

Operation & Maintenance Manual For Staircase Storey Shelters

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Chapter 1: Introduction

1.1 Background

With the implementation of the Civil Defence (CD) Shelter Act 1997 on 1 May 1998, new residential developments (i.e. public and private houses and flats) are to be provided with either household or storey shelters. The household shelter (HS) in a dwelling unit is designed with strengthened walls, floor and ceiling, and its walls are located at specified distances from the building exterior in accordance with the prevailing Technical Requirements for Household Shelters. Typically, a HS is used as a store-room in peacetime. The entrance to the HS is installed with light protective steel door that is approved under the Product Listing Scheme. The HS gives protection to the occupants against weapon effects such as blast and fragments during a National Emergency (NE). A storey shelter (SS), which has the same level of protection as the HS, is located in a common area for the protection of the residents of the dwelling units (i.e. not provided with HS) on that particular storey. A SS is designed to meet the prevailing Technical Requirements for Storey Shelters.

1.2 Staircase Storey Shelters

2. Since July 2004, an alternative to the SS concept, which is to double up the enclosed mechanically-ventilated exit staircase as a SS, was implemented. With staircase SS, it allows greater flexibility and better space optimisation in the design and layout of the residential development. The design of the staircase SS is also governed by the prevailing Technical Requirements for Storey Shelters.

3. This manual serves as a reference and guide for building owners and Management Corporations Strata Title (MCSTs) of residential developments that are provided with staircase SS within their premises. This manual aims to provide information and guidelines on the operations and maintenance requirements of staircase SS. This will enable building owners and MCSTs to adopt these guidelines in the management of the staircase SS in peacetime as well as when required for sheltering use in a NE.

4. The typical layout plans and sections of a staircase SS is as shown in **Annex A**. The staircase SS is an enclosed space with hardened walls, floors, landings, and doors. The staircase SS is mechanically ventilated for its peacetime usage. The SS walls at each storey are deemed as bounds of protection of the SS.

1.3 Operation & Maintenance Requirements

5. The CD Shelter Act 1997 requires that the building owner or management to be responsible in managing and maintaining the staircase SS in peacetime and during a NE. In this manual, the term building management (BM) refers to either the building owner or the MCST, which comprises all the subsidiary proprietors or owners of units in the estate. The BM shall put in place a regular maintenance programme for the staircase SS to be maintained in accordance to specifications described in Chapter 4.

6. The BM may appoint a Managing Agent (MA) to oversee the management and maintenance of staircase SS compartments. The BM shall also put in place procedures to get the shelter ready for occupation and to manage the shelters in a NE. The guidelines for operation and management of the staircase SS will be detailed in following chapters of this manual. Please note that the information contained in this manual is only applicable to the operation and maintenance of staircase SS, and not to other storey shelters (SS) or household shelters (HS).

7. During a state of tension leading to a NE, SCDF will issue direction to the BM to appoint a Shelter Operation Manager (SOM), who holds overall responsibility for managing the conversion and operation of the staircase SS during a NE. The SOM shall preferably be a resident living in the estate, and is familiar with the operation of the CD fixtures of the staircase SS. The SOM shall be assisted by shelter leaders (SLs) of individual SS compartments in the conversion and operation of staircase SS. Thereafter, the BM and SOM should put in place a Shelter Management Plan (SMP) (refers to Chapter 3) on the allocation of the residents to their respective staircase SS compartments and the relevant occupation procedures by the residents during a NE.

1.4 Inspection by SCDF

8. A staircase SS can only be considered effective if its structure and CD fixtures are regularly maintained to the desired standards. The SCDF will conduct regular inspections of staircase SS in residential developments to ensure that the operational readiness of the staircase SS is maintained. Where defects or improper maintenance are detected, SCDF will issue instructions for the necessary rectifications or adjustments to be carried out, and re-inspections will be conducted to ensure that the rectification works are done.

Chapter 2: Management of Staircase Storey Shelters

2.1 Roles & Responsibilities

Staircase SS are common property in the estates. It is the responsibility of Building Management (BM) to manage and maintain staircase SS to the stipulated maintenance standards (refer to Chapter 4). On the maintenance of the staircase SS, the BM may appoint a MA to ensure the shelter fixtures are properly maintained and kept in working order at all times. On the management of the staircase SS, upon direction given by SCDF (i.e. prior to a NE), the BM shall appoint a SOM to establish and implement the SMP (See Chapter 3). The SOM shall establish, maintain and update the shelter allocation plan and floor register of the residents. Every household in the residential estate shall be allocated a staircase SS compartment at the same floor.

2. In peacetime, the BM together with the MA should work together to ensure that activities/ tasks pertaining to shelter maintenance of the staircase SS according to the stipulated maintenance requirements (see Chapter 4) are carried out to ensure operational readiness. During a state of tension leading to a NE, when SCDF issues a notice to the BM to appoint the SOM and prepare the SMP, the BM has to activate the Fibre-Terminal Points in all the staircase SS compartments for internet connectivity.

3. In a NE, the conversion and operation of staircase SS compartments (see Chapter 3) are to be overseen by the SOM, under the management of the BM. The SOM should ensure that the tasks pertaining to shelter management are implemented accordingly. This would include the conversion and operation of staircase SS compartments during a NE.

2.2 Appointment of Shelter Leaders

4. This will be implemented when SCDF issues direction to the BM to appoint the SOM and prepare the SMP (Chapter 3). The SOM will have to appoint shelter leader (SL) from amongst the residents of each storey to undertake the tasks to operate and manage each staircase SS compartment at that storey. The appointment of SLs to assist the SOM shall be done in conjunction with the BM. The shelter management organisation structure and duties of the SOM and SL are given in greater detail in **Annex B**. The SOM and SLs are expected to be familiar with their duties and tasks.

5. When the need arises (e.g. prior to a NE), SCDF will embark on a programme to inform and prepare the public on the shelter protection measures including shelter occupation procedures, etc. Upon notification by SCDF, the SOM and SLs should commence conducting checks to ensure that the shelter fixtures are in good working conditions and to practise on the conversion and operations of the staircase SS for sheltering use (refer to Chapter 3 for details).

Chapter 3: Shelter Management Plan

3.1 Shelter Management Plan

A shelter management plan (SMP) is a document aimed at providing critical information for the management and maintenance of the shelters. This chapter outlines the fundamentals of a comprehensive SMP for the BM, SOM and SLs to facilitate the management of staircase SS within their estates. The relevant documents and charts that constitute a complete SMP are included in this chapter, for a typical residential estate incorporated with staircase SS.

3.2 Shelter Management Procedures

2. A key responsibility of the SOM is to put in place a SMP for the staircase SS. The SMP shall comprise the sequential list of activities to be carried out in each phase of shelter operation (see **Annex C**).

3. Shelter operation in times of emergency comprises 6 main stages as follows:

- a) Stage 1: Conversion Phase
- b) Stage 2: Standby Phase
- c) Stage 3: Moving-In Phase
- d) Stage 4: Stay-In Phase
- e) Stage 5: Dispersal Phase
- f) Stage 6: Recovery Phase

4. The detailed activities and tasks are described in the following paragraphs.

Stage 1: Conversion Phase

5. Upon being informed by the SCDF (48 hours' notice in advance will be given prior to a NE), the staircase SS compartments are to be converted from Normal Mode (i.e. usage as staircase) to Civil Defence (CD) Mode (i.e. usage as shelter) against imminent threats.

6. The tasks of converting staircase SS from Normal Mode to CD Mode are to be shared between the Shelter Operations Manager (SOM) and the Shelter Leaders (SLs) and to be completed within 48 hours.

7. In the conversion phase, the SOM oversees and co-ordinate activities depicted in Paragraph 8 of this chapter. The role of SLs is to carry out conversion within the SS compartments under their charge and be responsible to the SOM on the tasks carried out.

8. The following tasks shall be carried out during the conversion phase:

- a. To put in the FTP modem and ascertain that there is broadband/ WIFI connectivity at the FTP and to ensure that basic communication means (such as portable radio set and mobile devices) are available to obtain broadcast information. [Note: The SLs should inform the residents of the WIFI password to access WIFI signals
- b. To remove all the MV grilles within the SS compartments. [Note: As the MV system is still operating to ensure fire safety integrity is maintained in the staircase, the vertical blast hatches located in all SS compartments are to remain open. Similarly, the internal and external SS doors are to be kept open.]
- c. To close and seal fragmentation plates over the two ventilation sleeves (VS) found in every SS compartment using simple hand tools (if VS is found to be in open position).
- d. To remove door kerb from above the SS door, and install it onto the bottom of the door frame for 2 internal and 1 entrance SS doors of every SS compartment using the 5 no. of long screws, and keeping the 5 no. of short screws for peacetime conversion.

Stage 2: Standby Phase

9. The Public Warning System (PWS) is a network of sirens that the SCDF has placed at strategic points throughout the island, to warn the public of imminent threats. **Table 1** explains the various PWS signals. The SCDF will also make appropriate announcements via TV and radio during the emergency period. The residents should be paying attention to the sounding of PWS on any impending threat.

PWS Signal	How It Sounds	Situation	What It Means
Alarm Signal	One Minute of Wailing Blasts (May be repeated)	Sounded when imminent danger is approaching.	Move to the allocated staircase SS compartment immediately.
All Clear Signal	One Minute of Continuous Blasts	Sounded when the threat is over.	Leave the staircase SS.
Important Message Signal	One Minute of Pulsating Blasts	Sounded when the population is to be alerted to an important broadcast	Tune in to any radio station or online TV platforms such as Toggle for important emergency broadcast.

Table 1: Public Warning System Signals

10. The converted staircase SS compartments provided shall be ready prior to the sounding of “Alarm” signal for occupation by the residents. Upon hearing the “Alarm” signal via PWS or being informed of an imminent threat via online TV channels and/or radio broadcasts, the residents should move swiftly into the designated shelter compartment under the instructions of their respective SLs.

Stage 3: Moving-In Phase

11. During the shelter embarkation stage, both SOM and SLs shall guide the residents to their respective shelter compartments in an orderly manner. The following sequential actions shall be adhered to.

- a. To close and lock the internal SS door (i.e. door handle to be in Civil Defence (CD) Mode) within the SS compartment and the vertical blast hatch.
- b. To close the external SS door (in CD Mode) when all residents have entered the SS.
- c. Conduct roll-call within each compartment to identify any missing persons based on updated records of shelter floor register (**Annex D**). Assist anyone who is having difficulty in accessing the staircase SS, if time permits.
- d. Fill up the innermost areas of a SS compartment first. Family members are to stay together in a group. Avoid situation of overcrowding by having the shelter floor register updated prior to shelter occupation.
- e. Report the shelter embarkation status of the SS compartment to the SOM, using the shelter floor register. Identify missing persons based on records in shelter floor register, if any.

Stage 4: Stay-In Phase

12. During shelter occupation period that may last up to a few hours, the SOM and SLs shall share relevant information and updates (from government broadcasts via FTA TV and/ or radio channels), and monitor the well-being of shelterees in the SS compartments. The following actions shall be adhered to.

- a. Share relevant information and updates with the shelterees. Encourage fitter shelterees to care for the weaker ones.
- b. Check for unusual behaviour and conditions of any affected shelteree, and to render help immediately. If there is a need for medical evacuation arise, call 999 or 995 for immediate assistance.

- c. Encourage shelterees (with their mobile devices) to access the WIFI connectivity and tune in to the relevant online TV or radio channels via Toggle apps for any additional updates or special messages from the authorities.

Stage 5: Dispersal Phase

13. Upon hearing the “All-Clear” signal or being informed that the threat is over via TV and/or radio broadcasts, the SOM and SLs shall proceed with dispersal of shelterees from the shelter. The following action shall be adhered to:

- a. Inform shelterees that an ‘All Clear’ signal has been given to indicate that they may leave the shelter.
- b. Open the external SS doors carefully and guide the shelterees to leave in an orderly manner to return to their respective dwelling units.
- c. Attend to and arrange for the injured or sick shelterees (if any) to be conveyed to the nearest medical facility, as soon as possible.
- d. Unlock and open the internal SS doors and open the vertical blast hatches.
- e. Retain the SS in its set-up in CD Mode (with the entrance and internal SS doors as well as the vertical blast hatches open) for subsequent occupation. Identify any visible damages (if any) to the staircase SS compartments.
- f. SOM and SLs are to organise an after-action review on lessons learnt and improvements to be made in preparation for subsequent operation, if need be.

Stage 6: Recovery Phase

14. Once instruction is given by the relevant authority that the emergency period is over and that there is no longer the need for shelter occupation, the staircase SS can be reverted to its normal usage. The following actions are to be adhered to.

- a. Unlock and open the internal SS doors, to allow movement of persons through the staircase flights, with entrance SS doors kept fully open for normal usage of staircase.
- b. Uninstall the removable door kerbs by affixing them above the 2 internal and 1 entrance SS doors using the 5 no. of short screws, and reinstall the 5 no. of long screws.
- c. Open all blast hatches of the MV shaft / duct. Re-install MV grilles in all SS compartments. Close the fragmentation plates of the two ventilation sleeves (VS) found in each SS compartment, as in normal usage mode.

- d. Switch off and remove portable radio sets and FTP modem from all SS compartments.

3.3 Identification of Staircase SS Compartments

15. Staircase SS are primarily used as vertical means of ingress and egress of a building. For its civil defence role, staircase SS is internally divided into compartments which usually comprises a floor landing and a mid-landing. For protection, each staircase SS compartment is enclosed with hardened walls, floor landings and blast doors. Shelterees are expected to stay within designated SS compartments during shelter occupation. To facilitate control and reporting during operation, it is essential that each staircase SS compartment is clearly identified with: (i) The apartment block name or number; (ii) The appropriate level that the compartment is located on; (iii) Identification code of staircase used by BM with the prefix of SS for Staircase SS; For example, for a staircase SS labelled by the BM as Staircase 01 in an Apartment Block 321, its SS compartment at Level 9 may be designated as:

B321 /	09 /	SS(01)
(Block No.)	(The level where SS compartment is located)	(Prefix for staircase shelter; code)

3.4 Shelter Management Staff Aids

16. A set of shelter management staff aids shall be established and updated as necessary, as an integral part of the SMP. This section outlines the details required for several shelter management staff aids.

a) Shelter Allocation Plan

- i. The shelter allocation plan indicates the allocation of all dwelling units in the residential estate to the designated SS compartments. Details required in this plan include the block name or number, SS compartment identification code, and dwelling unit number. In addition, the SS compartment that the SOM would be located in shall be clearly indicated. (See **Annex D.**)
- ii. It should be noted that every dwelling unit shall be matched and allocated to an appropriate SS compartment, which is usually located on the same storey and situated within 40 metres from the entrance of an allocated dwelling unit.

b) Shelter Floor Register

The shelter floor register indicates the names of residents (including the SL) allocated to a particular SS compartment. The NRIC or foreign identification number and full name of every resident shall be provided in this register. This floor register can also be used to conduct a roll call and record the attendance

status of shelterees (i.e. either present or absent). The shelter floor register is to be updated in times of emergency in preparation for shelter occupation.

c) Shelter Occupation Summary Chart

The shelter occupation chart lists the staircase SS compartments, names of shelter leaders (SLs) and the shelter occupation status of the allocated residents. Information and details are arranged according to respective SS compartments, identified by the Block, Storey Level and SS identification code. The shelter occupation summary chart is to be used by the SOM to consolidate the overall occupation status of the staircase SS during shelter occupation. In a nutshell, the SLs shall report to the SOM of their respective SS compartment's shelter embarkation status, so that the SOM can sum up the number of shelterees who are present in their allocated SS compartments, as well as the number of shelterees who are absent from their respective compartments.

17. Templates of shelter management staff aids stipulated in Annex D may be used for actual operation to facilitate management control and operation. BM and SOM are encouraged to adapt the templates to suit local usage. A sample format and list of documents of SMP is given in Annex E.

Chapter 4: Maintenance Requirements

4.1 Maintenance of Staircase SS

The CD Shelter Act 1997 states that owners or occupiers of shelters are responsible to maintain the shelters according to prevailing regulations. This chapter specifies the basic minimum maintenance standards for the staircase SS. Dual-purpose equipment / fixtures used in the staircase SS should adhere to the requirements as spelt out in the manufacturers' or suppliers' operation and maintenance specifications.

4.2 Scope and Schedule of Works

2. This chapter covers the scope, the minimum maintenance standards and schedule for the following provisions of the staircase SS:

- a. Structural Components;
- b. Storey Shelter Blast Doors;
- c. Mechanical Ventilation Blast Hatches;
- d. Mechanical Ventilation System;
- e. Ventilation Sleeves;
- f. Other Fixtures

The details are given in the Maintenance Requirements for Staircase Storey Shelters (**Annex F**).

3. A staircase SS can only be operationally ready if the entire facility is well maintained during peace-time. The following maintenance guidelines shall be observed by the BM at all times:

- a) Periodic inspections are to be carried out by trained maintenance personnel, under the supervision of the BM.
- b) Durations between inspections are as indicated in the maintenance schedules found in **Annex F** and these may vary from item to item.
- c) For certain equipment/fixtures, a functional check is required in addition to the visual-inspection.

- d) Inspection and service reports shall be endorsed by the Building Management representative. Such reports shall be properly kept for record and inspection purposes.

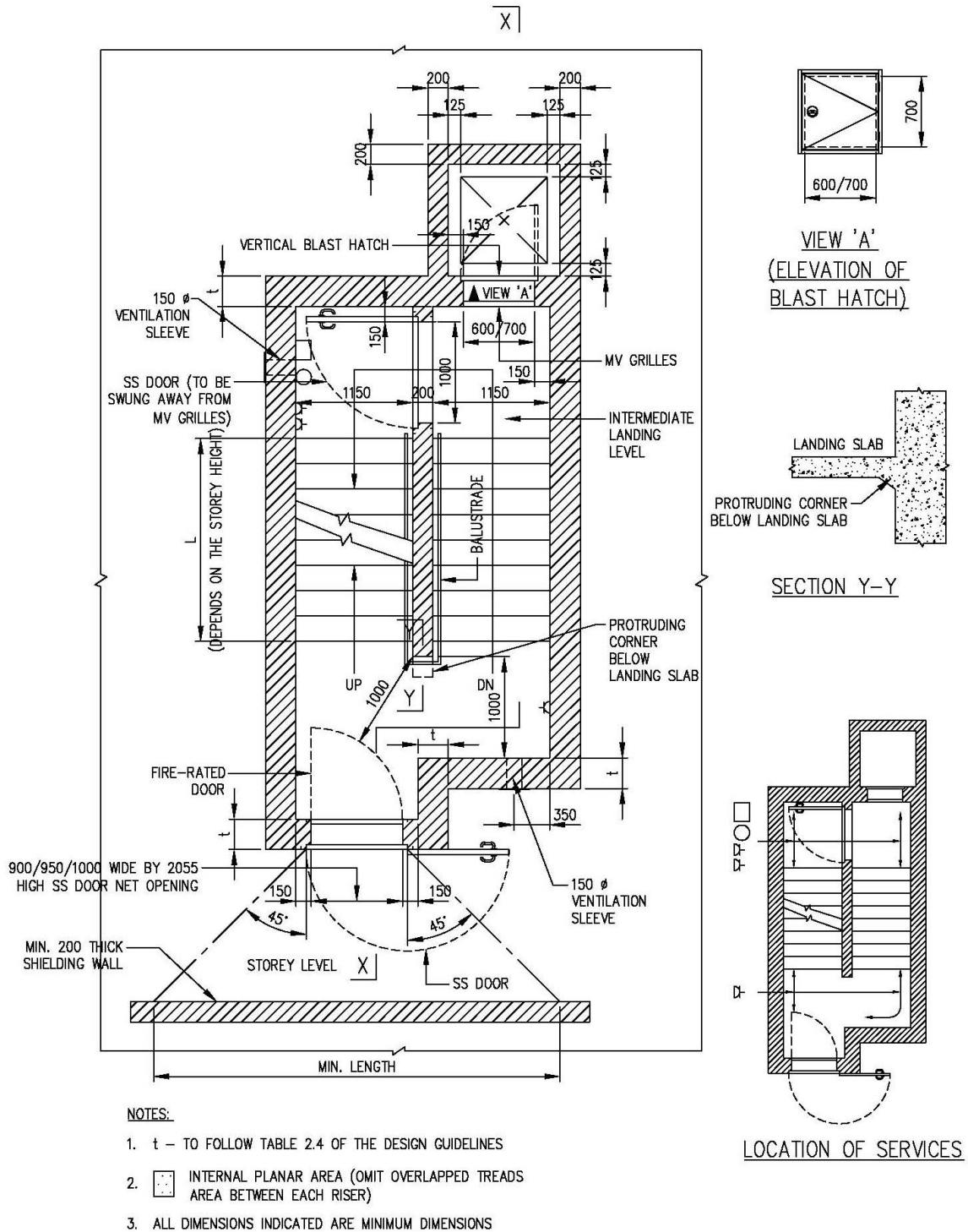


Figure 1 – Typical Plan of a Staircase Storey Shelter

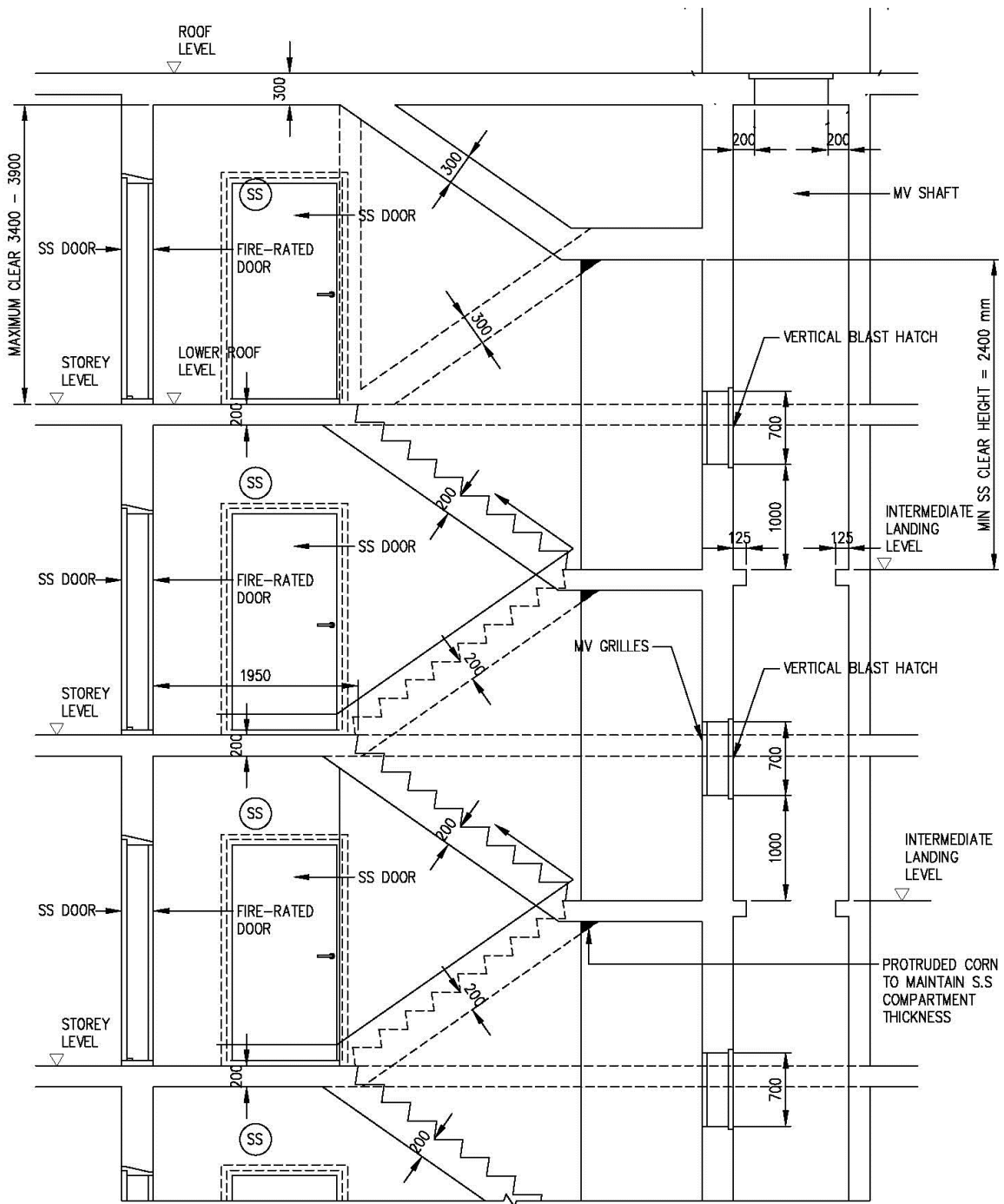
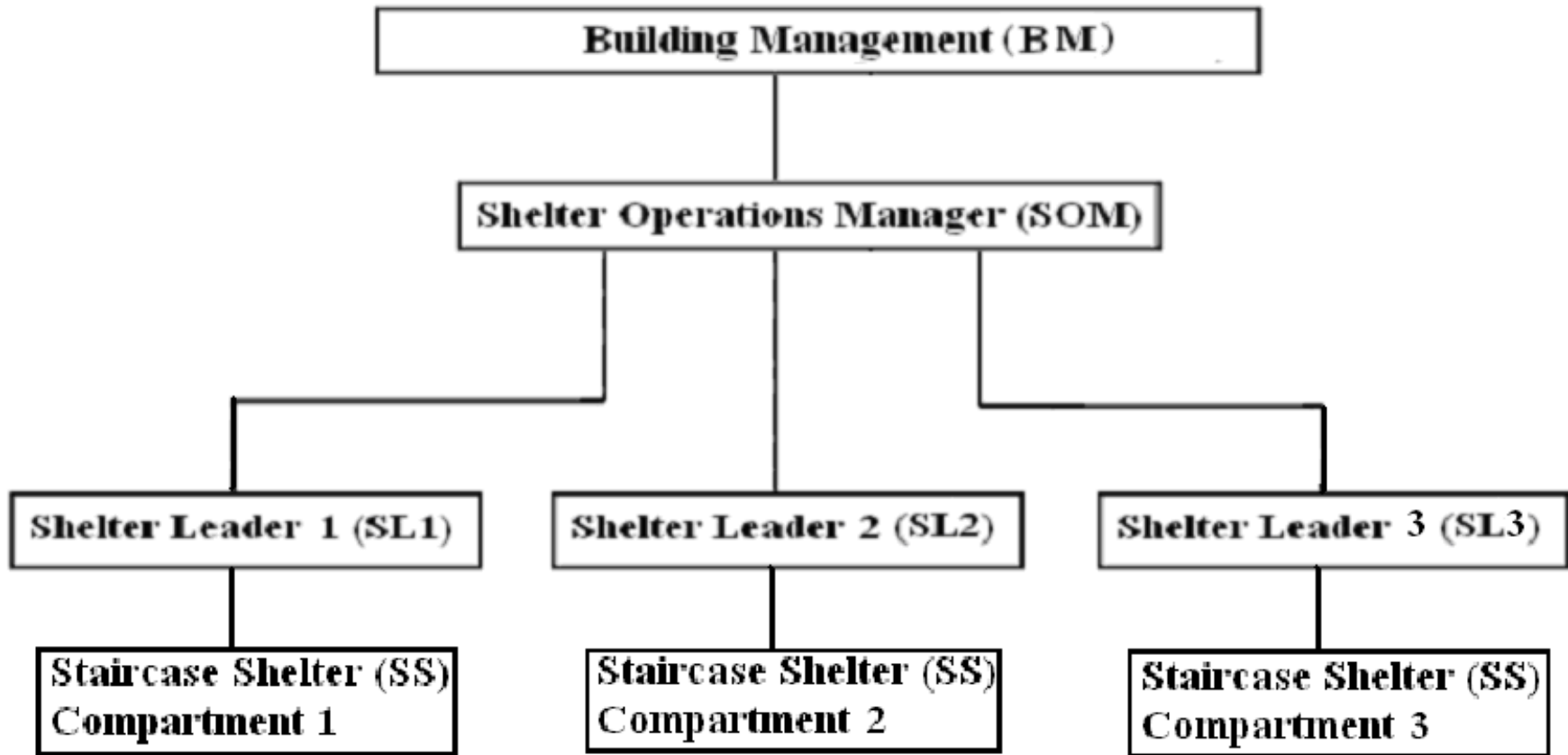


Figure 2 – Typical Section of a Staircase Storey Shelter

Shelter Management Organisation Structure



Note: One Shelter Leader (SL) should be assigned to each staircase SS compartment.

Duties and Responsibilities of Shelter Operation Manager (SOM)

The SOM holds overall responsibility to the Building Management (BM) of the residential development for the operation and management of SS within the estate. The duties of SOM include:

- a. Oversee the duties of the shelter leaders (SLs).
- b. Provide relevant instructions and directions to the SLs on the matters of shelter conversion and management.
- c. Formulate and update the Shelter Management Plan (SMP) with assistance from the BM.
- d. Oversee the implementation of the maintenance and state of readiness of staircase SS.
- e. Train and educate SLs and residents regularly so that they are familiar with their roles in shelter conversion and occupation.

Duties & Responsibilities of Shelter Leaders (SLs)

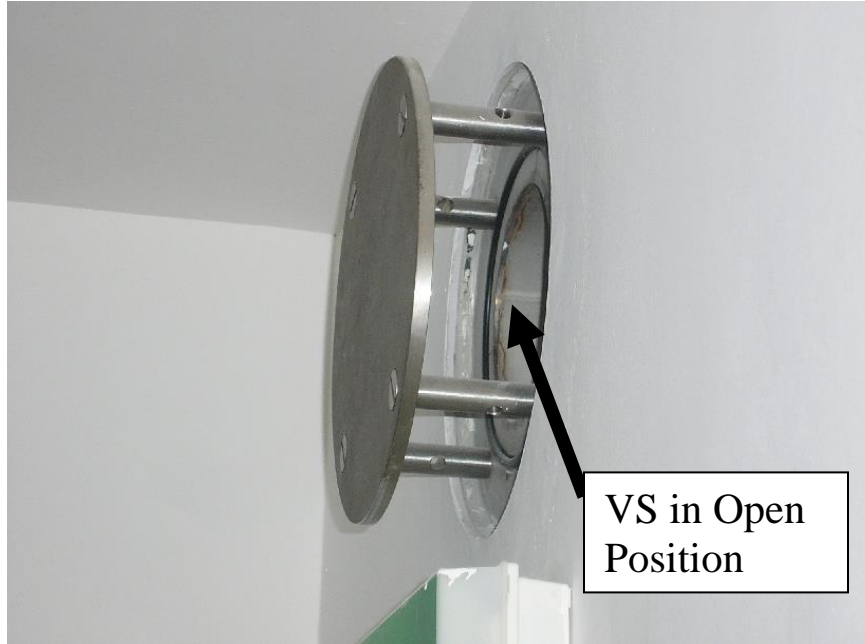
The role of the SL is to assist the SOM in operation and management of SS compartment.

The duties of a SL include:

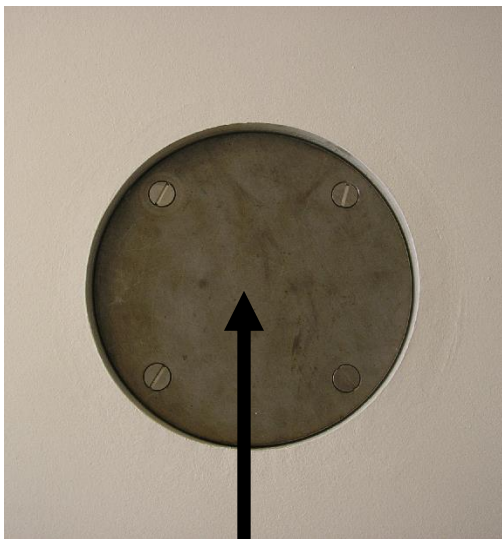
- a. Carry out shelter conversion for SS compartments under his/her charge from normal mode to CD mode, and vice-versa, according to the SOM's instructions.
- b. Identify and guide residents into the SS compartments, keep the SOM updated on the shelter occupation status, and seal the SS compartments.
- c. Manage the shelterees in the SS compartments during shelter occupation by providing guidance and support to the shelterees.
- d. Share relevant information with the SOM and the shelterees. Report relevant status during shelter occupation to the SOM at regular intervals.
- e. Assist SOM to update the shelter allocation plan and floor registers.
- f. Participate in training sessions and other activities organised by the BM and SOM on shelter occupation procedures.

Conversion of Staircase SS from Normal Mode to CD Mode

Step 1: Close and seal fragmentation plates over the two ventilation sleeves (VS) found in every SS compartment using simple hand tools (if VS is in open mode).



VS in Open Position



External Face of VS in Closed Position

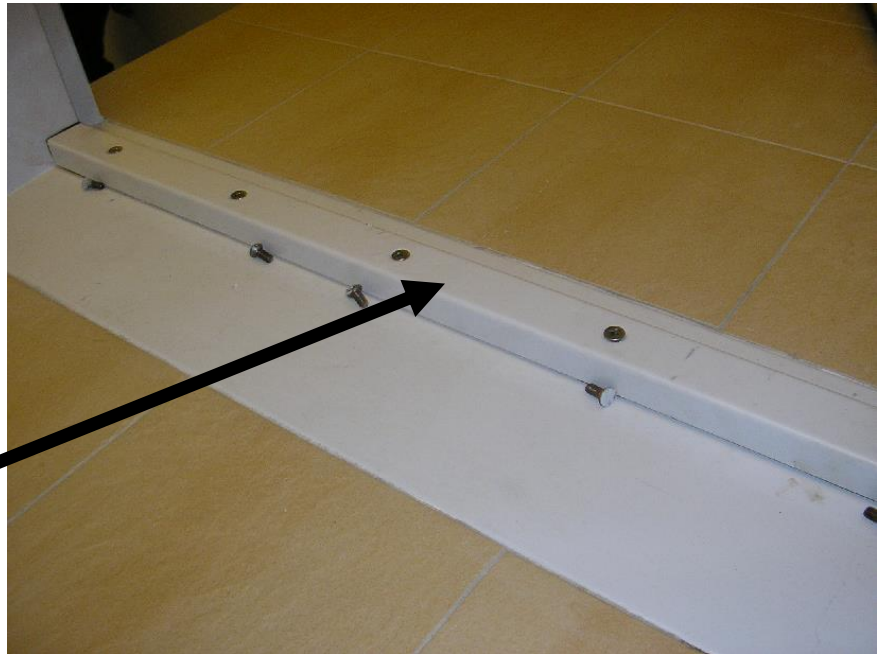


Internal Face of VS in Closed Position

Step 2: Remove door kerb from above SS door, and install it on the bottom edge of the door frame, for 2 internal and 1 entrance SS doors of every SS compartment using 5 longer screws, and install the 5 shorter screws onto the top of the door frame.



Remove door kerb from above SS door.



Install door kerb on bottom edge of SS door.



Step 3: Set up portable radio set and install the FTP modem in every SS compartment.



SHELTER ALLOCATION PLAN**(Sample)**

Updated On: _____

A 5-Storey Low-Rise Residential Estate Comprising 2 Blocks (Blocks 10 & 11) with 2 Staircase Storey Shelter Towers in Each Block and 10 Dwelling Units on Every Storey

Block Name / No.	Storey Level	Staircase SS Compartment(s)	Allocated Dwelling Unit No.
10	1 st	<i>B10/01/SS(A) (SOM)</i>	#01-01 to #01-05
		<i>B10/01/SS(B)</i>	#01-06 to #01-10
	2 nd	<i>B10/02/SS(A)</i>	#02-01 to #02-05
		<i>B10/02/SS(B)</i>	#02-06 to #02-10
	3 rd	<i>B10/03/SS(A)</i>	#03-01 to #03-05
		<i>B10/03/SS(B)</i>	#03-06 to #03-10
	4 th	<i>B10/04/SS(A)</i>	#04-01 to #04-05
		<i>B10/04/SS(B)</i>	#04-06 to #04-10
	5 th	<i>B10/05/SS(A)</i>	#05-01 to #05-05
		<i>B10/05/SS(B)</i>	#05-06 to #05-10
11	1 st	<i>B11/01/SS(C)</i>	#01-11 to #01-15
		<i>B11/01/SS(D)</i>	#01-16 to #01-20
	2 nd	<i>B11/02/SS(C)</i>	#02-11 to #02-15
		<i>B11/02/SS(D)</i>	#02-16 to #02-20
	3 rd	<i>B11/03/SS(C)</i>	#03-11 to #03-15
		<i>B11/03/SS(D)</i>	#03-16 to #03-20
	4 th	<i>B11/04/SS(C)</i>	#04-11 to #04-15
		<i>B11/04/SS(D)</i>	#04-16 to #04-20
	5 th	<i>B11/05/SS(C)</i>	#05-11 to #05-15
		<i>B11/05/SS(D)</i>	#05-16 to #05-20

SHELTER FLOOR REGISTER

(Sample)

Updated On: _____

A 5-Storey Low-Rise Residential Estate Comprising 2 Blocks (Blocks 10 & 11) with 2 Staircase Storey Shelter Towers in Each Block and 10 Dwelling Units on Every Storey

Block / Storey / SS : Block 10 / 01 / SS (A)

Dwelling Unit No.	NRIC / ID No.	Name of Occupant	Shelter Embarkation Status (Tick the relevant status)	
			Present	Absent
#01- 01				
#01- 02				
#01- 03				
#01- 04				
#01- 05				
Shelter Embarkation Status of SS Compartment				

Note: The names of all residents should be included in the shelter floor register.

Shelter Leader: _____

SHELTER OCCUPATION SUMMARY CHART

(Sample)

Updated On: _____

Staircase SS Compartment (Block / Storey / SS Tower)	Name of Shelter Leader	No. of Shelterees (Occupation Status)	
		Present	Absent
B10 / 01 / SS(A)			
B10 / 01 / SS(B)			
B10 / 02 / SS(A)			
B10 / 02 / SS(B)			
B10 / 03 / SS(A)			
B10 / 03 / SS(B)			
B10 / 04 / SS(A)			
B10 / 04 / SS(B)			
B10 / 05 / SS(A)			
B10 / 05 / SS(B)			
B11 / 01 / SS(C)			
B11 / 01 / SS(D)			
B11 / 02 / SS(C)			
B11 / 02 / SS(D)			
B11 / 03 / SS(C)			
B11 / 03 / SS(D)			
B11 / 04 / SS(C)			
B11 / 04 / SS(D)			
B11 / 05 / SS(C)			
B11 / 05 / SS(D)			

Shelter Occupation Status of Entire Estate		
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Shelter Operations Manager: _____

Format and List of Documents in Shelter Management Plan (SMP)

The shelter management plan shall consist of the following components:

- a. Layout Plan and Contents
A relevant set of building plans, clearly indicating the locations of all staircase SS and typical layout of SS compartments in the residential estate.
- b. Roles & Responsibilities
A shelter management organisation structure in the form of a chart, stating the names of persons holding the appointments of SOM and SLs. The general duties and responsibilities of the SOM and SLs should be included, and this information can be found in **Annex B**.
- c. Conversion Guide
A complete set of the conversion guide for staircase SS, which can be found in **Annex C**.
- d. Staff Aids
A complete set of shelter management staff aids, templates of which can be found in **Annex D**. Relevant fields shall be updated.
- e. Maintenance Records
Based on the maintenance schedules provided in **Annex F**, every inspection and service report for the maintenance of the staircase SS shall be included as records in the SMP.
- f. Additional Documents (if any)
Any other documents that the BM and SOM may find useful in managing the operation and maintenance of the staircase SS provided in the residential estate.

Introductory Notes

1. These requirements stipulate preventive maintenance measures to be carried out for the staircase storey shelters.
2. Maintenance activities shall be conducted in accordance with the frequency of maintenance stipulated.
3. Inspection and service reports shall be endorsed by the Building Management representative. Such reports shall be properly kept for record and inspection purposes.

SCHEDULE OF MAINTENANCE FOR STRUCTURAL COMPONENTS

The following items are to be checked and maintained at the intervals stated:

1. <u>REINFORCED CONCRETE WALLS, STAIRCASE FLIGHTS / LANDINGS / ROOF / UPPER ROOF SLABS</u>	FREQUENCY			
	M	Q	½ Y	Y
a) Visual checks for cracks and seepage (e.g. open cracks with crack width more than 1mm). All causes of cracks and seepage must be investigated and remedial must be proposed and carried out with the approval of FSSD/BCA. In case of crack widths more than 2mm, the nature of the cracks must be investigated. Surface cracks are of no concern. Cracking over the entire wall/slab thickness must be closed by suitable means (e.g. pressure grouting). Remedial works are to be carried out by a specialist with the approval of FSSD/BCA.			X	
b) Visual checks for corrosion of reinforcement under the concrete cover. Reinforcement affected by corrosion shall be suitably treated and protected.			X	
c) Visual checks for unauthorized openings in the staircase SS structure. Only two ventilation sleeves and one opening for mechanical ventilation shaft are allowed for every SS compartment.			X	
d) Visual checks for cracks and seepage in upper roof slab protecting the intake point of the MV shaft, if applicable.			X	

Notes:-

M – Monthly

Q – Quarterly

½ Y – Half Yearly

Y – Yearly

	FREQUENCY			
	M	Q	½ Y	Y
<p>2. <u>REINFORCED CONCRETE SHIELDING WALL</u></p> <p>a) Visual checks on the entire RC shielding wall in front of the entrance SS door for cracks, which could impair the structural safety and/or gas tightness. In case of crack widths more than 2mm, the nature of the cracks must be investigated. Surface cracks are of no concern. Cracks over the entire wall/slab thickness must be closed by suitable means (e.g. pressure grouting). Remedial works are to be carried out by a specialist with the approval of FSSD/BCA.</p> <p>b) Visual checks for corrosion of reinforcement under concrete cover.</p>			X	
<p>3. <u>SETBACK PROVISIONS</u></p> <p>a) Check to ensure that provision of reinforced concrete floor slabs, trellises and other structures as setback distance are in accordance with approved shelter plans and/or waiver decision letters.</p> <p>b) Check for unauthorised works that can adversely affect setback distance in terms of reduced protection level. Any reduction in protection level must either be rectified to meet original provisions in the approved shelter plans, or approved by the relevant authorities (SCDF and/or BCA).</p>			X	

Notes:-

M – Monthly

Q – Quarterly

½ Y – Half Yearly

Y – Yearly

**SCHEDULE OF MAINTENANCE FOR STAIRCASE STOREY SHELTER
(S/C SS) BLAST DOORS & REMOVABLE DOOR KERBS**

The following items are to be checked and maintained at the intervals stated:

	FREQUENCY			
	M	Q	½ Y	Y
4. <u>ENTRANCE & INTERNAL SS DOORS</u>				
a) Repair or replace any distorted or damaged parts of door as such parts will impair the operation and function of the door. Check and repair any damaged welds if necessary.			X	
b) Remove all rust from corroded areas, prepare and touch-up with approved paint/coating. Any parts of the locking mechanism affected by rust shall be appropriately treated and re-galvanised.			X	
c) Check the condition of hinges by closing and opening door completely. Replace any worn-out or misaligned hinges. Clean and grease the lock set, dismantle and adjust if necessary.			X	
d) Replace damaged or missing rubber seals. Loose seals are to be glued into the retainer. Check tightness of seal all around by applying chalk to the seal angle before closing the door. In case of discontinuous chalk marks, the seal is to be replaced until the chalk mark is continuous. The chalk test shall be applied to all protective doors and hatches with rubber gaskets. Material used for seal shall be of continuous skinned closed cell form expanded neoprene of EPDM rubber which meets the requirements of ASTM D1056.			X	

Notes:-

M – Monthly

Q – Quarterly

½ Y – Half Yearly

Y – Yearly

5. <u>REMOVABLE DOOR KERBS OF SS DOORS</u>	FREQUENCY			
	M	Q	½ Y	Y
a) Visual checks for any distorted or damaged parts of the removable door kerb as such parts will impair the operation and function of the entire door.			X	
b) Remove all rust from corroded areas, prepare and touch-up with approved paint/coating.			X	
c) Check the alignment and fit of the door kerb by installing it onto the bottom of the door frame using screws, before closing and locking the door.			X	
d) Replace or repair damaged or missing rubber seal that is installed within the door kerb. Any loose seal has to be glued into the door kerb. Check and replace the seal if it is deformed, deteriorated, hardened or loss of resiliency. Splice joint shall be formed for joining up the seal, and the entire bottom face of seal shall be bonded into the holder with adequate and appropriate adhesive. Material used for seal shall be of continuous skinned closed cell form expanded neoprene or EPDM rubber which meets the requirements of ASTM D1056.			X	

Notes:-

M – Monthly

Q – Quarterly

½ Y – Half Yearly

Y – Yearly

SCHEDULE OF MAINTENANCE FOR MECHANICAL VENTILATION (MV)
BLAST HATCHES

The following items are to be checked and maintained at the intervals stated:

<u>6. MECHANICAL VENTILATION BLAST HATCHES</u>	FREQUENCY			
	M	Q	½ Y	Y
a) Repair or replace any distorted or damaged parts of blast hatch as such parts will impair the operation and function of the blast hatch. Check and repair any damaged welds if necessary.			X	
b) Remove all rust from corroded areas, prepare and touch-up with approved paint/coating. The locking mechanism shall be re-galvanized.			X	
c) Check the condition of hinges by closing and opening blast hatch fully.			X	
d) Check and replace the seal if it is deformed, deteriorating, hardened or loss of resiliency. Splice joint shall be formed for joining up the seal and the entire bottom face of seal shall be bonded into the holder with adequate and appropriate adhesive. Material used for seal shall be continuous skinned closed cell form expanded neoprene or EPDM rubber which meets the requirements of ASTM D1056.			X	
e) Clean and grease the lock set, dismantle and adjust if necessary.			X	
f) Inspect and tighten all the bolts and nuts to the required torque if necessary.			X	

Notes:-

M – Monthly

Q – Quarterly

½ Y – Half Yearly

Y – Yearly

SCHEDULE OF MAINTENANCE FOR VENTILATION SLEEVES

The following items are to be checked and maintained at the intervals stated:

7. <u>VENTILATION SLEEVES ON SS WALLS</u>	FREQUENCY			
	M	Q	½ Y	Y
a) Check and repair any distorted or damaged parts of the ventilation sleeves as such parts will impair air-tightness of the staircase SS compartment. The 150mm wide openings through the wall(s) must not be obstructed.			X	
b) Remove all rust from corroded areas, prepare and touch-up with approved coating or paint. All moving mechanisms shall be re-galvanised.			X	
c) Check the condition of all 12mm stainless steel bolts and threaded holes by closing the 10 mm thick fragmentation plate completely, before opening it again. Replace damaged or missing steel bolts, if the fragmentation plate cannot be closed properly.			X	
d) Check that at least 50 mm of unobstructed clear space is available around the ventilation sleeve, and at least 500 mm in front of the fragmentation plate. Every ventilation sleeve must be easily accessible for maintenance and operation purposes.			X	

Notes:-

M – Monthly

Q – Quarterly

½ Y – Half Yearly

Y – Yearly

SCHEDULE OF MAINTENANCE FOR OTHER FIXTURES

The following items are to be checked and maintained at the intervals stated:

<u>8. ELECTRICAL & COMMUNICATION FIXTURES</u>	FREQUENCY			
	M	Q	½ Y	Y
a) Check for proper operation of all electrical and communication fixtures including light fittings, socket outlets, FTP , etc. Rectify or replace as necessary.			X	

Notes:-

M – Monthly

Q – Quarterly

½ Y – Half Yearly

Y – Yearly