

GUIDELINES FOR PLAN SUBMISSION, CONSTRUCTION AND COMMISSIONING OF HOUSEHOLD OR STOREY SHELTERS

Issued By:



**Civil Defence Shelter Engineering Department
Building Resilience Group**

BUILDING AND CONSTRUCTION AUTHORITY

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1 INTRODUCTION

- 1.1 This Guide serves as a reference to Qualified Persons (QPs) who are responsible for the planning, design, construction and commissioning of household or storey shelters.

QPs are advised to follow the guidelines described herein so as to obtain the approval of shelter plans from the Civil Defence Shelter Engineering Department (CSDS) of Building Resilience Group (BRG) in the Building and Construction Authority (BCA). During the design phase of a household or storey shelter, Notice of Approval (NOA) is issued separately for compliance with shelter building and structural requirements in accordance with the Household Shelter or Storey Shelter Technical Requirements. At the final stage of household or storey shelter construction, Notice of Approval (NOA) is issued when household or storey shelter meets the commissioning requirements in accordance with the Household Shelter or *Storey Shelter Technical Requirements. Refer to Flowchart at Annex A-1 for details.

*Note: * Storey shelter includes staircase storey shelter*

2 GENERAL ADVICE TO QUALIFIED PERSONS

Before undertaking the planning, design, construction and commissioning of household or storey shelters in residential houses or flats, QPs are advised to familiarise themselves with the shelter building, structural, construction and commissioning requirements as stipulated in the Household Shelter or Storey Shelter Technical Requirements. QPs should pay special attention to the following:

2.1 Interdependency between Qualified Persons

There is a high level of inter-dependency between the design architect and professional engineer in ensuring that shelter building and shelter structural

requirements are complied with. The requirements of household or storey shelter building design could affect shelter structural design requirements. Hence, the design architect shall be the overall co-ordinator for all stages of household or storey shelter design. This is to avoid abortive structural design works by the professional engineer (PE). In situations where transfer structures are used, the PE should be involved in the design from the onset and be present together with QP (Architect) when seeking design consultation with BCA to ensure that the design is feasible and supplementary design requirements, if necessary, can be complied with.

2.2 Routing and Penetration of Services

The routing and penetration of mechanical and electrical services through shelter walls are important details as they may affect the air-tightness requirements of a household or storey shelter. Hence, details showing the routing and locations of services penetration through walls, floor slab or ceiling slab of a household or a storey shelter are to be shown in the shelter building plans.

3 TECHNICAL REQUIREMENTS

In addition to this Guide, the planning, design, construction and commissioning of household or storey shelters shall be carried out in accordance with the Household Shelter or Storey Shelter Technical Requirements.

4 CONSULTATION ON SHELTER DESIGN

4.1 Consultation via CORENET

It is to QP's advantage that a consultation session with BCA/CDSO be arranged during the early design stage of a household or storey shelter. This should be done preferably before planning application. QPs can request a suitable date for consultation by submitting an e-Form BCA-CD-PLAN01 to CDSO of BCA via CORENET or by e-booking system.

For effective consultation, QPs are requested to bring along their preliminary design plans showing the following:

- (a) Shelter size;
- (b) Location of shelter/s with respect to overall building layout;
- (c) Location of shelter door and ventilation sleeves
- (d) Transfer structures, if any
- (e) Shelter setback distances from external building lines;
- (f) Thickness of shelter walls and slabs; and
- (g) Sectional view and elevation of shelter with respect to building elevation.

4.2 **Appointment for Consultation by E-Booking**

For QPs to gain full benefit from consultation of household and storey shelter, QP can e-book an appointment of their preferred date and time so that consultation can be provided as scheduled. This would enable better planning and management of time for QPs and BCA. E-Booking for appointment can be easily made at any time by logging into our BCA website and following the steps as given in the attached Annex C.

4.3 **Consultation with BCA**

QPs are responsible for the design of building works under the Building Control Act. Thus, QPs must lead and attend the consultation session with BCA so that they can make a conclusive decision on engineering solutions during consultation and speed up plan submission and approval.

5 **APPLICATION FOR APPROVAL OF SHELTER PLANS**

5.1 **Sequence of Application for Approval of Shelter Plans**

QPs are required to submit and obtain Notice of Approval (NOA) for the following shelter plans from CDSD of BCA in the following sequence:

- (a) Shelter Building Plans; and

(b) Shelter Structural Plans

In this way, shelter structural plans can be prepared in accordance with approved shelter building plans which comply with technical requirements of Household Shelters or Storey Shelters. This would improve design efficiency as unnecessary amendments to structural plans due to changes to shelter building plans as result of non-compliance with shelter technical requirements can be prevented.

QPs are to take note that construction works pertaining to household or storey shelter can only commence after Notice of Approval (NOA) for shelter structural plans has been obtained.

5.2 Project Reference Number

In the application for approval of shelter building plans, the architect shall indicate the project reference number on the shelter building plans. QPs making subsequent shelter structural plans submission should indicate the same project reference number issued by the architect on their plans. The following abbreviation should be used for the respective plan type: **CD** for shelter building plans and **CS** for shelter structural Plans. For example: A9999-12345-2001-**CD01** & A9999-12345-2001-**CS01**

For subsequent amendment submissions made to the approved shelter plans or re-submission of shelter plans after receipt of Notice of Disapproval (NOD) issued by BCA, QPs shall use respective plan type suffix and unique numbers in their application. For example, if shelter building plans CD01 has been used and QP wishes to submit amendment design of the approved CD01 plans or to re-submit shelter building plans after NOD has been issued, then CD02 shall be used for the subsequent submission. For re-submission (in response to WD), QP shall use the same plan type number as stated in the Written Direction.

5.3 Standard Approval Stamp

Site layout plan, key plan and location plan of household shelter or storey shelter shall be submitted. All types of shelter plans must bear the following standard approval stamp on the right-hand column on every plan. The plans and design calculations (applicable for structural application only) shall bear a standard certification from the QP on the first and last sheet of the plans and calculations (refer to specimen on the following page).

In the application for approval of shelter building plans or structural plans, QP shall use the standard approval stamp to certify and endorse that all the shelter requirements as stipulated in the Household Shelter or Storey Shelter Technical Requirements have been fully complied with.

Standard Approval Stamp for Civil Defence Shelter Plans

100 mm

120 mm

____ Sheet of ____

BUILDING AND CONSTRUCTION AUTHORITY
APPROVED UNDER SECTION 5 / SECTION 5A OF THE
BUILDING CONTROL ACT (CAP 29)

Project Reference No: _____

Approval granted herein is with respect to civil defence shelter works only.

Standard Certification for Civil Defence Shelter Plans

I, _____, hereby submit the detailed civil defence shelter plans *(and design calculations) prepared by me and certify that: -

(a) the preparation of these civil defence shelter plans are in accordance with the Building Control Regulations; and

(b) the civil defence shelter works shown on these plans are designed in accordance with the shelter technical requirements.

2 Total number of civil defence shelter plans submitted: _____ and total number of pages of design calculations: _____.

Qualified Person's Signature and Stamp

Date

** Delete where not applicable*

5.4 Shelter Data

Design architect is required to provide shelter data of the development project in the standard format as shown below. These data shall be clearly shown on the first page of shelter building plans.

Standard Format of Shelter Data

Data of Household Shelter						
Dwelling Unit Type	GFA of Unit (m ²)	No of HS	Area of HS (m ²)	No of Square Units #	Volume of HS (m ³)	Shelter Type*

* Legend for HS

HA: HS Aboveground
HB: HS Basement

+ Legend for SS

SA: SS Aboveground
SB: SS Basement

Applicable for HS which are trapezoidal or L-shaped HS.

No. of square units (0.6 m x 0.6 m) used for the assessment of trapezoidal or L-shaped HS
For more details, please refer to Technical Requirements for HS

5.4.1 For development project with Storey Shelters, the following data is required to show the computation of nominal occupancy for each storey shelter:

Data of Storey Shelter									
Storey	Dwelling Unit Type	GFA (m ²)	Nominal Occupancy	Total Nominal Occupancy (TNO)	Area of SS (m ²)		Volume of SS (m ³)		Shelter Type +
					Required (TNO x 0.6m ²)	Provided	Required (TNO x 1.8m ³)	Provided	

5.5 Types of Shelter Plan Submission

Every new shelter plan application, re-submission after receipt of a Notice of Disapproval or amendment design to approved shelter plans shall be accompanied by e-Form BCA-CD-PLAN02 (for shelter building plan or structural plan submission). The detailed requirements for the application of the various types of shelter plans are as follows:

5.5.1 Shelter Building Plans

When applying for approval of shelter building plans, QP shall submit the following shelter building plans together with e-Form BCA-CD-PLAN02

- (a) Site and location plans
- (b) Building layout plans with sections & elevations
- (c) Layout and sizes of transfer structures (if any) including their direct supporting columns and walls.
- (d) Shelter detailed plans, sections and elevations showing the routing and penetration of services as well as the location of ventilation and HS/SS door openings and blast hatch opening (applicable for SS)
- (e) Waiver decision letter from SCDF (if applicable)

QP shall submit the application form together with shelter building plans via e-CORENET to BCA. Upon approval of shelter building plans by CDS of BCA, a Notice of Approval (NOA) of shelter building plans will be issued to the QP (Refer to Flowchart at Annex A-2).

To facilitate early approval of staircase storey shelter building plans, QPs and designers are encouraged, prior to the plan submission, to check their design and details against the checklist (Refer to Annex A-3) and ensure technical requirements are complied with.

5.5.2 Shelter Structural Plans

When applying for approval of shelter structural plans, QP is required to submit the following shelter structural plans together with the e-Form BCA-CD-PLAN02:

- a) Floor plans indicating the shelter's location
- b) Vertical & horizontal sections through the shelter tower (including non-shelter) showing the reinforcement details.
- c) Cross sectional details of openings such as the blast door opening, ventilation sleeve opening and blast hatch opening (applicable for SS)

- d) Footing plans (if footing is integrated with HS / SS slab)
- e) Details of transfer beam or slab (if applicable)
- f) Design calculations on unshielded non-shelter wall or transfer structure supporting HS / SS tower (if applicable)

5.5.3 Resubmission of Plans

If there are non-compliant items found in the shelter building or shelter structural plans, a Written Direction will be issued to the QP. Re-submission in response to WD shall be made within the stipulated time via CORENET in correspondence mode (to quote the same E-Submission no. and plan type no. as in the Written Direction). If QP fails to do so, a Notice of Disapproval (NOD) would be issued to the developer and QP, who is then required to make a new application accompanied by e-form BCA-CD-PLAN02

If there are major or many non-compliant items in the shelter plans, Notice of Disapproval (NOD) would be issued directly to the QP. To obtain early approval of shelter plans, QP for shelter building plan and shelter structural plan are encouraged to arrange a consultation with the plan-processing officer on any doubt or uncertainties before re-submitting amended shelter plans.

5.6 Waiver Application

Designing shelter in compliance with shelter technical requirement would do away with waiver application and speed up the plan submission and approval process. Where waiver of the Household Shelter or Storey Shelter Technical Requirements is needed, QP has to submit application form together with the relevant shelter plans to the Commissioner of the Singapore Civil Defence Force (SCDF). Waiver application form can be downloaded from SCDF Website. Waiver application must be made and approved prior to submission of shelter building plan to BCA.

6 CONSTRUCTION OF HOUSEHOLD OR STOREY SHELTERS

After QPs have obtained all the necessary approval of the shelter plans (including shelter structural plans), they may proceed with the shelter construction works after they have obtained permit to carry out building works from Building Engineering Group of BCA.

To facilitate CDS staff in conducting shelter site inspection during construction, QP is advised to submit shelter works schedule and the site location plan to CDS within stipulated time after NOA for shelter structural plan has been obtained. QP shall ensure that household or storey shelters are constructed in accordance with the approved shelter plans.

7 COMMISSIONING OF HOUSEHOLD OR STOREY SHELTERS

Shelters have to be commissioned prior to application of TOP, as rectification works would be impractical or almost impossible after the occupants take possession of the completed buildings. Commissioning procedure for household or storey shelters are separated into two types, namely:

- a) First Shelter Commissioning
- b) Project Shelter Commissioning

In both first shelter and project shelter commissioning, QP shall submit the application form for commissioning (together with the relevant *checklist for Household Shelter or Staircase Storey Shelter or Storey Shelter) at least 5 working days before the proposed date of inspection. QP shall also reply to Written Direction for site inspection (if any) issued for the project before application for the commissioning of shelter.

*Checklists are attached in Annex D, E & F

Application for first and project shelter commissioning re-inspection in response to Written Direction should be made at least 14 working days before the proposed date of re-inspection.

7.1 First Shelter Commissioning (Refer to Flowchart at Annex A-4)

Application for commissioning of First Shelter is not mandatory. If QP decides to request for commissioning of first shelter so as to serve as a reference for other shelters' commissioning in the same project development, QP shall use the e-Form BCA-CD-COMM01 to apply for first shelter commissioning inspection. CDSO will witness the commissioning inspection with the QP and the builder. 3 different types of test, i.e. chalk mark, light penetration and air-tightness test, will be carried out.

When all the commissioning requirements for the first household or storey shelter are met, CDSO will issue a Notice of Approval (NOA) of commissioning of the first household or storey shelter. It should be noted that it is the responsibility of the QP to ensure that the rest of the household or storey shelters in the same project development are constructed with the same standards as that of the first household or storey shelter.

7.2 Project Shelter Commissioning **(Refer to Flowchart at Annex A-4)**

For a project development where commissioning of the first household or storey shelter was not carried out (since it is optional), QP can apply for approval of project shelter commissioning by submitting e-Form BCA-CD-COMM01. Upon receiving the application from QP, CDSO will arrange for an inspection with the QP and the builder. When CDSO assesses that the completed household or storey shelters have fully complied with the commissioning requirements, CDSO will issue a Notice of Approval (NOA) of commissioning of project household or storey shelters. This Notice of Approval for project household or storey shelters commissioning has to be submitted when QP applies for TOP.

In both **7.1** and **7.2**, QP would be issued with a Written Direction if there are non-compliant items discovered during the commissioning inspection. QP shall re-apply for the commissioning test of the first or project household or storey shelters to CDSO upon rectification of the shelter defects. The resubmission shall be made via CORENET in correspondence mode (to quote the same E-Submission No. and plan type no. as in the Written Direction). Depending on the circumstances, commissioning re-inspection may be required before Notice of Approval is issued. Please refer to "Guidelines for Selection of Household Shelter (HS) or Storey Shelter (SS) Samples for Project Commissioning Inspection" in Annex B.

7.2.1 Block Basis Commissioning of Household or Storey Shelters

Where there is more than one block of apartments in a residential development such as HDB flats or condominiums, QP may apply for commissioning of project household or storey shelters on a block basis. Each application for commissioning of project household or storey shelters shall be accompanied by the e-Form BCA-CD-COMM01 and identified with the commissioning type suffix "CN" and its unique number. For example, if the commissioning type "CN 01" has been used in the application for approval of commissioning of the first household or storey shelters, then "CN 02" shall be used for the subsequent applications.

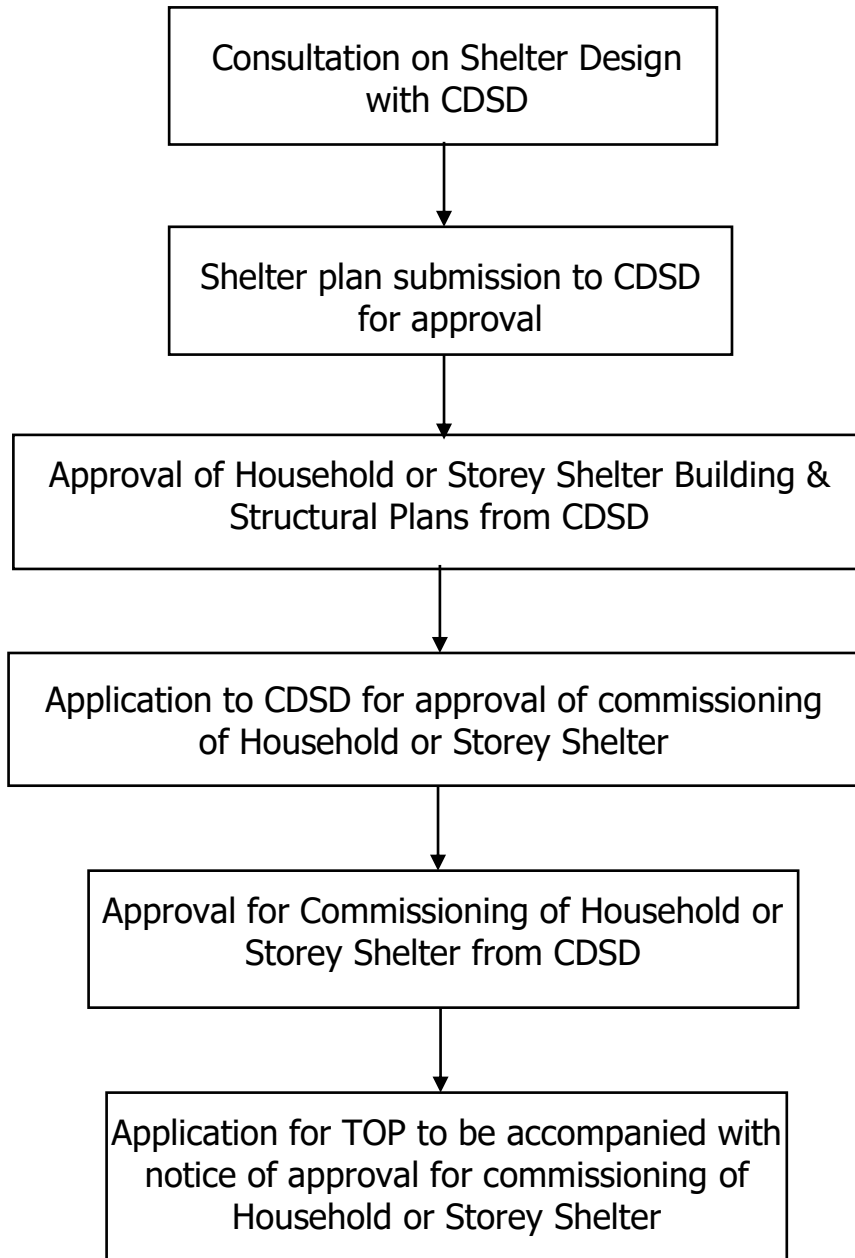
7.2.2 Application for commissioning of shelters on "floor basis" in super high-rise apartment block is also permitted provided that there is no break in floor level when making the application. For example in a 40-storey building, QP may apply for commissioning of 1st to 19th storey in one application, follow by 20th to 40th storey in another application. This is to allow for commissioning inspection on 2 separate dates in view that the no. of shelters in one block may be too large to complete in one day.

8 CONCLUSION

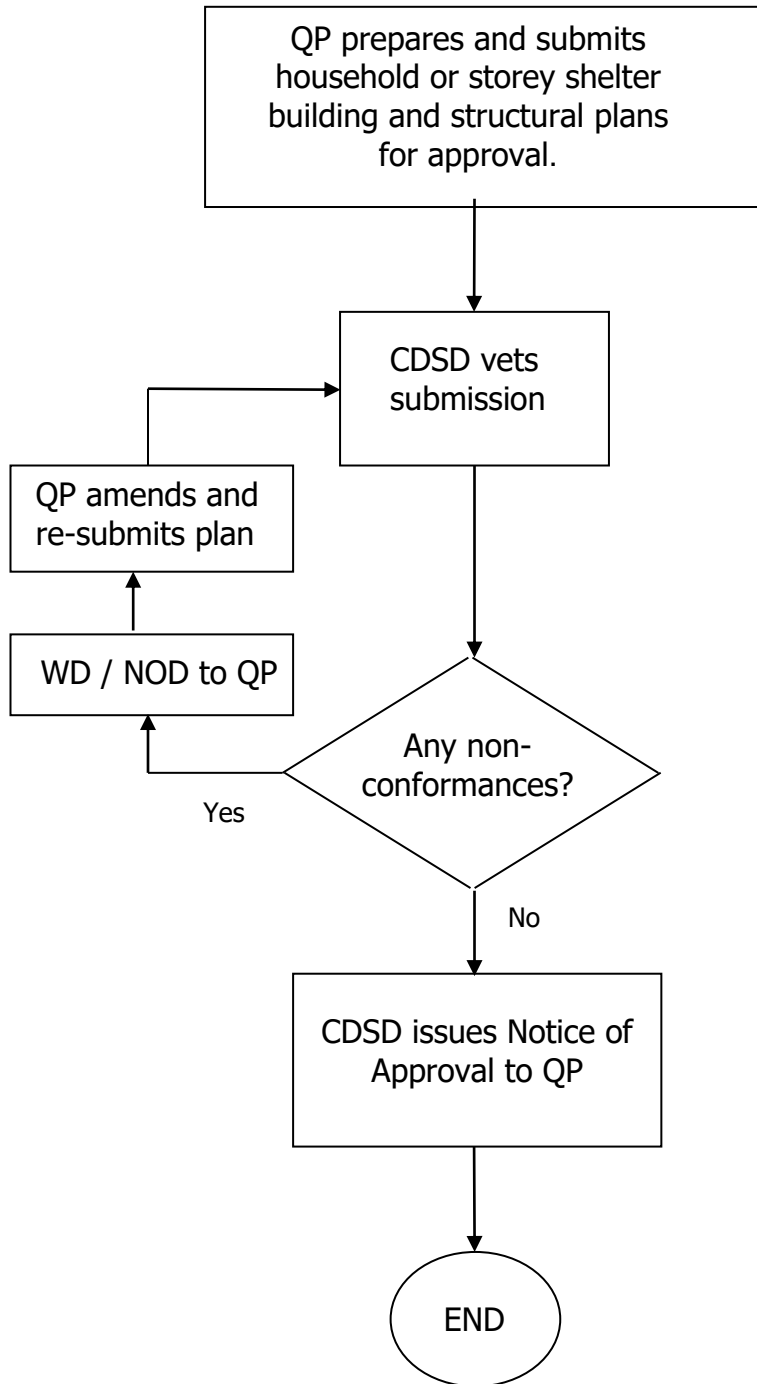
This set of guidelines has been prepared to guide the QP in submitting shelter plan and commissioning applications. The QP is advised to consult CDSO early for any doubt and uncertainties during the building design stage, especially when the QP is undertaking the planning and design of household or storey shelter for the first time. This is to avoid reworks arising from non-compliant items of shelter requirements which might be discovered after plan submission and amendments are necessary.

During the construction phase of household or storey shelters, QP, site supervisors and builders should work closely as an integrated team to ensure that all shelter requirements are met. This would facilitate early completion and commissioning of household or storey shelters.

FLOWCHART FOR DESIGN AND PLAN SUBMISSION OF HOUSEHOLD OR STOREY SHELTERS



FLOWCHART FOR APPROVAL OF SHELTER BUILDING AND SHELTER STRUCTURAL PLANS



Staircase Shelter Design Checklist:

To facilitate early approval of the shelter building plans, QPs are encouraged to go through the following items and check against the design provisions before submitting formal shelter plans to BCA for approval:

(A) Setback Distance:

- Setback distance of SS wall meets the minimum requirements as stipulated in the latest Technical Requirements of storey shelter. Setback distance envelop is clearly shown in the plan.
- The dimension (including clear gap) of the trellis is shown in the plan/section if it is introduced to offset against shortfall in setback distance.
- The net depth of down-hang beam is clearly shown in the section. If down-hang beam is introduced at the edge of the building line so as to adopt a shorter setback distance.
- Setback envelop of shielding slab to protect non-SS wall of SS tower is clearly indicated and based on $\frac{1}{2}$ of the storey height.

(B) Shelter Wall and Slab Dimension:

- The thickness of shelter wall corresponds with the internal clear height of the staircase.
- The minimum thickness of the floor slab (including staircase waist) of the bottom-most SS and ceiling slab (including staircase waist) of the top-most SS is 300mm.
- The minimum clear width of the staircase provided is 1150mm.
- The dimension and thickness of the strengthened slab outside and above entrance SS door are clearly indicated.

(C) Shielding Wall:

- 200mm thick RC shielding wall is provided in front of the entrance SS door.

(D) SS door:

- A minimum 150mm RC nib is provided at the edge of the SS door opening and they are clearly indicated in the plan.
- The swing direction of the internal SS door is in the direction of fire escape to the ground floor.
- The net SS entrance door opening is 900mm/1000mm by 2055mm.
- The net SS door opening inside the staircase is 1000mm by 2055mm.

(E) Fixtures in Each Shelter Compartment:

- 3 power socket outlets are provided in each shelter compartment. One single power socket outlet is located near to the ventilation sleeve opening.

(F) Ventilation Sleeves:

- The minimum clearance between the centerline of the ventilation sleeve opening and shelter wall/slab is 350mm. The minimum distance between the centreline of 2 ventilation sleeve openings is 1000mm.
- The minimum distance between the centerline of the ventilation sleeve opening and the edge of the shelter door is 275mm.
- The centerline of the ventilation sleeve opening is between 1900mm and 2600mm measured from the finished floor level of the staircase.

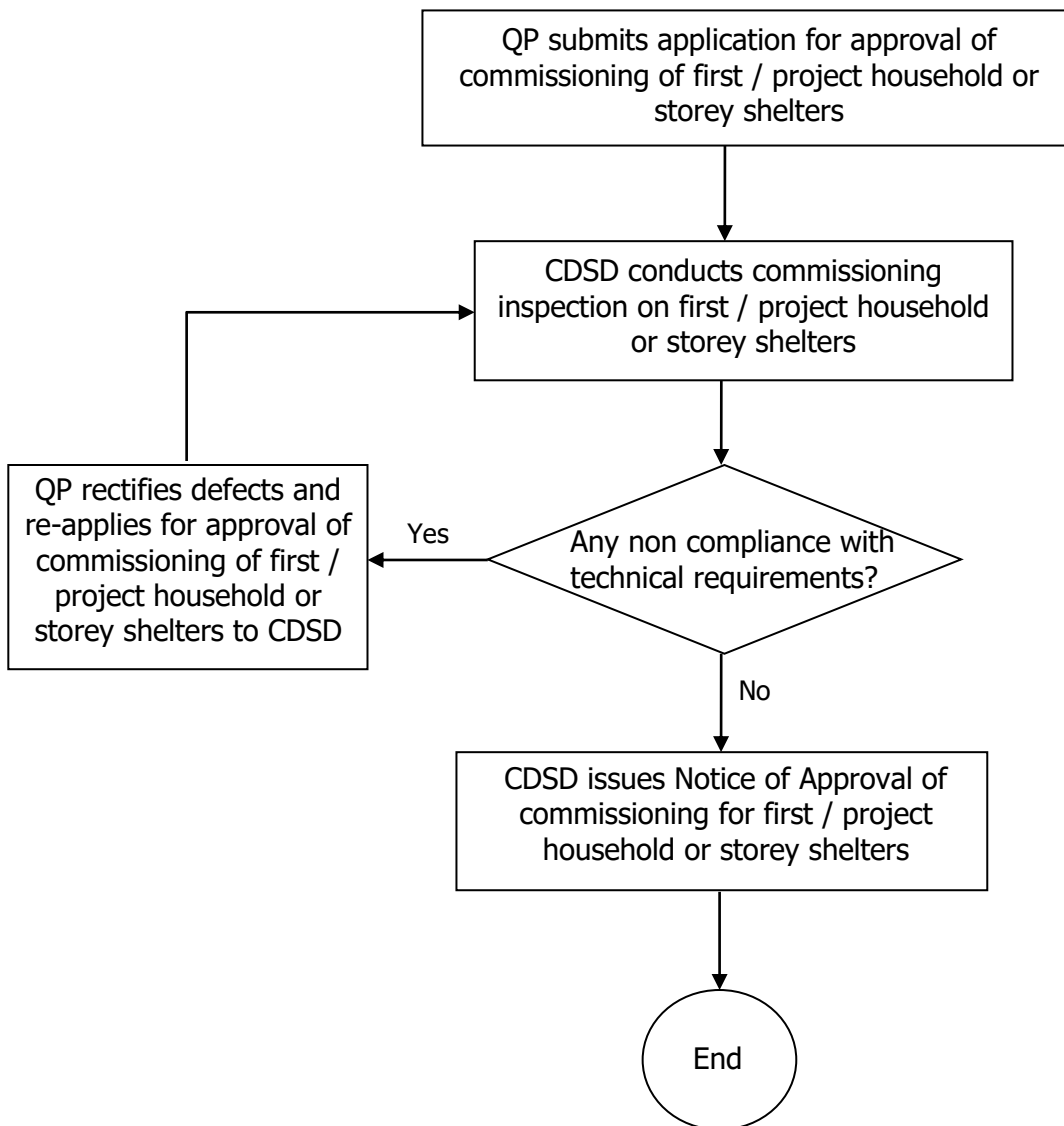
(G) Blast Hatch and MV Inlet Protection:

- A minimum 150mm RC nib is provided around the edge of the vertical blast hatch openings and they are clearly indicated in the plan.
- The size of the blast hatch opening is 700mm for the side with hinge and 600mm or 700mm the other adjacent sides.
- RC ledge with 125mm projection is provided in the MV riser and at the same level with the mid-landing slab.
- The thickness of the protective slab and wall for the MV opening at the top-most level is 300mm or 400mm - depending on the configuration of the blast hatch.

(H) General

- Allocation of shelter space, shelter area and volume are clearly indicated. SS and Non-SS compartments are clearly indicated.
- Transfer structure is not permitted to support staircase shelter tower.
- If NS wall of staircase shelter tower is not protected, design calculations such NS wall would have to be submitted by the QP for shelter structural works for approval.
- Soft copy of the waiver approval letter issued by SCDF (where applicable) is included in the submission.

FLOWCHART FOR COMMISSIONING OF FIRST OR PROJECT HOUSEHOLD OR STOREY SHELTER



GUIDELINES FOR SELECTION OF HOUSEHOLD SHELTER (HS) OR STOREY SHELTER (SS) SAMPLES FOR PROJECT COMMISSIONING INSPECTION

Household Shelter sample size

Table 1 enumerates the required sample size of HS to be selected in each project (or block-basis) request for commissioning inspection and over-pressure air-tightness tests.

Table 1

Number of HS in each Project (or Block-basis) request of commissioning inspections	Number of HS samples Selected for Project HS Commissioning
1-5	1
6-20	2
21-100	5
> 100	5% of total units to be commissioned

Storey Shelter sample size

Table 2 enumerates the required sample size of SS compartments to be selected in each project (or block-basis) request for commissioning inspection and over-pressure air-tightness tests.

Table 2

Number of SS compartments in each Project (or Block-basis) request of commissioning inspections	Number of SS compartment samples Selected for Project SS Commissioning
1 - 5	1
6 - 10	2
11 - 30	3
31 - 50	4
> 50	8% of total SS compartments to be commissioned

Commissioning Inspections

To facilitate the smooth progress of the commissioning inspections, QP are encouraged to put in the request for inspection via CORENET e-Submission System at least 5 working days in advance. The commissioning inspection will only be carried out in the presence of QP or their representatives.

In cases where the HS or SS samples failed the commissioning inspection, a re-commissioning inspection is required after completion of remedial works.

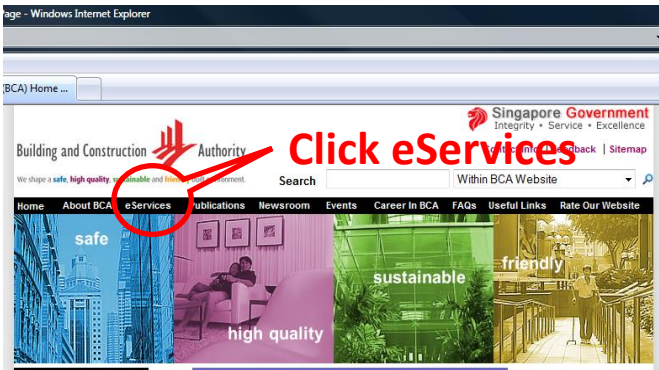
For the re-commissioning inspections, the number of HS or SS to be identified for which had failed in the previous inspection will be selected and checked. The request for the re-commissioning inspection should be made by the QP at least 14 working days in advance.

The Notice of Approval for Commissioning of Project Household Shelter or Storey Shelter will be issued when all the HS or SS samples for the entire project (or block-basis) passed the commissioning inspection.

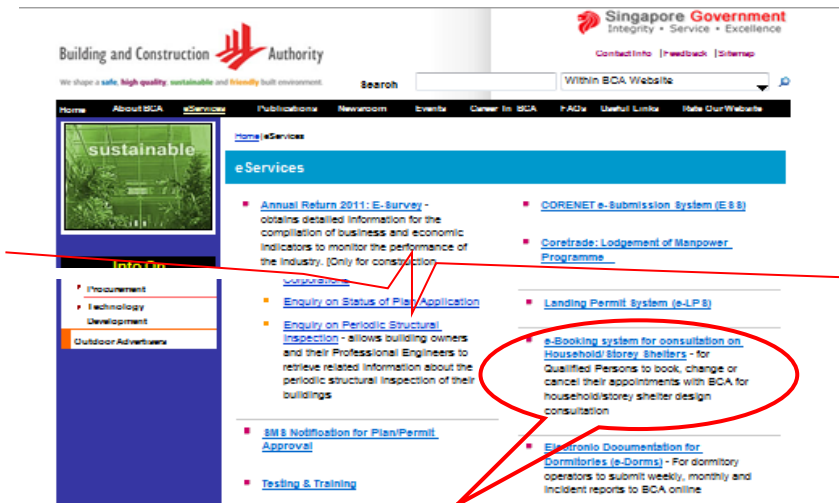
E-BOOKING SYSTEM FOR CONSULTATION ON HOUSEHOLD/STOREY

STEP-BY-STEP GUIDE

Step 1: Go to BCA website www.bca.gov.sg and click e-Services

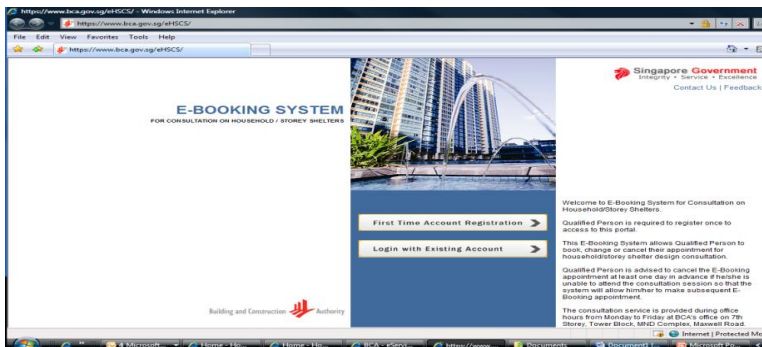


Step 2: Scroll down and click on e-Booking system for consultation on Household/Storey



Click to go to e-Booking system

Step 3: In the e-booking system website, book your appointment for consultation meeting



Checklist for submission with application for commissioning of Household Shelter (HS)

Project Reference: _____

Project Address: _____

S/No	Please Tick <input checked="" type="checkbox"/>	Description	Photo (See sample checklist) to be taken at site and inserted
A		Readiness condition of HS	
1	<input type="checkbox"/>	To apply for commissioning inspection, HS must be completed (see attached photo) in compliance with technical requirements. (e.g. setback distance, services, CD door, ventilation sleeves, internal/external floor finish level and no plastering on the internal wall.)	
B		Ventilation Sleeves	
1	<input type="checkbox"/>	Both external and internal face of ventilation sleeve shall be cleared and free of cement grout and painting.	
2	<input type="checkbox"/>	Screw threaded holes on the internal flange of ventilation sleeve shall be cleared and free of cement grout.	
3	<input type="checkbox"/>	The inner flange of ventilation sleeve shall be flushed with internal face of the HS wall.	
4	<input type="checkbox"/>	Ventilation sleeve (inside HS) shall be positioned such that the centre of the sleeves shall be: a) at least 300 mm from any surrounding wall and ceiling slab. b) at least 1900 mm above finished floor level. c) at least 1000 mm apart.	
5	<input type="checkbox"/>	For ventilation sleeve above false ceiling (outside HS wall), access opening and removable false ceiling panel of 600 mm X 600 mm shall be provided.	
6	<input type="checkbox"/>	Fragmentation plate of the ventilation sleeve above false ceiling (outside HS wall) must be able to close and open without obstruction.	
7	<input type="checkbox"/>	False ceiling (outside HS) fronting the ventilation sleeves shall have a clear distance of at least 500 mm away from the fragmentation plate in open position.	
C		HS Door and frame	
1	<input type="checkbox"/>	PLS label and HS door notice shall be pasted on the door.	
2	<input type="checkbox"/>	HS door and door frame shall be completed with final painting.	
	<input type="checkbox"/>	HS door shall be able to close and lock in CD mode as shown in the door notice.	
	<input type="checkbox"/>	External floor finish shall be clear from the bottom edge of the HS door.	

3	<input type="checkbox"/>	Alignment of locking pins and pin holes on the HS door frame shall not exceed 3mm.	
4	<input type="checkbox"/>	The 5mm gap between the HS door and door frame shall not be less than 2mm or more than 8mm.	
5	<input type="checkbox"/>	Rubber gasket shall be fully secured into the recess along the sides of the door panel.	
6	<input type="checkbox"/>	Handle shall be secured properly such that it is not loose or jammed from turning.	
D		Services	
1	<input type="checkbox"/>	Socket outlet/fixtures for Telephone, TV/Radio and Power point (2nos or twin) shall be installed inside the HS.	
2	<input type="checkbox"/>	Both open end of each conduit shall be sealed with sealant to a depth of 100mm.	
E		Commissioning testing (Trial)	
1	<input type="checkbox"/>	Trial testing is carried out by a competent site representative to all HS units.	

I, _____ (QP) certify that the above have been checked by

_____ (a competent technical representative) and that the Household shelters are built of good quality and are ready for commissioning.

(Signature of QP)

Checklist for submission with application for commissioning of Staircase Storey Shelter (SSS)

Project Reference: _____

Project Address: _____

S/No	Please Tick <input checked="" type="checkbox"/>	Description	Photo (See sample checklist) to be taken at site and inserted
A		Readiness condition of SSS	
1	<input type="checkbox"/>	To apply for commissioning inspection, SSS must be completed (see attached photo) in compliance with technical requirements. (e.g. setback distance, services, CD door, blast hatch, MV shaft, ventilation sleeves, , internal/external floor finish level and no plastering on the internal wall).	
2	<input type="checkbox"/>	The sloping face of the staircase flight soffit shall be extended over the vertical face of the RC wall to achieve required thickness. [This is where the staircase flight projected beyond the vertical face of the RC wall.]	
B		MV Duct opening	
1	<input type="checkbox"/>	Air inlet at the top of the MV shaft Gasket for blast hatch must be properly installed so that it can be closed and opened without obstruction.	
2	<input type="checkbox"/>	A minimum setback distance of 2900 mm shall be provided for the protection of blast hatch opening for air inlet at the top of MV shaft.	
3	<input type="checkbox"/>	Air inlet at the bottom of the MV shaft Gasket for blast hatch must be properly installed so that it can be closed and opened without obstruction.	
C		Ventilation Sleeves	
1	<input type="checkbox"/>	Both external and internal face of ventilation sleeve shall be cleared and free of cement grout and painting.	
2	<input type="checkbox"/>	Screw threaded holes on the internal flange of ventilation sleeve shall be cleared and free of cement grout.	
3	<input type="checkbox"/>	The inner flange of ventilation sleeve shall be flushed with internal face of SSS wall.	
4	<input type="checkbox"/>	Ventilation sleeve (inside SSS) shall be positioned such that the centre of the sleeves shall be: a) at least 350 mm from any wall and ceiling slab. b) at least 1900 mm above finished floor level. c) at least 1000 mm apart.	
5	<input type="checkbox"/>	For ventilation sleeve above false ceiling, access opening and removable false ceiling panel of 600 mm X 600 mm shall be provided.	
6	<input type="checkbox"/>	Fragmentation plate of the ventilation sleeve above false ceiling (outside SSS wall) must be able to close and open without obstruction.	
7	<input type="checkbox"/>	False ceiling (outside SSS) fronting the ventilation sleeves shall have a clear distance of at least 300 mm away from the fragmentation plate in open position.	

D		SSS Door and frame
1	<input type="checkbox"/>	PLS label and SS door notice shall be pasted on the door.
2	<input type="checkbox"/>	SSS door and frame shall be completed with final painting.
	<input type="checkbox"/>	SSS door shall be able to close and lock in CD mode as shown in the door notice.
	<input type="checkbox"/>	External floor finish shall be clear from the bottom edge of the SSS door.
3	<input type="checkbox"/>	Alignment of locking pins and pin holes on the SSS door frame shall not exceed 3mm.
4	<input type="checkbox"/>	The 5mm gap between the SSS door and door frame shall not be less than 2mm or more than 8mm.
5	<input type="checkbox"/>	Rubber gasket shall be fully secured into the recess along the sides of the door panel.
6	<input type="checkbox"/>	Removable kerb is affixed at top of door frame during inspection.
7	<input type="checkbox"/>	Removable kerb can be installed on the threshold of door frame during inspection such that the gap between the door frame and the two ends of the kerb is 2-3 mm.
8	<input type="checkbox"/>	The edge of the flange at two ends of the removable kerb must be chamfered.
9	<input type="checkbox"/>	The bottom corner of door frame next to removable kerb should have a 90° straight edge of 35mm in height.
10	<input type="checkbox"/>	Handle shall be secured properly such that it is not loose or jammed from turning.
E		Blast Hatch and frame
1	<input type="checkbox"/>	* Vertical blast hatch/ Horizontal blast hatch (*Delete where not applicable)
	<input type="checkbox"/>	a) Label shall be provided to indicate the handle position where the blast hatch is in open mode (peacetime) and in CD locked mode.
	<input type="checkbox"/>	b) Rubber gasket shall be fully secured into the recess along the sides of the door panel.
	<input type="checkbox"/>	c) Handle shall be secured properly such that it is not loose or jammed from turning.
F		Services
1	<input type="checkbox"/>	Three 13A switch socket outlets shall be provided inside SS where; Two switch socket outlet shall be in the vicinity of the Telephone, TV/radio outlet and another one shall be away from these two switch socket outlets.
2	<input type="checkbox"/>	Both open end of each conduit shall be sealed with sealant to a depth of 100mm.
G		Commissioning testing (Trial)
1	<input type="checkbox"/>	Trial testing is carried out by a competent site representative for all SSS units.

I, _____(QP) certify that the above have been checked by _____
(a competent technical representative) and that the staircase storey shelters are built of good quality and are ready for commissioning.

(Signature of QP)

Checklist for submission with application for commissioning of Storey Shelter (SS)

Project Reference: _____

Project Address: _____

S/No	Please Tick <input checked="" type="checkbox"/>	Description	Photo (See sample checklist) to be taken at site and inserted
A		Readiness condition of SS	
1	<input type="checkbox"/>	To apply for commissioning inspection, SS must be completed (see attached photo) in compliance with technical requirements. (e.g. setback distance, services, CD door, rescue hatch, cat ladder for rescue hatch, ventilation sleeves, internal/external floor finish level and no plastering on the internal wall.)	
B		Rescue Hatch	
1	<input type="checkbox"/>	A rescue hatch shall be provided on the floor and ceiling of every SS in a SS tower. (Except that of the bottom-most SS and ceiling of the top-most SS.)	
2	<input type="checkbox"/>	The nett clear opening of the rescue hatch shall be 700mmX700mm.	
3	<input type="checkbox"/>	The rescue hatch shall be positioned such that its edge (without hinges) is minimum 150 mm and its edge (with hinges) is minimum 250 mm from the adjacent SS wall.	
C		Cat Ladder to Rescue hatch	
1	<input type="checkbox"/>	The width of the cat ladder shall be 400 mm measured between centre of vertical members. The cat ladder (above hatch opening) shall be 85 mm measured from SS wall to centre of vertical members. The cat ladder (below hatch opening) shall be 250 mm from SS wall to centre of vertical members.	
D		Ventilation Sleeves	
1	<input type="checkbox"/>	The flange of ventilation sleeve and fragmentation plate shall be cleared and free of cement grout and painting.	
2	<input type="checkbox"/>	All screw threaded holes on flange of ventilation sleeve shall be cleared and free of cement grout.	
3	<input type="checkbox"/>	The flange of ventilation sleeve shall be flushed with internal face of SS wall.	
4	<input type="checkbox"/>	Ventilation sleeve (inside SS) shall be positioned such that the centre of the sleeves shall be: <ul style="list-style-type: none"> a. at least 350 mm from any wall and ceiling slab. b. at least 1900 mm above finished floor level. c. at least 1000 mm apart. 	

S/No	Please Tick <input checked="" type="checkbox"/>	Description	Photo (See sample checklist) to be taken at site and inserted
E		SS Door and frame	
1	<input type="checkbox"/>	SS door notice shall be pasted on the inner face of SS door.	
2	<input type="checkbox"/>	PLS label shall be pasted on the side of the SS frame and door.	
3	<input type="checkbox"/>	SS door and frame shall be completed with final painting.	
	<input type="checkbox"/>	SS door shall be able to close and lock in CD mode as shown in the door notice.	
	<input type="checkbox"/>	External floor finish shall be clear from the bottom edge of the SS door.	
4	<input type="checkbox"/>	Alignment of locking pins and pin holes on the SS door frame shall not exceed 3mm.	
5	<input type="checkbox"/>	The 5mm gap between the SS door and door frame shall not be less than 2mm or more than 8mm.	
6	<input type="checkbox"/>	Rubber gasket shall be fully secured into the recess along the sides of the door panel.	
7	<input type="checkbox"/>	Handle shall be secured properly such that it is not loose or jammed from turning.	
F		Services	
1	<input type="checkbox"/>	Three 13A switch socket outlets shall be provided inside each SS such that, Two switch socket outlet shall be in the vicinity of the TV/radio/ Telephone outlet and another one shall be away from these two switch socket outlets.	
2	<input type="checkbox"/>	Both open end of each conduit shall be sealed with sealant to a depth of 100mm.	
G		Commissioning testing (Trial)	
1	<input type="checkbox"/>	Trial testing is carried out by a competent site representative for all SS units.	

I, _____ (QP) certify that the above have been checked by

_____ (a competent technical representative) and that the storey shelters are built of good quality and are ready for commissioning.

(Signature of QP)

APPLICATION FORMS**E-FORMS**

FORM REF	FORM TITLE	PLAN TYPE
BCA-CD-PLAN01	Request for Consultation on Civil Defence Shelter Requirements	CD, CS
BCA-CD-PLAN02	Application for Approval of Civil Defence Shelter Plans	CD, CS
BCA-CD-COMM01	Application for Approval of Commissioning of Civil Defence Shelter	CN