.2 - 8.0MW
41m
50m>10m
310m²
Height 4.5m (max)
SETBACK
3.193m<5.75m
EXIT A
EXIT B
EXIT C
EXIT D
EXIT E
66m
>60m
SE
SITE BOUNDARY
(NOTIONAL BOUNDARY)
RADIATION < 12.6 kW/m²
BC5 - 3.1MW
SS5.1 - 4.7MW
SETBACK
7.735m<17.25m
EXISTING APRON
SENSITIVITY STUDY:
SSA - EXIT B UNAVAILABLE
SENSITIVITY STUDY:
OPENING CLOSED FOR SS2.2-13.0MW


SMOKE RESERVOIR SIZE = 8,730 m²
SMOKE RESERVOIR LENGTH = 230 m
PERFORMANCE-BASED ESCS BY NATURAL MEANS
230m
X
A
B
D
E
F
G
H
J
K
L
M

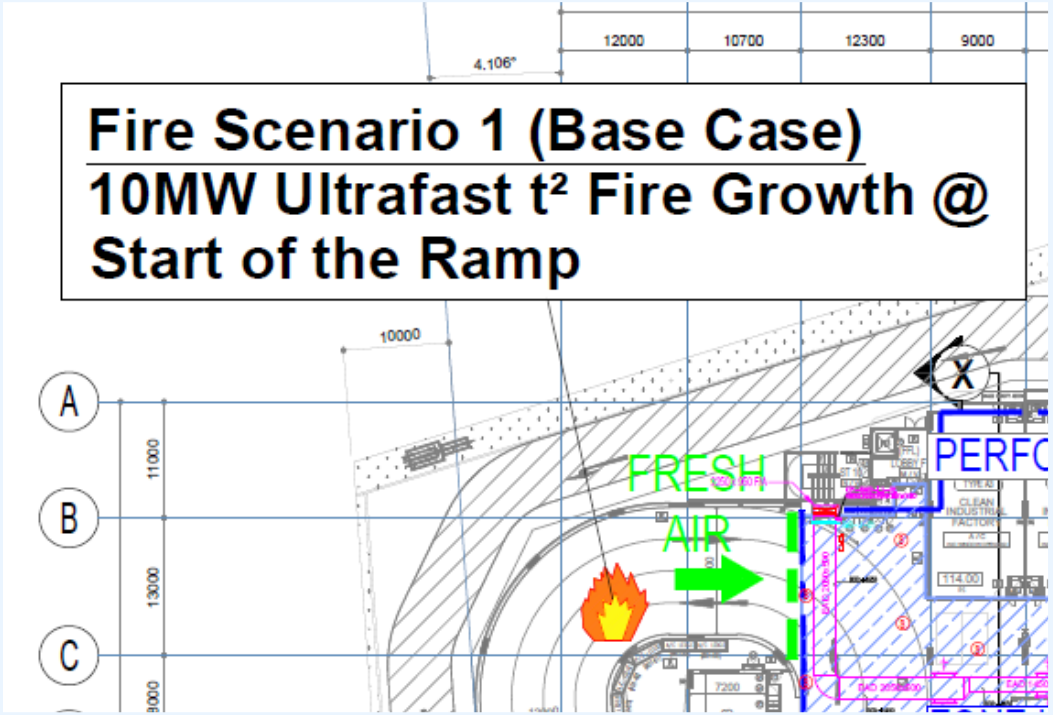

B1M-ZONE-1
3081 m²
B1M-ZONE-2
3105 m²
B1M-ZONE-3
3109 m²
B1M-ZONE-4
3100 m²
REFER TO B1M-ZONE-4
COMMERCIAL

Sprinkler protected

Floor to ceiling = 2.8M



SCDF
The Life Saving Force


Fire Scenario 1 (Base Case)
10MW Ultrafast t² Fire Growth @ Start of the Ramp
12000
10700
12300
9000
4,106*
10000
A
B
C
11000
13000
FRESH
AIR
X
PERFO

?

X

Fire Safety Provisions vs Trial Design

Fire safety provisions

- ESC
- ESFR
- Fire shutters
- Beam detectors
- Hosereel
- FCC
- Dry riser
- Fire extinguisher
- ……..

Trial design

- ESC
- ESFR/In-rack/Std Sprk
- Fire shutters
- Beam detectors
- Water monitors
- Strobe lights
- Smoke curtain with 60s delay
- ……..

What is shown during PB presentation:

- Results (Tables and slices)
  - ✓ Indicate timing for ASET/RSET on the results for searching.
  - ✓ If smoke layer drops below 2.5m, have a few slices prior to show prior timings. ASET = ASET ?
  - ✓ When results look strange/off, discuss reason below the slice.

General things to note

- Check spelling
- Tables/figures/pictures
- Point form
- Appropriate headings/sub-headings
- Paragraphing
- Use colours wisely

From our earlier approved PBD, we would like to highlight changes to the locations of the fire curtains provided for 1st storey. The revised layout of fire curtains are as reflected in Figure 2 below. These changes to the fire curtains arose from recent site coordination carried out between the structural beams, mechanical & electrical (M&E) services and the fire curtains. Furthermore, the proposed changes also serve to de-conflict the clashes between the protected areas from the fire engine accessways. This change in fire curtain locations also minimize the areas of the non-commercial activity/sterile zones, providing further reliability in design that these sterile zones will be kept clear at all times.

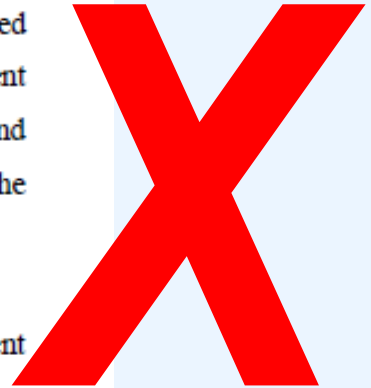
The new positions of the fire curtains are determined based on the same concept as per our approved PBD, with the intention to provide a fire barrier along the escape routes between the escaping occupants and a fire happening at 1st storey. As per our earlier approved PBD, all fire curtains shall meet 2-hr fire rating (Integrity and insulation). The fire curtains remain to be designed with a two-stage descent and activated by the nearby smoke detectors. The first-stage descent will be a pre-determined height of 2.4m AFFL, with the second-stage descent to floor level after a 5 minutes time delay. Strobe lights will be provided on either side of the fire curtains to offer visual alert to the occupants of the descending curtains. Appropriate floor markings will be provided at the fire curtain locations to prevent obstructions from being placed directly underneath the fire curtains and obstruct curtains from deploying fully. Areas to be enclosed by the fire curtains will be demarcated as 'non-commerci spaces to prohibit combustible materials from being placed within the protected passageways.

Engineered smoke control is provided throughout the 1st storey hospital street as well as to some of the tenant spaces. The engineered smoke control is designed in accordance with the prescriptive code and to maintain a minimum clear layer height of 2.5m above finished floor level. Fast response sprinkler heads (RTI < $50m^{0.5}s^{0.5}$ are provided throughout the 1st storey for early automatic fire intervention. The temperature rating and wa discharge density will be in accordance with CP52. Figure 3 below shows the engineered smoke control z at 1st storey.

We would also like to highlight the addition of 5 more escape staircases with extended travel distances to the external building line. These are staircases S.42, S.42A, S.43, S.63 and S.63A. The extended travel distances for each of the staircases to the building external line are reflected in the following table below. However, staircases S.42 and S.43 first open to a fire protected lobby/corridor before discharging to the common hospital street, thereby reducing their travel distance out of a protected area to 27m. Refer to Cloud A in Figure 2 below.

From the qualitative analyses, an unlikely potential for outbreak will be limited and contained within the fire compartment by the Automatic Sprinkler System. The heat and smoke will be vented out through the high level clear permanent openings along the driveway facade (G/L: F-G/5-16) for one side of the building (refer to Annex B) as well as the heat and smoke will be exhausted out through the smoke exhaust ducts along the driveway via mechanical fans at the roof for the other areas of the building (refer to Annex B). **All the eight (8) groups of mechanical fans at the roof level with a total exhaust rate of 576,000CMH will be turn on simultaneously in the event of an unlikely fire emergency upon detection on that storey.** The replacement air to the ESCS is provided by the permanent clear openings at the facade of the building. As an added enhancement to the levels of fire safety, early warning system via the automatic Fire Alarm System and Emergency Voice Communications System will enable the occupants to evacuate from the premises at the earliest instance.

The key stakeholders for this Performance-based submission to the proposed development are as follows:



General things to note

- All tables/Figures have its own unique number.
- Page numbering
- Name files/plans/reports accordingly
- Mark up as a set and not individual pages.

General things to note

- All reports must be endorsed (Δ and sign).
- Searchable
- We don’t read Executive Summaries. (Generally)
- No hand-written mark-ups
- Avoid project specific abbreviations
- Check for errors.

Spot the Errors

172 + 60 + 239 = 401 ?

Required Safe Egress Time (R.S.E.T) = $t_d + t_p + t_t$
RSET = 172 + 60 + 239
= **401seconds.**

All simulations were simulated to 1200s.

As all simulations reached steady state, an infinite ASET is achieved.

FSE Report

Copy / Paste.

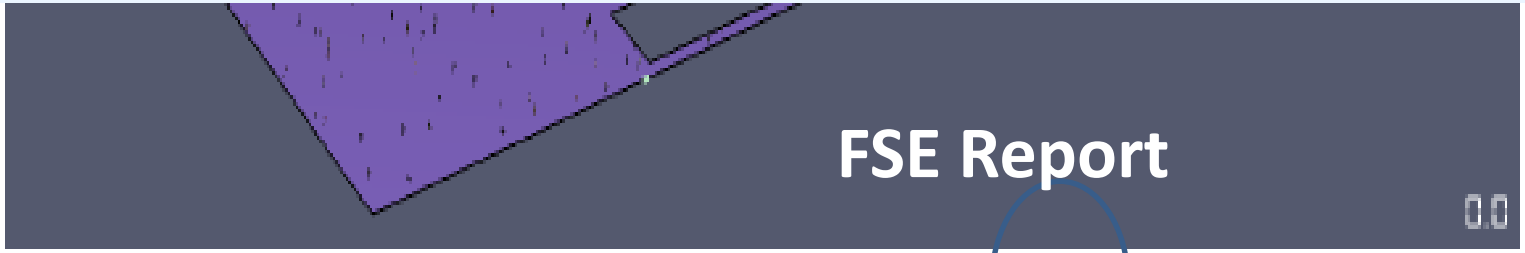
Scenario	Storey	ASET	RSET*	Safety Factor
PR-S1	Ground	1200	Detection time + Pre-movement time and Travel time 172 + 60 + 239 =401 sec	2.99 which is > 1.2 - OK

Note: ** Detection time, Pre-movement time and travel time are from FSER*

Table 2 : Peer Reviewer's Fire Scenario ASET/RSET Summary

Peer Reviewer Report

This is obviously a copy and paste without exercising due diligence in evaluating the results. Such actions are unacceptable.



Occupant Load Before Egress (Total occupants: 858 persons)

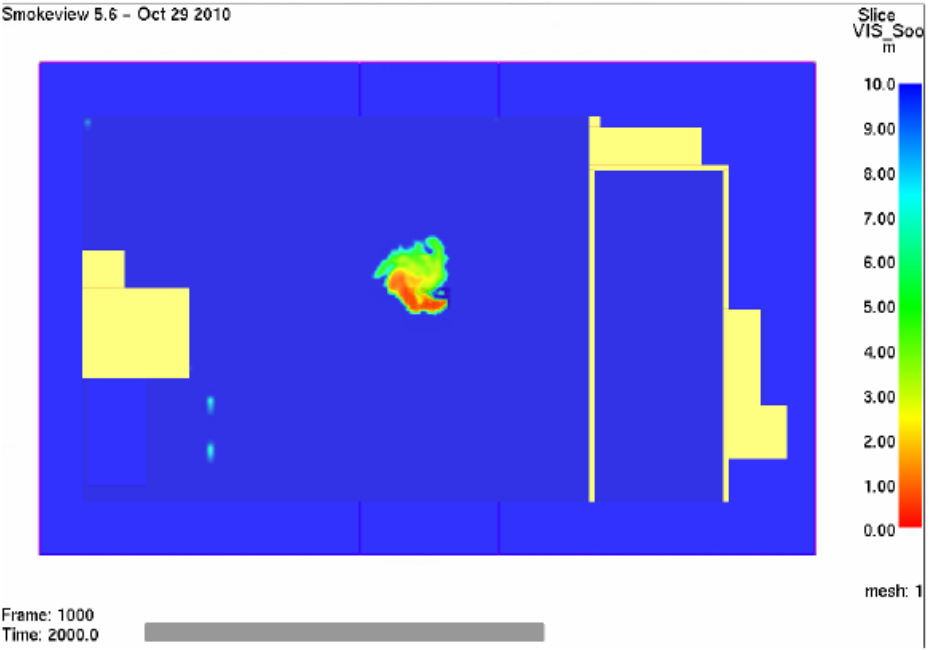
16	4- Occupant Characteristics	Please indicated the maximum number of occupants at any one time in the factory.	As per architect declaration, the maximum number of occupants in the building we are studying is 622 occupants

Peer Reviewer Report

OL 858 or 622 ?

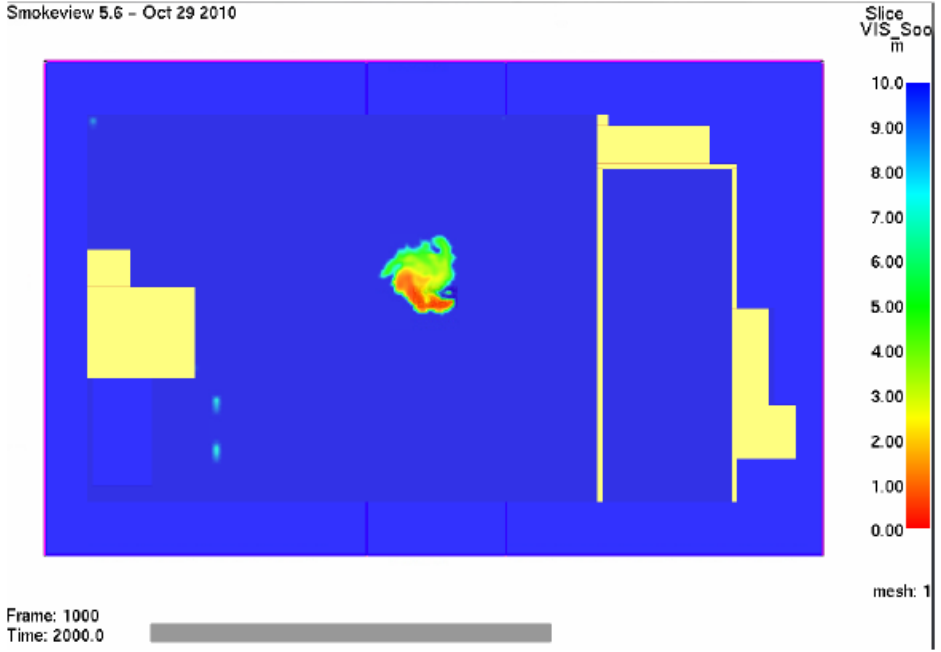
WVR/00052/17 (Original) – Slide #51

FDS Results – SS1 (Visibility, Z = 2.5m above FFL @ L3



WVR/00312/17 – Slide #51

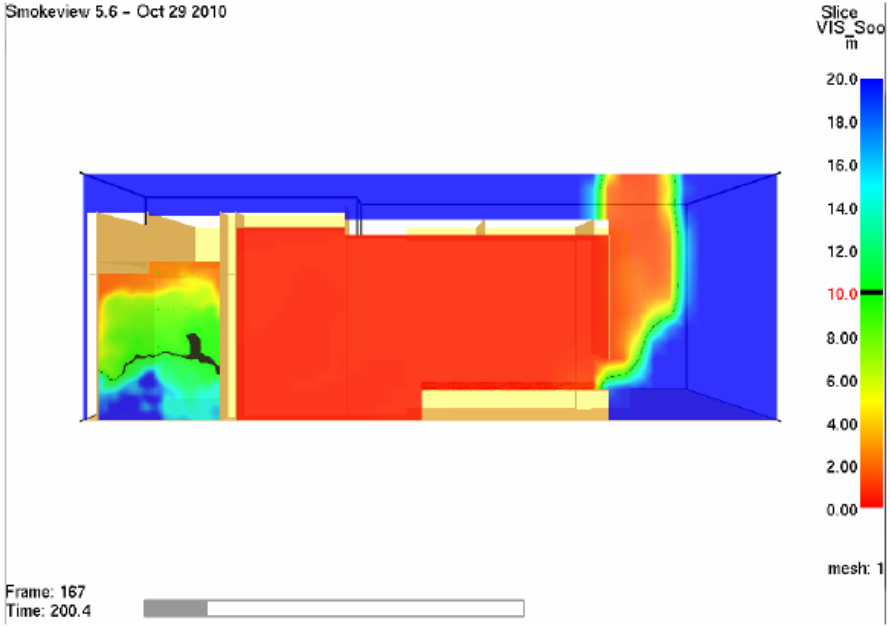
FDS Results – SS2 (Visibility, Z = 2.5m above FFL @ L3



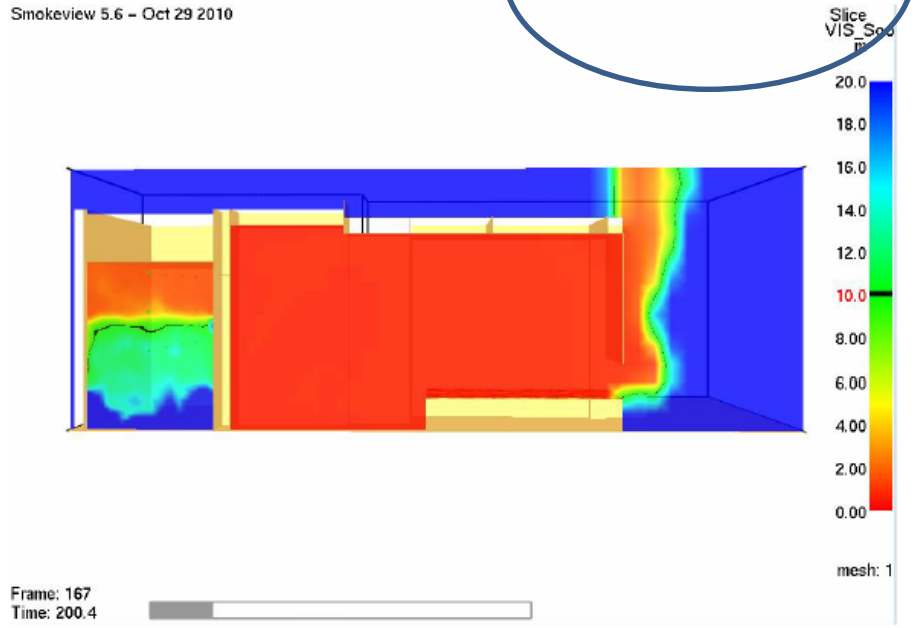
Reason for error: The error occurred due to a typo on the heading.

Comparative Study (Visibility Slides) – Tower A

PB – Visibility Slide @ X=0.75m



CC – Visibility Slide @ Y=0.75m



The activation time of sprinkler system is tabulated below based on the FPE Tools calculation. The activation time of sprinkler system ranged from 310-366 seconds.

Sprinkler activation time = ?

Table 9.3.1.1: Activation time of sprinkler system from 1st storey production area

Design Fire Scenario	Type of T^2 Fire	Type of Sprinkler	Max RTI of Sprinkler ((ms)^0.5)	Max Height of Sprinkler (m)	Temp Rating (°C)	Basis of Design	Radial Distance of sprinkler (m)	Activation time (Seconds)
1st Storey Production Area								
S1, S1-1S	Ultra Fast	Quick Response Sprinklers	50	15.5	68	Based on Activation of 2nd 'ring' of sprinklers	4.93	**206**
S2	Ultra Fast	Quick Response Sprinklers	50	7.2	68	Based on Activation of 2nd 'ring' of sprinklers	4.93	**136**
S3	Ultra Fast	Quick Response Sprinklers	50	13	68	Based on Activation of 2nd 'ring' of	4.93	**186**

3.	**FSSD query:**	There are many fire protection features to be activated in a fire alarm (i.e shutters, dampers), and the chances of any one of the smoke control components failing to activate & operate properly will increase. However, none of your analysis scenarios actually reviewed those scenarios.
	QP reply:	Noted. The following design fire scenarios will be added as sensitivity analyses: Scenario 1: Failure of 1 out of 2 nos of solid roller shutter Scenario 2: Failure of 8 out of 24 nos of motorised dampers Please find the addition of design fire scenarios in the revised FEDB report.

Table 9.5.3.1: Summary of Proposed Design Fire Sizes

Design Fire Scenario	Description	Type of t^2 Fire	Type of Sprinkler	Max RTI of Sprinkler ((ms)^0.5)	Max Height of Sprinkler (m)	Temp Rating (°C)	Justification for design fire size (MW)			Activation time (Seconds)
							Basis of Design	Radial Distance of sprinkler (m)	Calculated Fire Size (MW)	
1st Storey Production Area										
S1	Production area protected by Quick Response Sprinklers. Ceiling sprinklers activate and control fire growth	Ultra Fast	Quick Response Sprinklers	50	15.5	68	Based on Activation of 2nd 'ring' of sprinklers	4.93	**9.24**	**222**
S2					7.2			4.93	**3.94**	**145**
S3					13			4.93	**7.50**	**200**

Table 9.5.3.2: Sensitivity Analysis - Summary of Proposed Design Fire Size

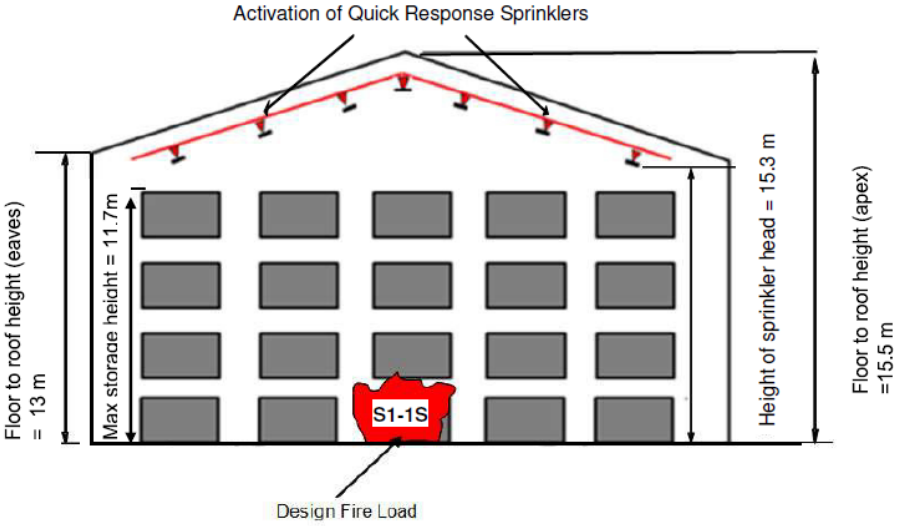
Design Fire Scenario	Description	Type of t^2 Fire	Type of Sprinkler	Max RTI of Sprinkler ((ms)^0.5)	Max Height of Sprinkler (m)	Temp Rating (°C)	Fire Size (MW)	Remark
1st Storey Production Area								
S1-1S	Production area protected by Quick Response Sprinklers. Ceiling sprinklers activate and control fire growth	Ultra Fast	Quick Reponse Sprinklers	-	-	-	**11.10**	An extreme design situation of the 1.2 times design fire size considered in the Base Analysis is considered.

Where are the 2 new sensitivity cases ?

Design Fire Scenario S1-1S (Sensitivity Analysis)

A design fire size of 1.2 times larger than the fire size of design fire scenario S1 is considered. QR roof sprinklers are used for protection of production area. The scenario considers the activation of these ceiling sprinklers due to a machine fire at floor level.

Figure 9.5.2.1: Design Fire Scenario S1-1S : Activation of Ceiling Sprinklers

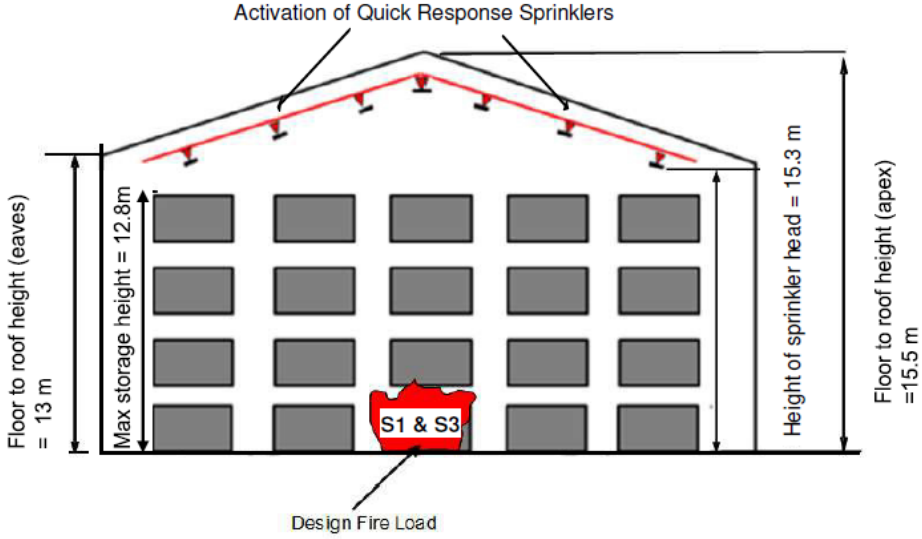


Design Fire Scenario S1: Activation of QR Ceiling Sprinkler under Apex

The floor to ceiling height is 15.5 m high at apex and the maximum estimated height of sprinkler heads from the floor is anticipated to be 15.3 m.

Roof sprinklers are used for protection of production area. The scenario considers the activation of these ceiling sprinklers due to a fire at floor level.

Figure 9.5.1.2: Design Fire Scenario S1 & S3 – Activation of QR Sprinklers



Storage height = 11.7m or 12.8m ?

BASE CASES

Scenario	Location	Description	HRR	Soot Yield Setting for FDS[26]
Base BC1	Level B1	Fire points are located at critcal points of the parking space. Grid D/36-37. 3 jet fans closest to the fire source are de-activated. Sprinkler system de-activated.	4 MW	0.05kg/kg
Base BC2	Level B1M	As in BC1. Fire point at Grid B/14 at the B1M storey	4 MW	0.05kg/kg

ADDITIONAL CASES

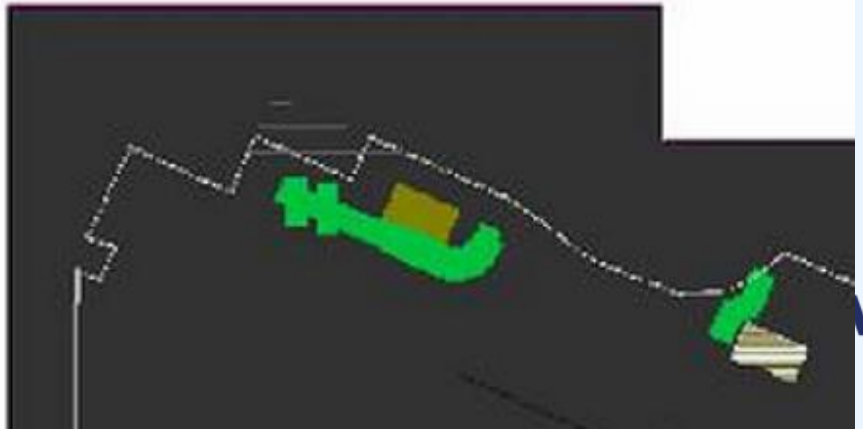
Scenario	Location	Description	HRR	Soot Yield Setting for FDS[26]
Additional AC1	Level B1M	Fire points are located at critcal points of the parking space. Grid B/34. 3 jet fans closest to the fire source are de-activated. Sprinkler system de-activated.	4 MW	0.05kg/kg
Additional AC2	Level B1	As in AC1. Fire point at Grid M/23.	4 MW	0.05kg/kg

ADDITIONAL CASES

Scenario	Location	Description	HRR	Soot Yield Setting for FDS[26]
Additional AC1	Level B1M	Fire points are located at critcal points of the parking space. Grid B/34. 3 jet fans closest to the fire source are de-activated. Sprinkler system de-activated.	4 MW	0.05kg/kg
Additional AC2	Level B1	As in AC1. Fire point at Grid M/23.	4 MW	0.05kg/kg

AC1 - ADDITIONAL FIRE POINT AT B1 - VISIBILITY RESULT

MEASURED SMOKE LOGGED AREA = 351.7 SQM
(ALLOWABLE AREA = 1000 SQM



ADDITIONAL CASES

Scenario	Location	Description	HRR	Soot Yield Setting for FDS[26]
Additional AC1	Level B1M	Fire points are located at critcal points of the parking space. Grid B/34. 3 jet fans closest to the fire source are de-activated. Sprinkler system de-activated.	4 MW	0.05kg/kg
Additional AC2	Level B1	As in AC1. Fire point at Grid M/23.	4 MW	0.05kg/kg

AC2 - ADDITIONAL FIRE POINT MODEL AT B1M - VISIBILITY RESULT

Errors in information

- Unclear
  - ✓ Systems activated by smoke detector or sprinklers?
- Absent
  - ✓ Updated reports with missing info.
- Inaccurate

ASET of 380 sec doesn't apply to all cases ?!?!

Table 4: Results of ASET/RSET

Scenario	RSET = a + b+ c (sec)	ASET (sec)	Safety Factor	Acceptance Criterion
Base case 1	182.3	380	2.08	**≥2**
Base case 2	149* /182.3	298* / 380	2*/2.08	**≥2**
Base case 3	182.3	380	2.08	**≥2**

Quality of Reports

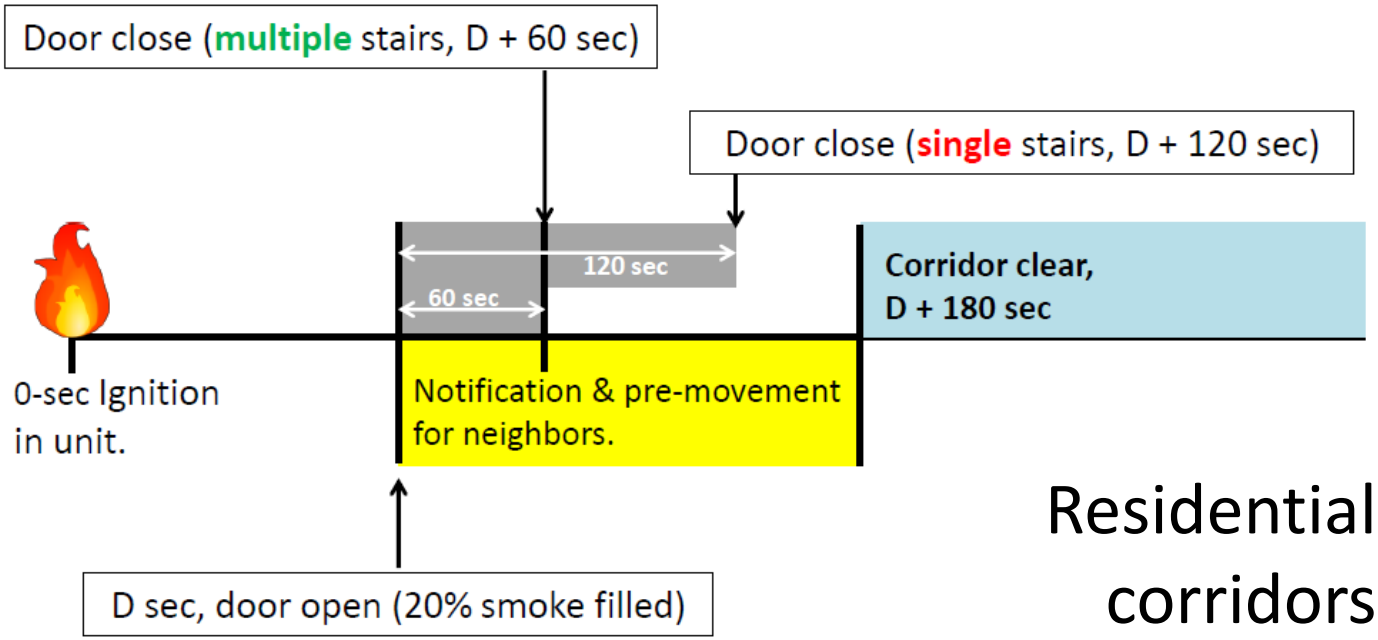
Cause confusion to readers.
Unclear/inconsistent reports will be rejected without reasons.
We are not here to check your reports.

Acceptance Criteria

Residential Corridors

180 seconds after door opens, at the height of **Z = 2m**:

1. Visibility for the whole corridor must **exceed 10m** &
2. Temperature for the whole corridor must be **less than 60°C**.



Residential corridors

Acceptance Criteria

- For residential corridors and exit staircases:
  - ✓ Come for a consultation/discussion.

Waiver Applications

Supported by Fire Engineering
Assessment by FSE

FER for WVR

- Which clause is it ?
- Reject if different/unclear.
- Which block(s) is/are involved ? Payment per different design/block.
- FER and WVR application must match.

Date : 30 December 2015

Registrar, Board of Architects
Registrar, Professional Engineers Board
President, Singapore Institute of Architects
President, Institution of Engineers, Singapore
President, Association of Consulting Engineers, Singapore

Dear Sir/Mdm

CONDUCT OF FIRE ENGINEERING ASSESSMENT IN SUPPORT OF FIRE SAFETY WAIVER APPLICATION

PB Waiver Applications

Year 2015	Year 2016	2017 till Mar 17
40 - 50	80 - 90	30 - 35

2 PB officers

2 PB officers

2 PB officers

Circular

- Issues : QP/Applicant kept in the dark.

✓**Send queries to FSE and QP/Applicant**

PB Waiver Applications

And PB projects in general.

Time Mgmt:

- Status checks
- Early occupation

Submission of Documentation

Submission of documentation

- FDS source code for all design fires (soft copy), where relevant to accompany all FER/WVR submissions.
- PB briefing to client to close audit (1) complete FER in addition to (2) O&M.

SCDF
The Life Saving Force

F.E.D.

F.E.D. Analysis

- Not automatically accepted as acceptance criteria
- Do submit when ASET/RSET = 2 or slightly more.

D.J.F. for car parks

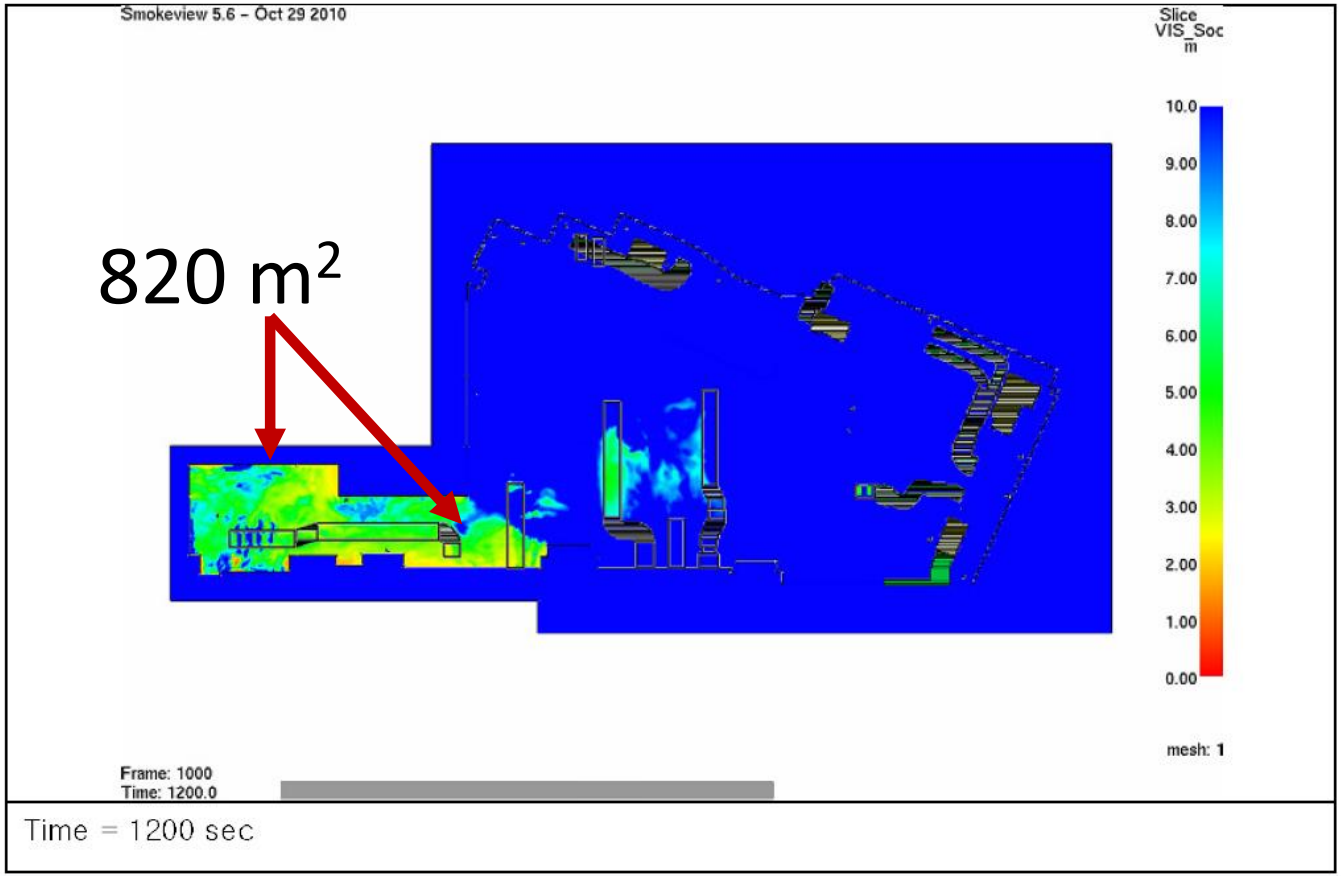
4.2 Acceptance criteria

4.2.1 Not more than 1000m^2 of the car park space can be smoke-logged for at least 20 mins, regardless of whether the fire is located within the smoke control zone or across the zone boundaries (Note: After the 20mins duration, smoke is expected to remain confined within the 1000m^2 area). Within this smoke-logged area, there shall be at least 1 viable route for the fire-fighters where the following conditions are satisfied:

a) Smoke temperature shall not exceed 250^{0}C at a height of 1.7m from floor level.

b) Visibility shall not be less than 5m at a height of 1.7m from floor level.

Visibility – Level B1M



Time = 1200 sec

DJF Results :

- "Fail" > 800 m^2
  - ✓Discussion:
    - Ceiling beam and duct layout
    - Run more fire scenarios.

End