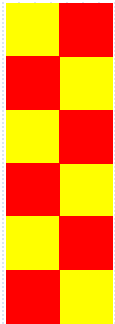




SCDF

The Life Saving Force

... for a safer Singapore



Common Audit Issues



Scope

- ❖ Introduction
- ❖ Missing/incomplete endorsement
- ❖ Missing information
- ❖ Common non-compliances
 - General
 - PG-specific
- ❖ Conclusion



Introduction

- ❖ All fire safety works in buildings must be designed by Qualified Persons (QPs)
 - In accordance with the prevailing Fire Code
 - Approved by SCDF prior to commencement of the works
- ❖ Under self-regulation system, SCDF approves plans based on QP's declaration of compliance with the prevailing Fire Code, Fire Safety Act and its Regulations
 - Incumbent on QP to be conversant with Fire Code and submit compliant plans to SCDF



Missing/incomplete endorsement (Fire Code)

- ❖ Endorsement by QP not provided on plan
- ❖ Endorsement by QP is incomplete
 - Fire Code edition (e.g. 2018, 2023) not provided on plan
 - NRIC No. is not required

Complete endorsement shall be provided on every plan

I, _____, ~~NRIC No.~~ _____, being a qualified person, hereby certify that the building works and fire safety works as shown on these plans have been designed in accordance with the provisions of the Code of Practice for Fire Precautions in Buildings 2023, including all amendments applicable up to the date of this submission, the Fire Safety Act and its Regulations, the relevant code of practice or designed guidelines, subject to waivers granted under Section 27 of the Act.



Missing information (Storage)

❖ Storage space not indicated in building plans for PG VI buildings

- Refer to SCDF circular dated 19 Jan 2021
- Refer to Cl.9.6.1c. on requirements for storage space within PG VI premises





The Life Saving Force
...for a safer Singapore

SINGAPORE CIVIL DEFENCE FORCE

Date : 19 Jan 2021

Our Ref: CD/FSSD/12/02/03/01

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/Madam,

ADVISORY ON INDICATION OF STORAGE SPACE IN BUILDING PLANS FOR PURPOSE GROUP VI BUILDINGS

Purpose Group VI usage (factory) in buildings refers to areas with manufacturing, processing, servicing or testing activities as listed in Table 1.4A (Designation of Purpose Groups) of the Fire Code.

2. Generally, Purpose Group VI usage requires some storage space as part of the manufacturing process. The storage space, regardless of the size/area and duration, including short term storage as part of the production process e.g. finished product or raw material, shall be clearly indicated in the building plans and comply with the requirements stipulated in the Fire Code.

3. This circular serves to remind Qualified Persons of the need to indicate such storage space in the building plans and comply with the relevant Fire Code requirements when they submit their plans to SCDF for approval. In addition, QP or RI who has any projects under their purview with storage space but not indicated in the building plans should notify SCDF by 20 Mar 21. Otherwise, any use of factory spaces as storage will be deemed as change of use from factory to storage which is an offence under the FSA.



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SINGAPORE SERVICE CLASS



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SCDF – A member of the Home Team

HQ SINGAPORE CIVIL DEFENCE FORCE, 91 UBI AVENUE 4, SINGAPORE 408827
TEL: 68481454 FAX: 68481490 EMAIL: CHOY_Chon_Jin@scdf.gov.sg

Missing information (Flammable Storage)

❖ Missing diesel tank details and endorsement from **Mechanical Engineer** to relevant Standards/Code

- Tank capacity
- Bund wall containment capacity
- Refer to SCDF circular dated 8 May 2006
 - Relevant QPs and RIs for submission of plans on combustible gas/hazardous material installation

SINGAPORE CIVIL DEFENCE FORCE FIRE SAFETY & SHELTER BUREAU		
HQ Singapore Civil Defence Force 91 Ubi Ave 4 Singapore 408827 Fax : 6848 1488 Website : http://www.scdf.gov.sg		
Please quote our ref. no. in all future correspondences		
Our Ref: CD/FSSD/12/01/03/04	DID: 68481409 FAX: 68481493	
08 May 2006		
Registrar, Board of Architects (BOA) Registrar, Professional Engineers Board (PEB) President, Singapore Institute of Architects (SIA) President, Institution of Engineers, Singapore (IES) President, Association of Consulting Engineers, Singapore (ACES)		
Dear Sirs		
RELEVANT QPs AND RIs FOR SUBMISSIONS OF PLANS ON COMBUSTIBLE GAS/HAZARDOUS MATERIAL INSTALLATION		
The issue on the relevant Qualified Persons and Registered Inspectors for submissions of fire safety plans on combustible gas / hazardous material installation was brought up for discussion in the regular FSSD Standing Committee meeting in late last year. A work group comprising of members of the FSSD Standing Committee was set up to study the issue. Recommendations by the work group as shown in the attached table were accepted and approved by the Committee for implementation with immediate effect. 2. Please convey the contents of this circular to members of your Institution/Association/Board. The circular is also available in CORENET-e-Info: http://www.corenet.gov.sg/einfo. 3. For inquiry or clarification, please contact Cpt Han Fook Kuang at tel. no. : 68481467 or e-mail address: Fook_Kuang_Han@scdf.gov.sg		
Yours faithfully		
(transmitted via e-mail)		
Ding Tuen Cheng Secretary, FSSD Standing Committee for Commissioner Singapore Civil Defence Force		
1 A PROUD MEMBER OF THE HOME TEAM		

Missing information (Flammable Storage)

RELEVANT QPs & RIs FOR SUBMISSIONS OF PLAN ON HAZARDOUS MATERIALS

S/N	Type of Work	Type of Submission	QP		RI	
			Current	Proposed	Current	Proposed
1	Storage (cylinder or drums) facility including: a. Engine accessway b. Fire hydrant c. Bund wall d. Drainage with associated piping and fixtures	BP	a. A b. C/S	no change	RI(Arch) + RI(M&E)	no change
2	Storage (pressurised or non-pressurised tank) facility including: a. Engine accessway b. Fire hydrant c. Bund wall d. Drainage with associated piping and fixtures	BP	a. A with* M b. C/S	A/S/C with* M	RI(Arch) + RI(M&E)	no change
3	Storage (cylinder or drums) facility including: a. Engine accessway b. Fire hydrant c. Bund wall d. Drainage with associated piping and fixtures e. Manifold with associated piping & fixtures	BP	a. A with* C/S/M b. C/S	A/S/C with* M	RI(Arch) + RI(M&E)	no change
4	Storage (pressurised or non-pressurised tank) facility including: a. Engine accessway b. Fire hydrant c. Bund wall d. Drainage with associated piping and fixtures e. Manifold with associated piping & fixtures f. Pumping system with associated piping & fixtures	BP	a. A with* C/S/M b. C/S	A/S/C with* M	RI(Arch) + RI(M&E)	no change
5	Storage (cylinder) with manifold system, including associated piping and fixtures	BP	a. A with* C/S/M b. C/S/M	no change	RI(Arch) + RI (M&E)	no change

Official (Open)

Missing information (Flammable storage)

- To provide MAQ (for lab & minor storage), including information such as habitable height, storey, etc.
- To list the size of container/bottle/package/cylinder
- Fire resistance rating of FM safety cabinet
- Include endorsement to codes where relevant e.g. NFPA 55

LOCATION: 4TH STOREY													
-CNC MACHINING SECTION (PRODUCTION AREA)													
LIST OF FLAMMABLE LIQUIDS/SOLIDS STORED IN FM SAFETY CABINET (SC 1)													
FLAMMABLE LIQUID		FLAMMABLE LIQUID		FLASH POINT (°C)	QUANTITY (litre)						RATING OF FIRE SAFETY CABINET	APPROVING BODY	REMARKS
		CATEGORY	CLASS		PRESENT			FUTURE					
					PER TIN/ CONTAINER	QTY (No)	TOTAL QTY (LITRE)	PER TIN/ CONTAINER	QTY (No)	TOTAL QTY (LITRE)			
1	IPA	2	3	12	18	4	72	18	6	108	30 mins	FM or Equivalent	MAX. STORAGE PER FIRE SAFETY CABINET IS 250L
2	IPA	2	3	12	18	1	18	18	2	36			
					TOTAL QTY : 90L			TOTAL QTY : 144L					
NOTE					10. THE MAXIMUM ALLOWA SHALL BE 2L/M2 OF								

NOTE:

10. THE MAXIMUM ALLOWABLE QUANTITY (MAQ) FOR STORAGE PER FLOOR ALLOWED SHALL BE 2L/M² OF FLOOR AREA PER FIRE COMPARTMENT.

11. THE MAXIMUM ALLOWABLE QUANTITY (MAQ) SHALL BE 100% OF STORAGE ALLOWED SHALL BE 100% OF STORAGE ALLOWABLE FOR 1ST TO 3RD STOREY AND 75% OF STORAGE ALLOWABLE FOR THE 4TH STOREY LEVEL.

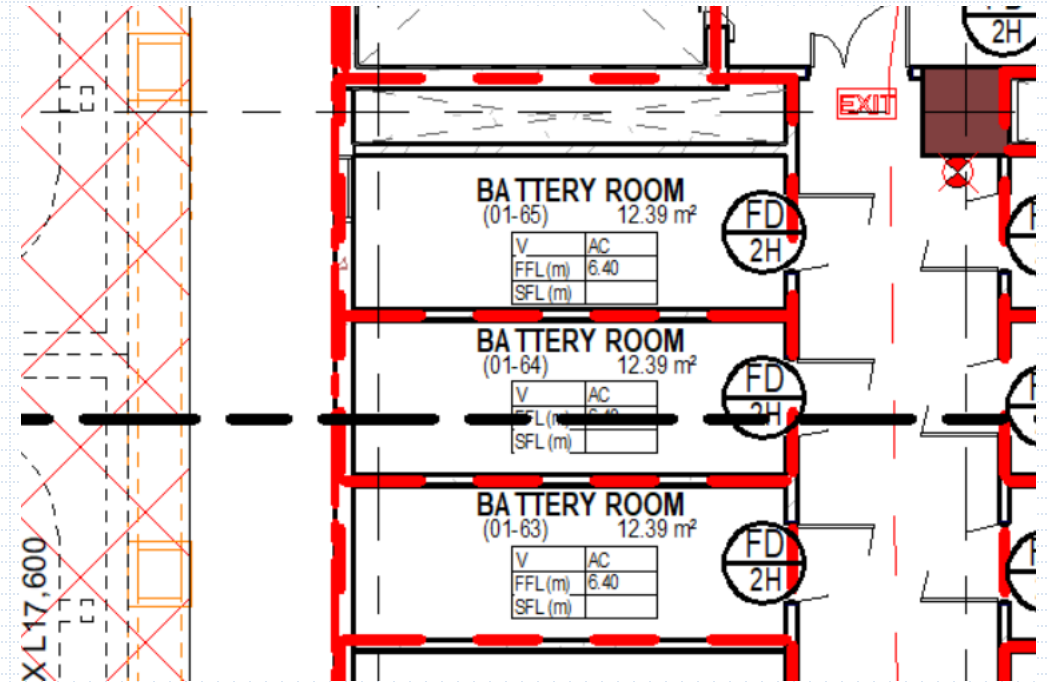
NOTE:

THE HABITABLE FLOOR HEIGHT FOR THIS BUILDING IS LESS THAN 24M HIGH.

Missing information (Battery storage)

- To include type of battery stored, e.g., Lithium ion, Lead-acid, etc.
- To include capacity of battery stored in each compartment.

For battery rooms of threshold stored exceeding limits stated in Table 10.3.1, ESS requirements will apply. i.e. ventilation, location, etc.



Common non-compliances (General)



Cl.4.2.1a.

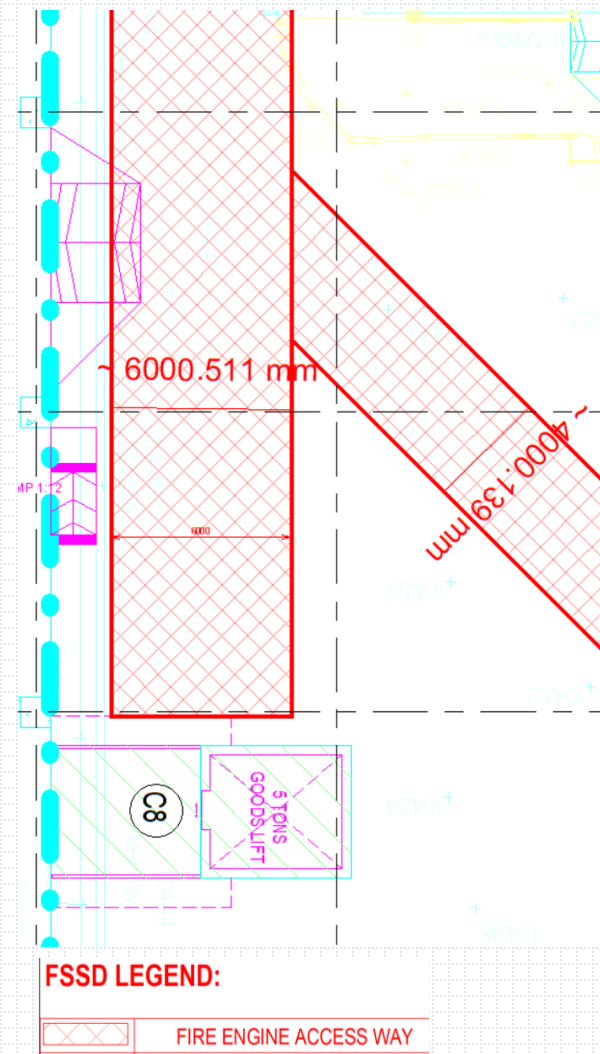
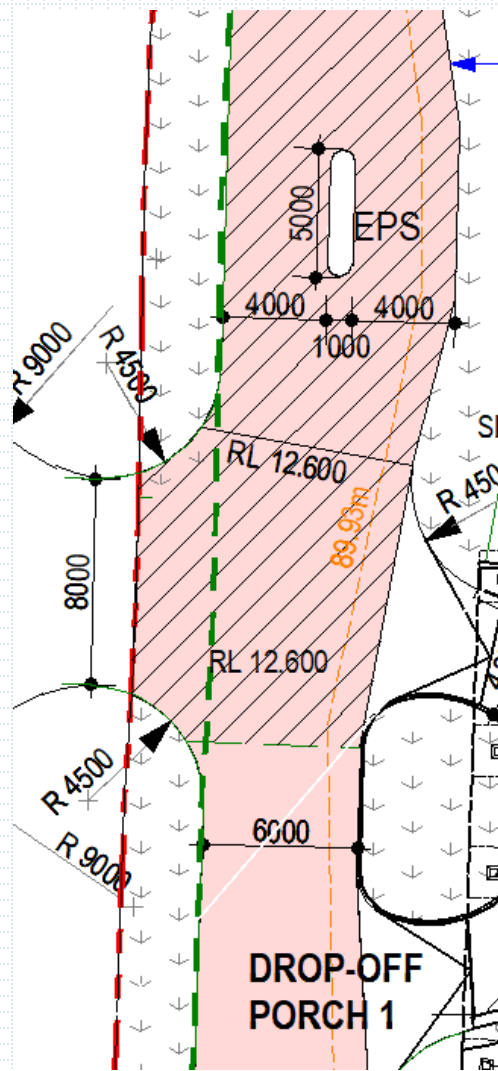
Clause	Description	Mistake made	Remarks
4.2.1a.	<u>General</u> Fire engine accessways/fire engine access (FEA) roads shall be provided to ensure site accessibility for firefighting appliances.	• Not clearly indicating which part of the road is ○ FEA road ○ FEA way ○ Turfed FEA road ○ Turfed FEA way	• Each type of FEA has different requirements • To be clearly indicated as other clauses may be involved, e.g. ○ Cl.4.2.2c.: Distance from centre position of fire access opening ○ Cl.4.2.2f.(5): FEAWay with overhead obstruction excluded from FEAWay provided



Cl.4.2.1a.

❖ Mistake

- Different types of FEAway or road not clearly indicated
- Symbols on plan (hatched and unhatched) do not tally with Legend (unhatched only)



Note: Road width of 4m and cannot be FE Away. Road with overhead structure excluded from provision of FE Away.

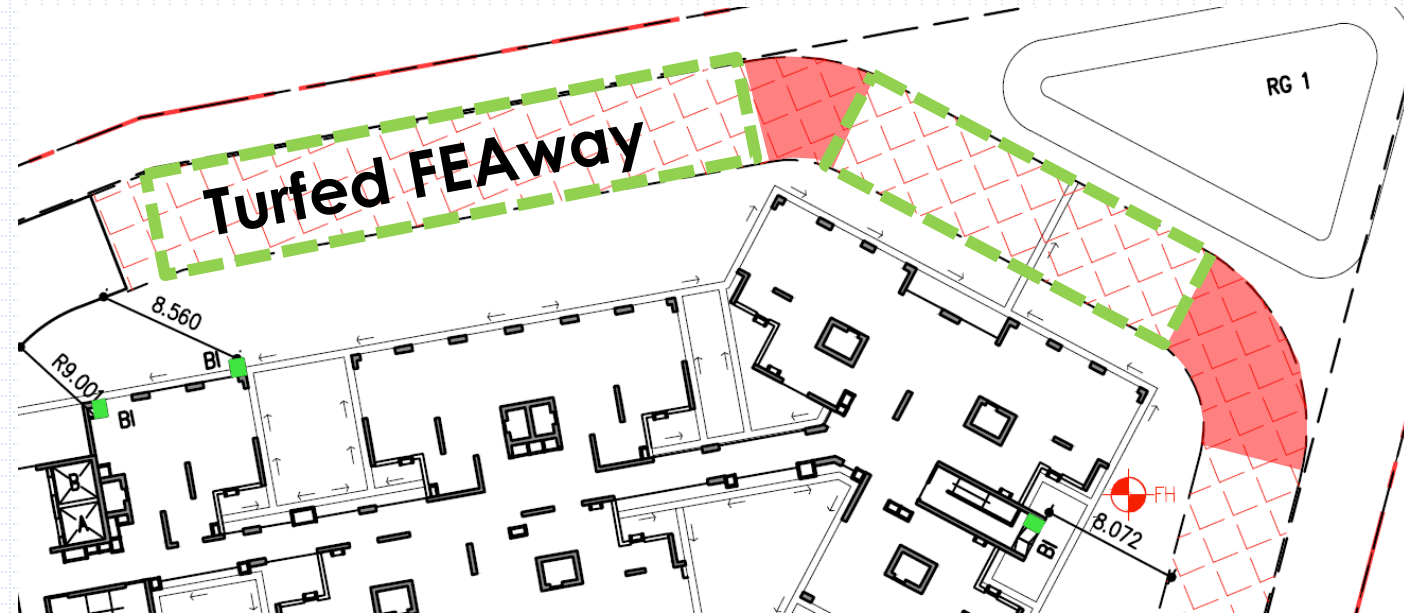
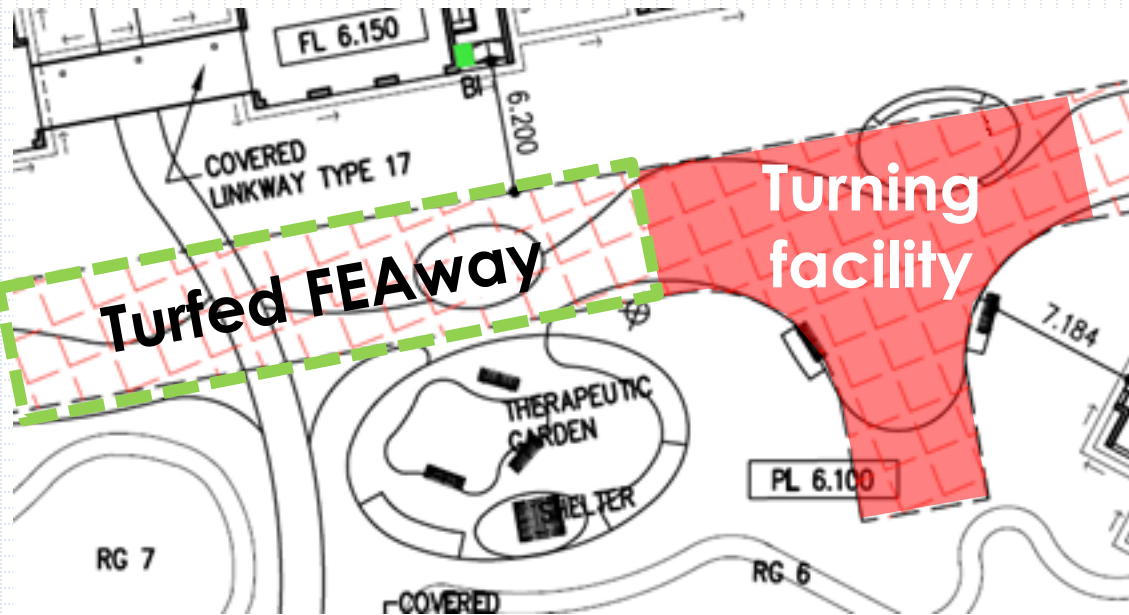
Cl.4.2.2k.

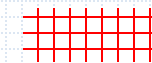
Clause	Description	Mistake made	Remarks
4.2.2k.	<u>Ancillary usage of fire engine accessway/fire engine access road</u> Fire engine accessway/fire engine access road shall not be turned into other usages such as pond, water features, car parking lots (including loading & unloading), etc. Turfing of fire engine accessway/fire engine access road is only permitted on the straight stretch of the fire engine accessway/fire engine access road with gradient not exceeding 1:15.	• Turfed FEAway/road along part of road which is not straight	• FEA road serving as turning facility cannot be turfed



Cl.4.2.2k.

❖ Mistake: Turfed FEAWay/road is not straight



 Turfed FEAWay

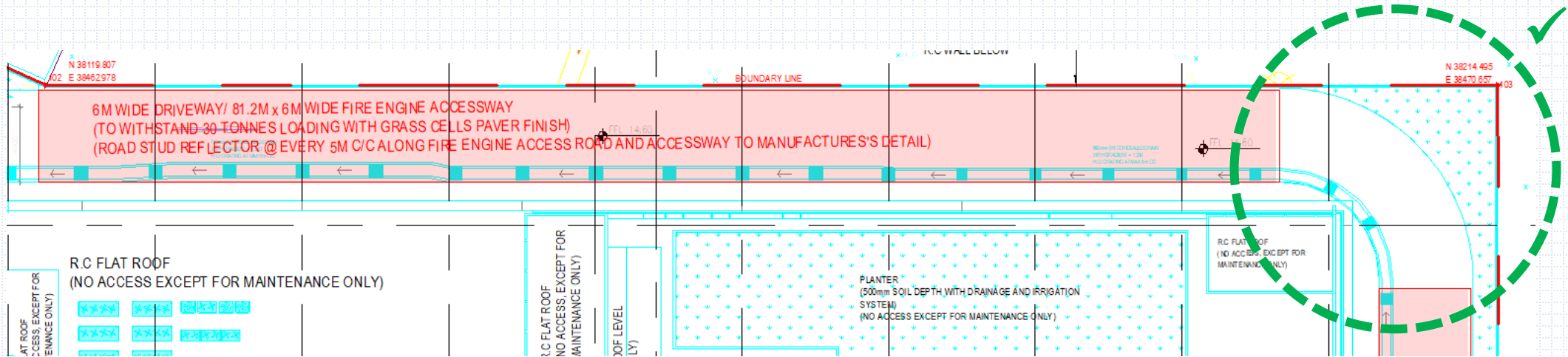
 Turfed FEAWay along
bend in road 

Official (Open)

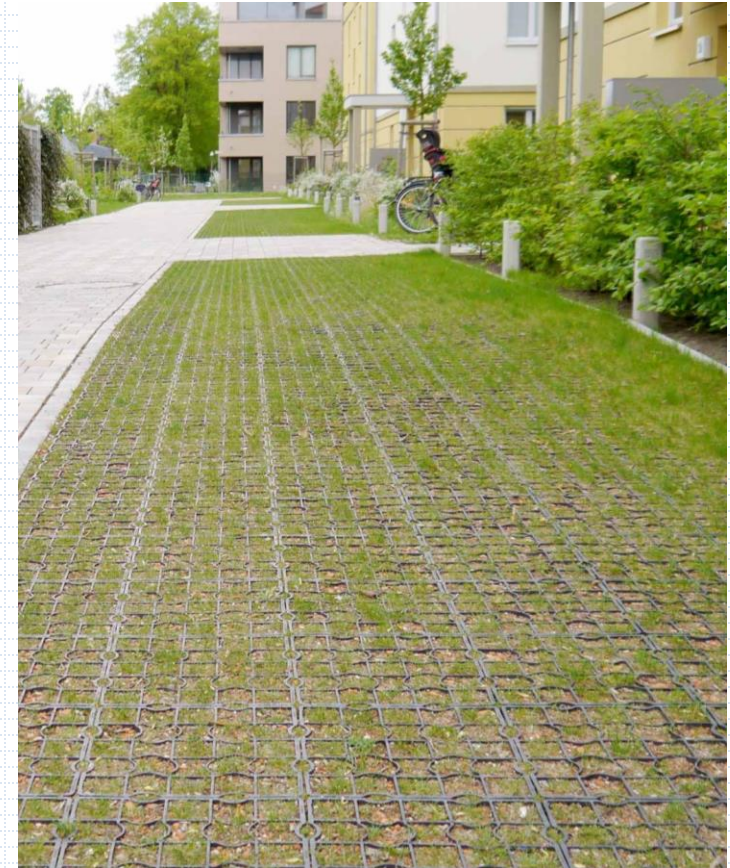
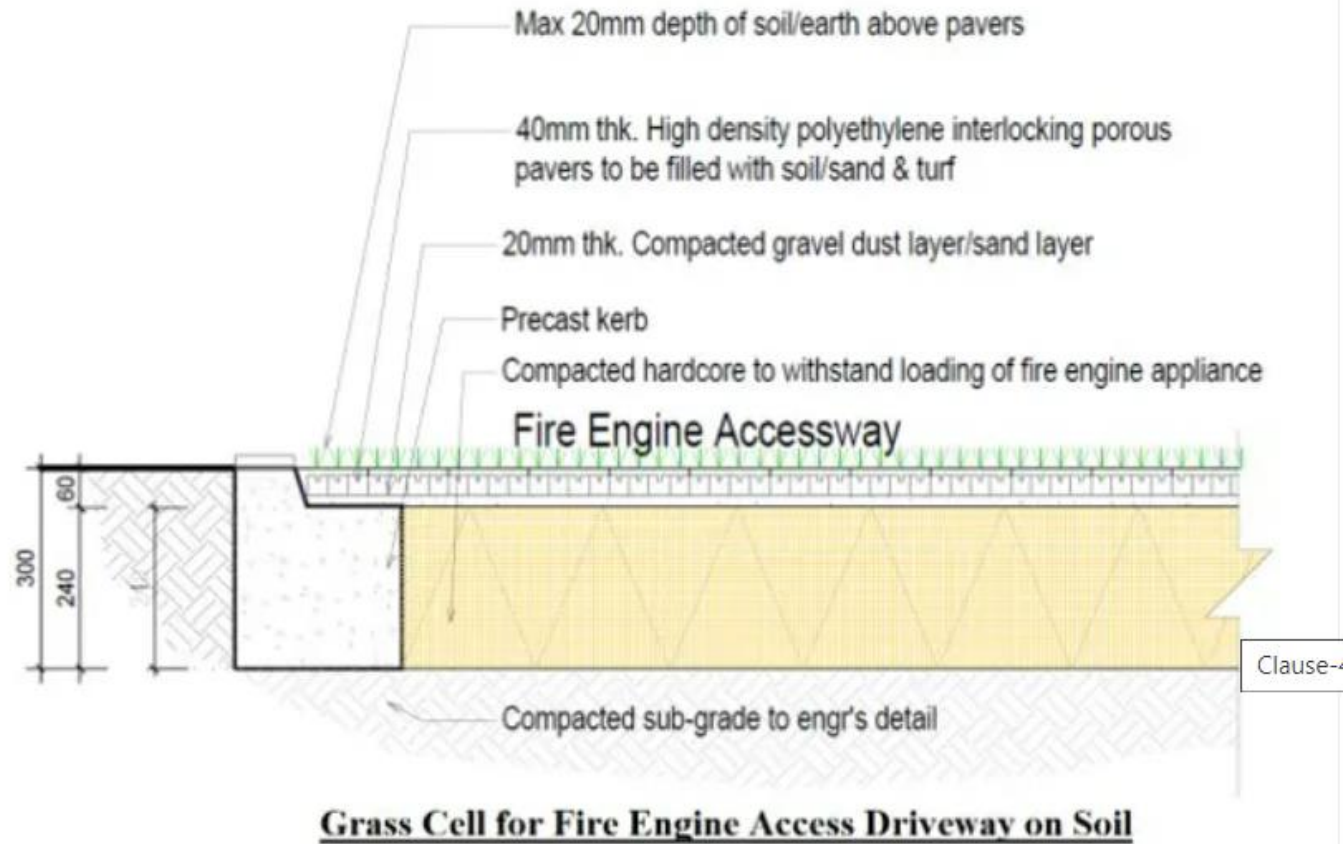
Cl.4.2.2k.

❖ Correct example

- Turfing is only confined to the straight stretch of the FEAWay



Cl.4.2.2k.

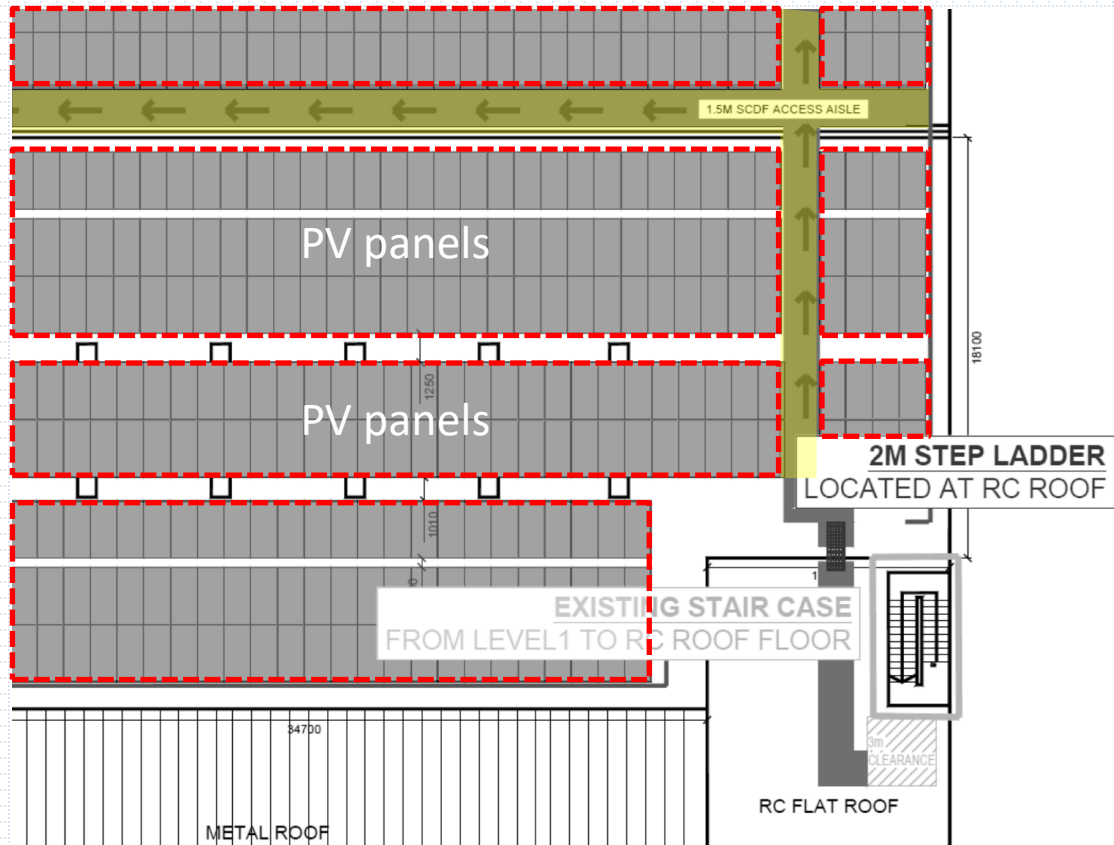


Cl.6.1.2a.

Clause	Description	Mistake made
6.1.2a.	<u>Provision of fire extinguisher</u> Fire extinguishers shall be provided in all buildings except the following: (1) PG I buildings; (2) residential floors of PG II buildings; (3) car parking areas in standalone car parks or mixed-use residential buildings; (4) roof level of single storey buildings with roof height not more than 12m or inaccessible pitched roof up to 24m from grade level used solely for roof-mounted PV installations in accordance with Cl.10.2.1b.(1); and (5) roof level of an external/ open-sided overhead bridge/shed/linkway/ walkway with clear width less than 6m, roof height not more than 12m and used solely for roof-mounted PV installations in accordance with Cl.10.2.1b.(1).	• Non-provision of fire extinguisher in roof terrace/garden accessible to public • Non-provision of fire extinguisher for PV installation outside of 6.1.2.a.(5)

Cl.6.1.2a.

- ❖ Mistake: non- provision of hose reel and extinguisher



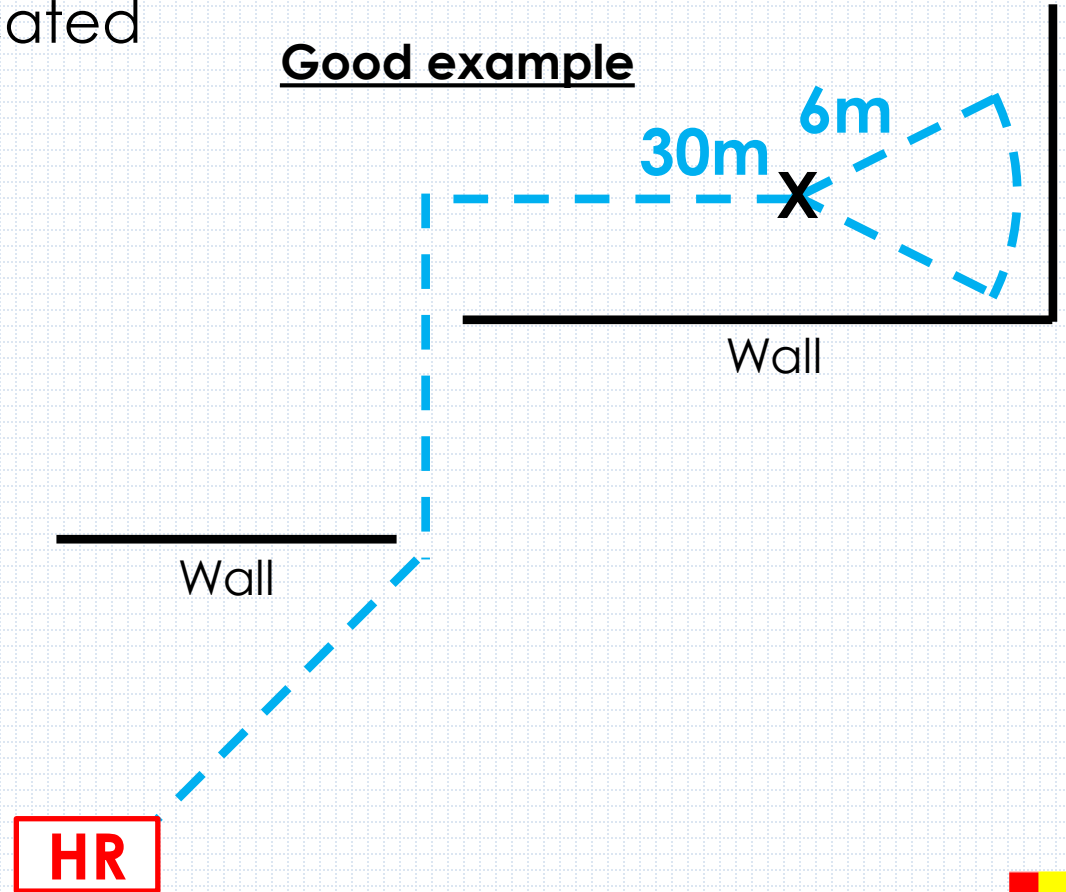
Cl.6.2.8d.(3)

Clause	Description	Mistake made	Remarks
6.2.8d.(3)	<u>Siting and installation of hose reels</u> Hose reels shall be sited in prominent and accessible locations within a distance of 5m from the exit door but not inside exit staircases. If there are parts of the floor space that are beyond the 36m coverage (30m hose path and 6m throw) of the hose reel, additional hose reels shall be provided at the common area or at a distance of not more than 5m from the exit access door of a room.	- Hose reel coverage not indicated by 30m hose path and 6m straight throw ○ Circle with radius of 36m ○ Last 6m is not straight - Insufficient hose reel coverage - Hose reel coverage over half-height walls	- Hose reel shall be provided for every storey in compliance with SS 575 - Where roof is non-habitable, hose reels shall be provided to cover the M&E plants/ equipment



Cl.6.2.8d.(3)

- ❖ Hose reel coverage cannot pass through obstacles
- ❖ The last 6m shall be a straight throw (indicated by an arc of 6m radius)



Cl.6.2.8d.(3)

Clause	Description	Mistake made	Remarks
6.2.8d.(4)	<u>Siting and installation of hose reels</u> Hose reels located within a room shall not be used for covering the areas outside the room.	Hose reels located within a room used to cover areas outside the room	



Cl.6.4.5

Clause	Description	Mistake made	Remarks
6.4.5	<u>Fire sprinkler installation</u> In multi-storey buildings under PG II to VIII with an aboveground car park, the provision of fire protection and smoke control systems for the car park shall be in accordance with Table 6.4B.	• Information not provided on per-elevation and per floor/deck basis that showing that ventilation provided complies with Cl.3.2.8 • If other structures integrated with MSCP e.g. electrical substation, pump room and utility room, they shall be taken into account and treated as obstruction to ventilation of MSCP	• To refer to Cl.3.2.8 on requirements of an open-sided car parking deck, e.g. ○ Not less than 50% of sides permanently open or unobstructed ○ No part of floor space more than 12m from opening ○ Air well not less than 10m², or 0.1m² for every 300mm of height, whichever is greater, and have min dimension on plan of 2m

Table 6.4B for car parking deck

TABLE 6.4B : REQUIREMENTS FOR VENTILATION, SMOKE PURGING SYSTEM & AUTOMATIC FIRE SPRINKLER SYSTEM IN ABOVEGROUND CAR PARKS (STANDALONE OR WITHIN BUILDINGS)											
Habitable Height		Aboveground Car Park									
		Criteria for the Largest Car park Compartment				Smoke Purging System	Automatic Fire Sprinkler System	Type of Fire Alarm Systems			
Building	Car Park	Area	Cubicle Extent	No. of Storey	Ventilation (as per Cl.3.2.8)					Auto	Manual
≤ 24m	≤ 24m	≤ 4000m ²	≤ 15000m ³	≤ 3-storey	NR	NR	NR ⁽²⁾	NR ⁽¹⁾	NR		
		> 4000m ² and ≤ 5000m ²	≤ 15000m ³	≤ 3-storey	Comply	NR	NR ⁽²⁾	R	NR		
					Not comply	NR	R	NR	NR		
					Comply	NR	NR ⁽²⁾	R	NR		
		Cubical extent > 15000m ³ or Area > 5000m ² or more than 3 storey			Not comply	R	R	NR	NR		
> 24m	Any	≤ 5000m ²	-	≤ 3-storey	NR	NR	R	NR	NR		
		Area > 5000m ² or more than 3 storey			Comply	NR	R	NR	NR		
					Not comply	R	R	NR	NR		

Note:

NR – Not required
R – Required

⁽¹⁾ Automatic fire alarm system shall be extended to the car park if the building is protected with automatic fire alarm system

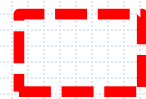
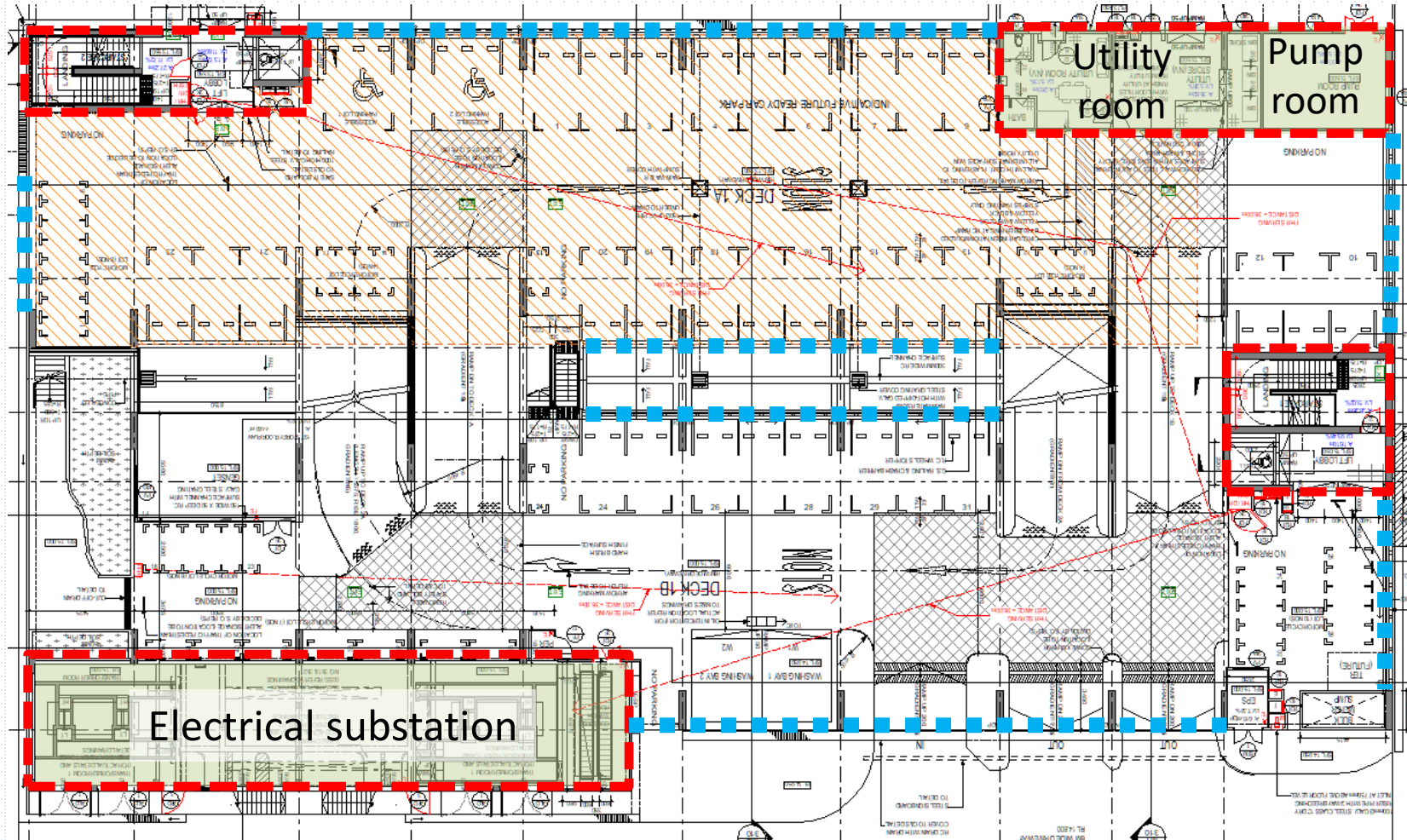
⁽²⁾ Sprinkler shall be extended to the car park if the building is protected with automatic fire sprinkler system



Cl.6.4.5

❖ Mistake: Rooms and enclosed spaces along building perimeter are not taken into account when determining if MSCP meets ventilation requirements (Cl.3.2.8). The following are considered as obstruction to ventilation

- Electrical substation
- Utility room
- Utility store
- Pump room
- Staircase



Obstructions



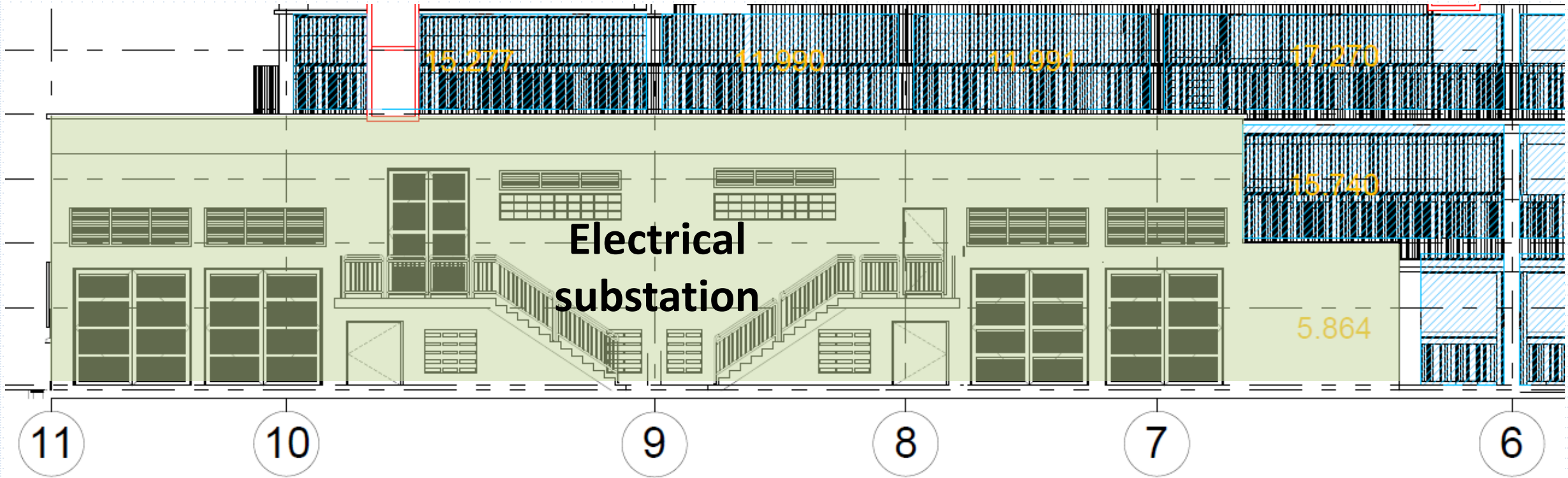
Openings

MSCP 1st storey

Official (Open)



Cl.6.4.5



Elevation plan



Common non-compliances (PG-specific)



Cl.3.2.2a.

Clause	Description	Mistake made	Remarks
3.2.2.a	<u>Cubical extent for compartment exceeding 4m in height</u> In computing the cubical extent of compartments in single storey buildings such as factories, sport halls, markets, food courts, multi-purposes halls, cinemas, concert halls, churches, temples and similar buildings, the height of 4m shall be used where the actual height exceeds that figure.	Commonly seen when there is a change of use from production to warehouse function, sprinkler is required due to cubical extent exceeding Table 3.2A	

Rationale - Clause 3.2.2



The 4m in height serve as a relaxation for purpose of computing cubical extent, instead of using the actual height, for single storey buildings of non-warehouse usage. The consideration takes into account that such spaces are meant to facilitate placement of machinery and for purpose of viewing, and are unlikely to have high level storage.



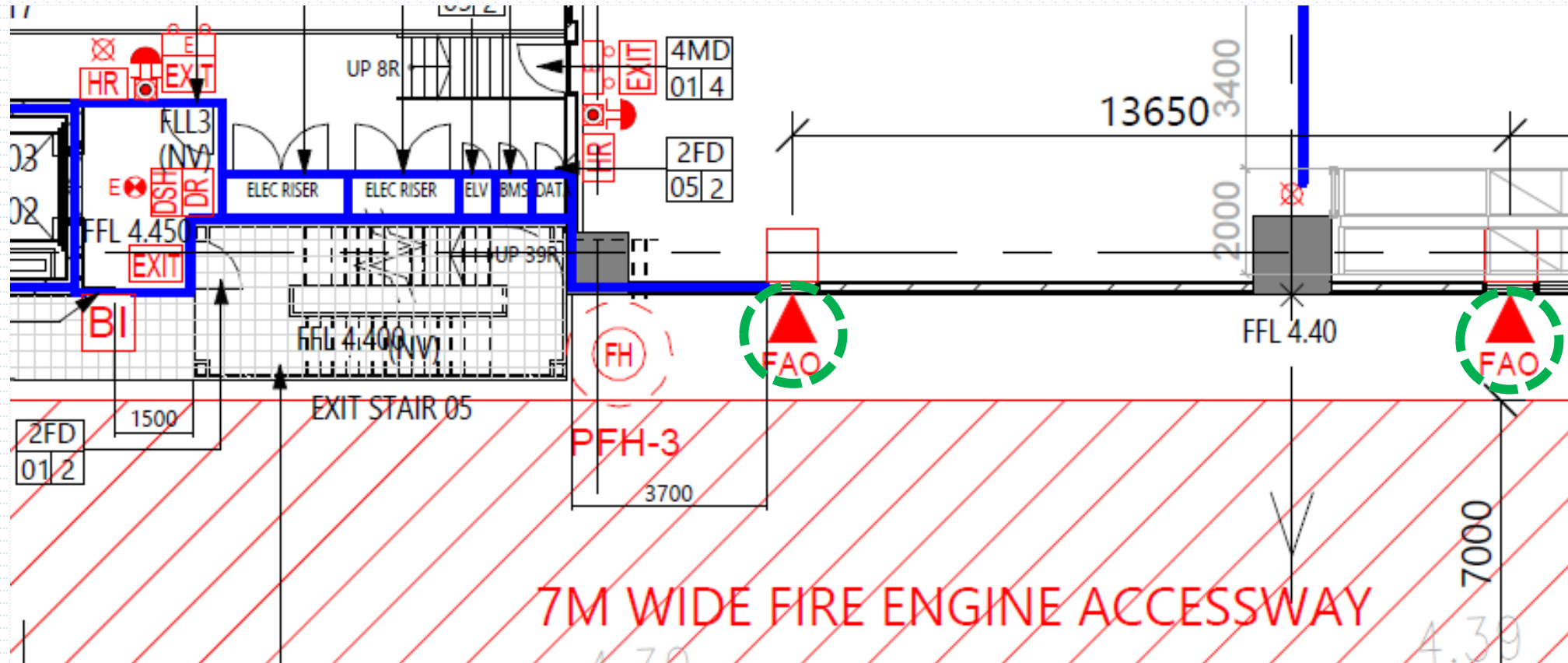
Cl.4.2.3e.(3)(b)

Clause	Description	Mistake made	Remarks
4.2.3e.(3)	<u>Fire access opening to compartment or spaces</u> (a) For buildings under <u>PG III, IV, V and VII</u> exceeding the habitable height of 10m, and up to 90m, fire access openings are required at every storey level, <u>other than the 1st storey</u>, and shall face the fire engine accessway directly.	- Non-provision of fire access opening at 1st storey - Fire access opening not indicated on plan	- The phrase “other than the 1st storey” appears in Cl.4.2.3e.(3)(a) but not Cl.4.2.3e.(3)(b) - Door can be used as fire access opening
	(b) For building under PG VI and VIII, fire engine access openings located over a fire engine accessway shall be provided along the external walls, up to a habitable height of 90m.		



Cl.4.2.3e.(3)(b)

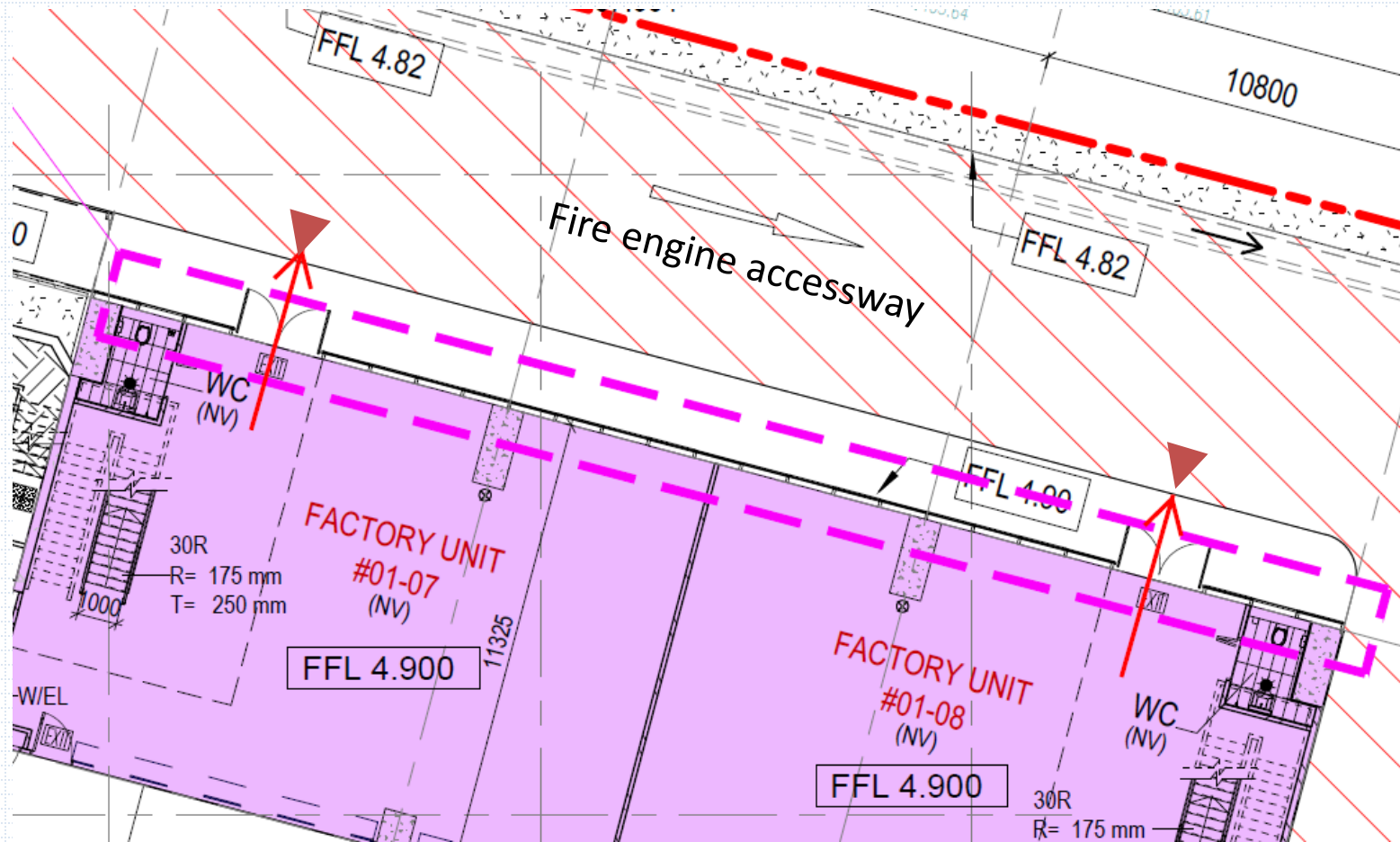
❖ Correct example



Official (Open)

Cl.4.2.3e.(3)(b)

- ❖ Doors can double as FAO, if it is readily openable from the inside and outside. FAO can also be designed as non-laminated breakable glazing.



Official (Open)



Cl.9.3.3e.(3)

Clause	Description	Mistake made	Remarks
9.3.3e.	<u>Internal corridor to dormitory bedrooms</u> (3) an internal corridor shall be naturally cross ventilated in accordance with Cl 2.2.13b(7)(c);	Ventilation openings not located on opposite facing walls to each stretch of internal corridor	Operable window is not deemed to be fixed opening
2.2.13b(7)(c)	<u>Cross-ventilated corridor/lobby which complies with all of the following:</u> (i) The corridor/lobby shall have fixed openings abutting an external space. The ventilation openings shall be located on opposite sides of the corridor/ lobby at high level and shall not be less than <u>50%</u> of the superficial area of the opposing external walls. (ii) No part of the floor area of the corridor/lobby shall be at a distance of more than 12m from the ventilation openings. (iii) The distance of 12m can be measured along the internal corridor via the intermediate ventilation opening to the external space, provided there is no unprotected openings in the walls along the path to the external space shall not be less than 2m.		

Cl.9.3.3e.(3)

Clause	Description	Mistake made	Remarks
1.4.29 (for reference)	<u>Cross-ventilated corridor/lobby</u> A corridor/lobby with fixed and unobstructed ventilation openings located on opposite facing walls , which face the external space , to allow for air circulation caused by outside breezes or wind.	• Ventilation openings not located on opposite facing walls to each stretch of internal corridor	• Operable window is not deemed to be fixed opening



Cl.9.3.3e.(3)

- ❖ Mistake: Non-provision of effective cross ventilation to the internal corridor to dormitory bedrooms

Non-provision of ventilation opening

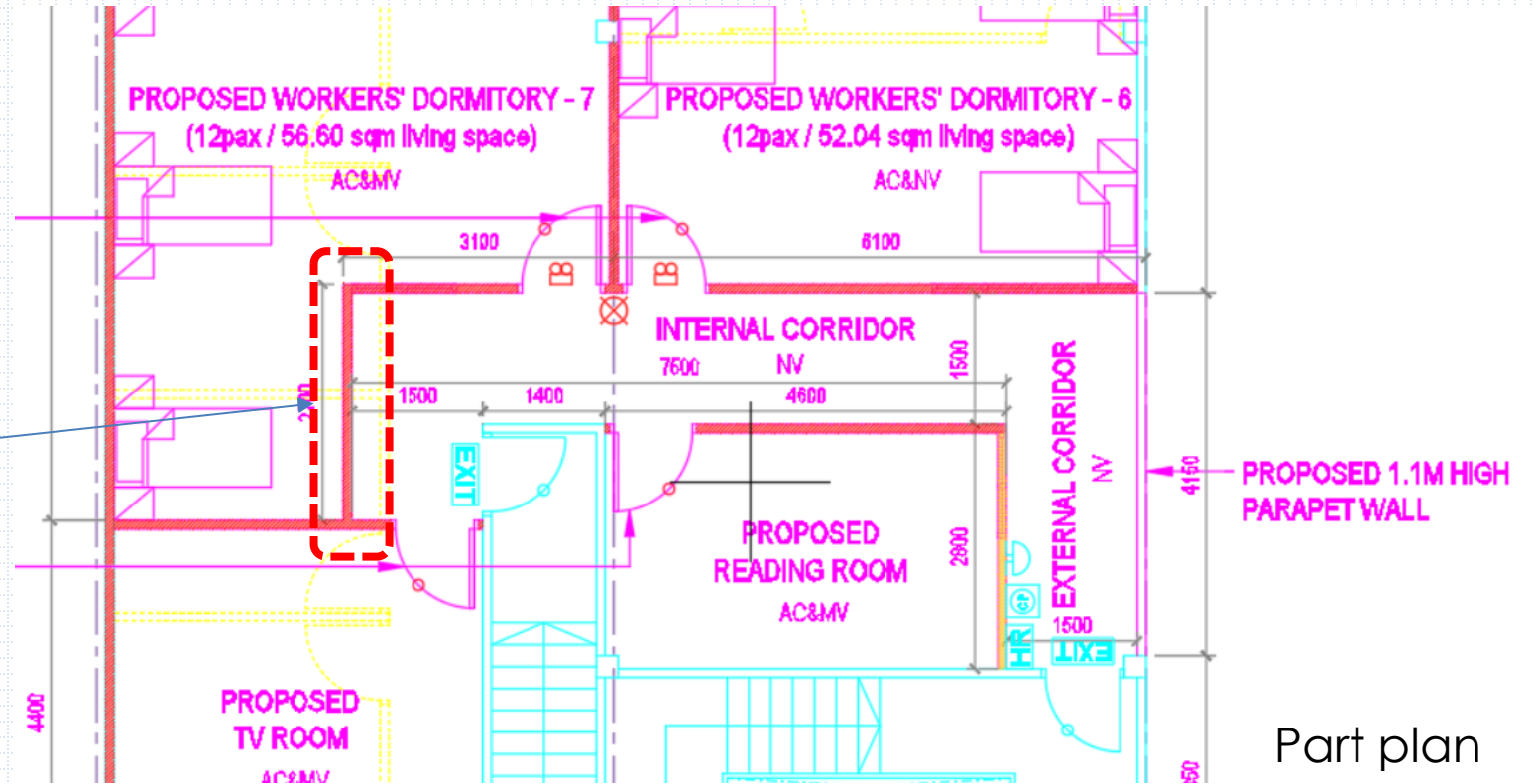
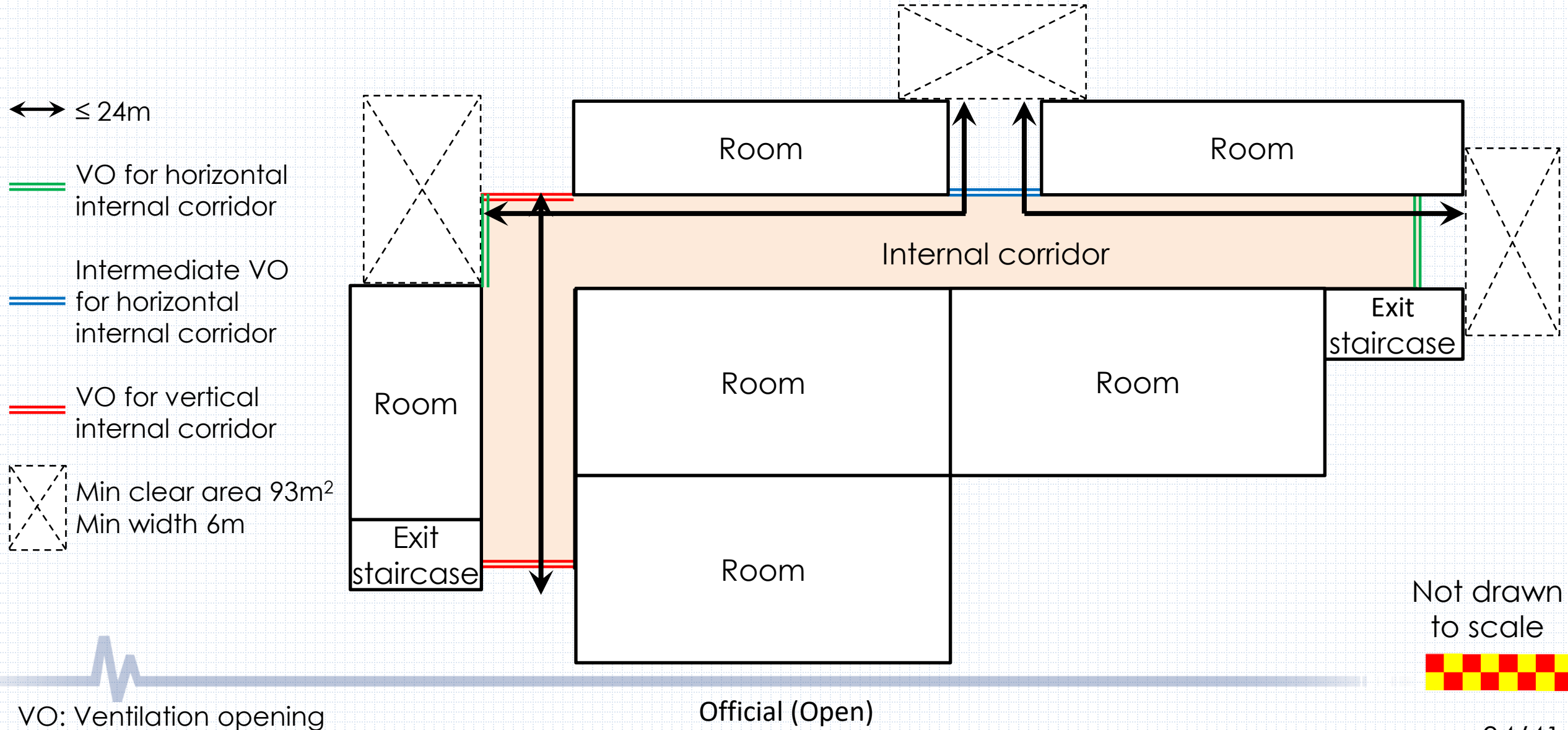


Illustration of cross ventilation

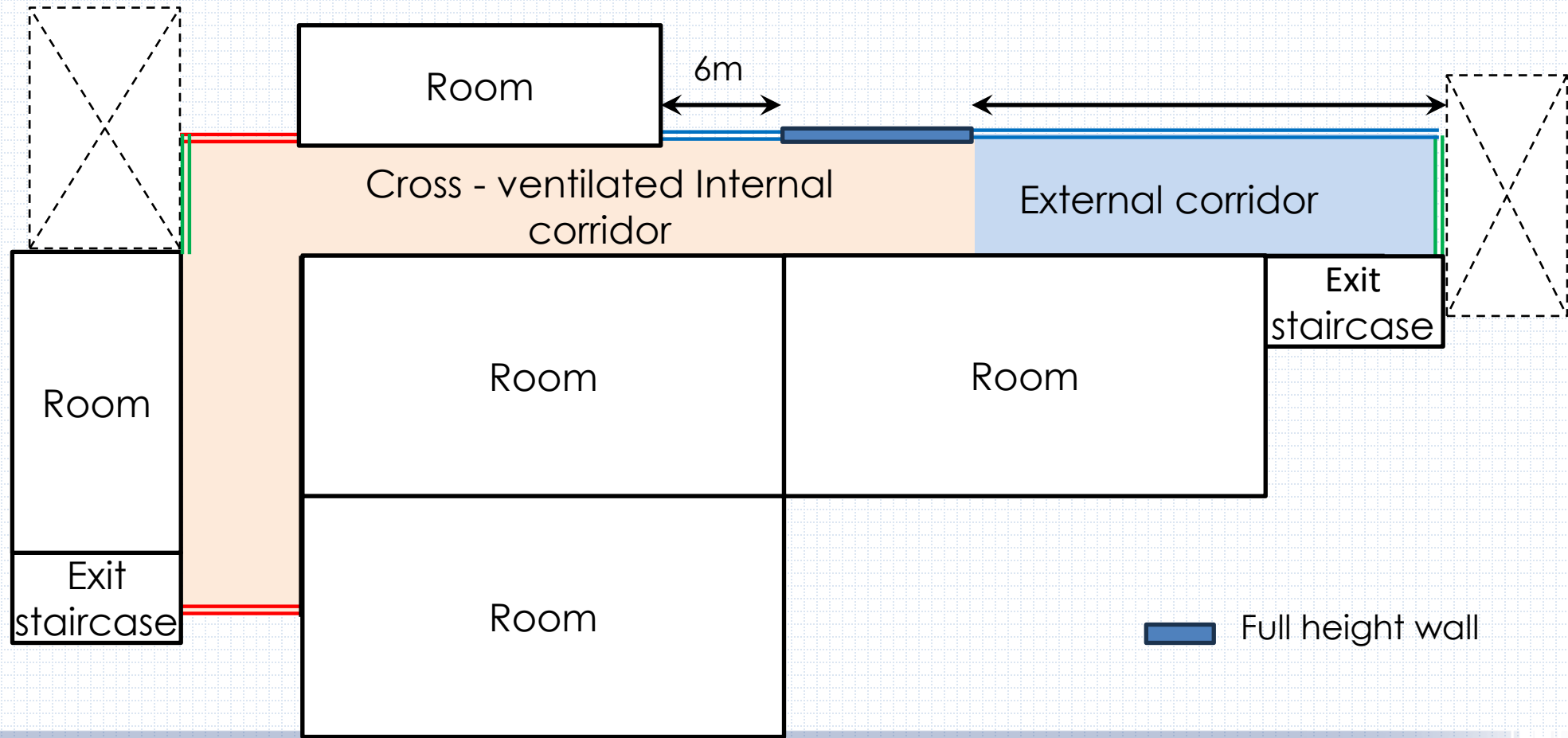


Cl.2.3.10f.

Clause	Description	Mistake made	Remarks
2.3.10.f	<u>External corridor</u> External corridor shall comply with the following requirements: f. the length of unobstructed and uninterrupted openings above the parapet wall of the external wall shall not be less than 6m and shall abut an external space.	• Treating the entire corridor as an external corridor despite part of the corridor not fulfilling the uninterrupted opening requirements	Rooms fronting internal corridor shall comply with internal corridor requirements. Cross ventilation will be measured up to opposing walls.

Cl.2.3.10f.

- ❖ Rooms fronting internal corridor shall comply with internal corridor requirements. Cross ventilation will be measured up to opposing walls.



Official (Open)



Table 2.2A

❖ Mistake: incorrect persons per unit of width

Note: For 1st storey with direct exit to external without relying on the protected staircase, columns no. 2a, 3a & 4a shall be left blank.

(1) Storey occupancy (eg 5th storey office)	(2) Exit located or Identification		(3) Clear width (m)		(4) Units of Width (¹ / ₂ m each)(Exit Rate - Persons/Unit Width)				(5) Exit capacity (No of persons)		(6) No of persons provided with means of escape (the smallest) o 5a & 5b
	(2a) Stairs (eg stair A)	(2b) Exit doors (eg door to stair A)	(3a) Stairs (eg 1.8)	(3b) Exit doors (eg 1.4)	(4a) Stairs		(4b) Exit doors (80)		(5a) Stairs	(5b) Exit doors	
					Unit of Width	Persons per Unit Width (eg 60)	Unit of Width	Persons/Unit Width (eg 80)			
2nd Storey	Stair 1	Door 1	1.25	0.85	2.5	60	1.5	80	150	120	120
	Stair 2	Door 2	1.25	0.85	2.5	60	1.5	80	150	120	120

TABLE 2.2A : DETERMINATION OF EXIT REQUIREMENT											
Type of Occupancy	Max Travel Distance(m)				Capacity No of persons per unit of width ^(x)				Min Width (m)		Max Dead
	One-way travel		Two-way travel								
	Non-sprinklered	Sprinklered	Non-sprinklered	Sprinklered	Door opening ^{(c), (d)} & (e)		Staircases ^(f)	Ramps Corridors Exits Passageways ^(d)	Staircases/ Exit Passageway	Corridors	Corri
					Exit to outdoors at ground level	Other exit & corridor doors					Non-sprinklered
Hotels, Boarding Houses, Serviced Apartments, Hostels, Backpackers Hotel, Dormitories	15	20	30	60	60	50	45	50	1	1.2	15

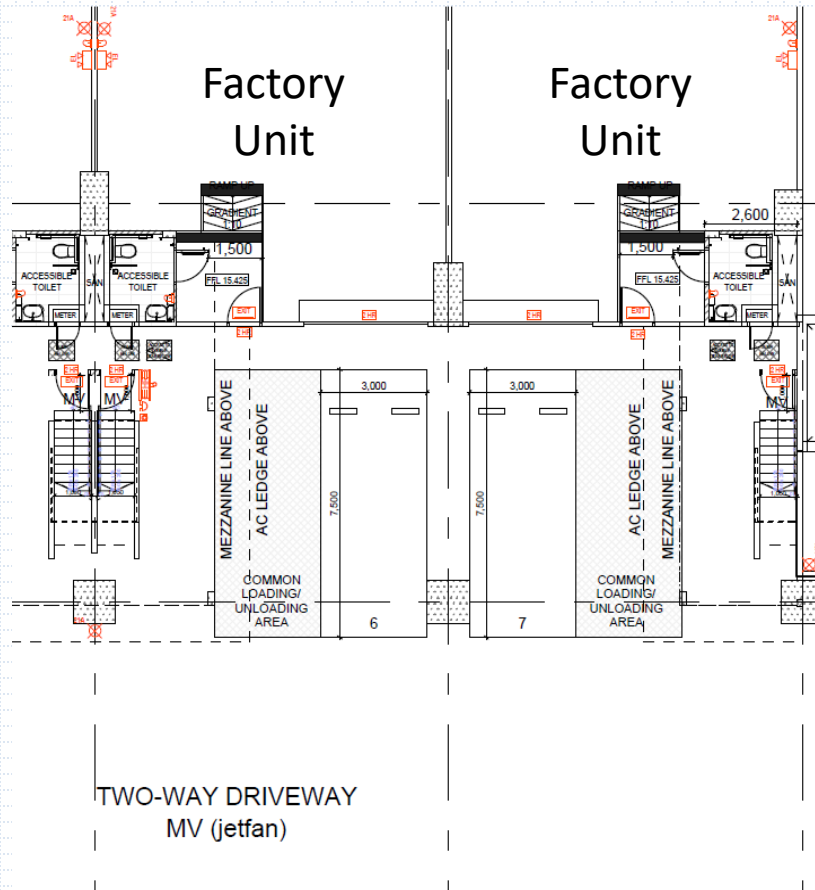
Cl.7.4.4a.

Clause	Description	Mistake made	Remarks
7.4.4	<u>Ductless jet fan system</u> a. General This system can be used in lieu of a smoke purging system for conventional car parks where <u>passenger cars/ light weight vehicles</u> are parked alongside each other with common driveways. It is not intended for mechanized car park systems or other forms of car parking systems.	• MV jet fan system is used for ramp up factory and warehouse driveway where majority of the vehicles are heavy vehicles	



Cl.7.4.4a.

- ❖ MV Jet fan should be provided based on heavy vehicles assumption



Conclusion

- ❖ It is important for QP to obtain the necessary consultations & waivers prior to plans submission:
 - To avoid downstream problems
 - Plan audit
 - Inspection
 - Rectification works
 - To avoid submitting amendment plans at the last minute right before application for TFP/FSC



Thank you for your attention

