SINGAPORE CIVIL DEFENCE FORCE

Your Ref:

Our Ref: CD/SB/C/A1/3/4

Date: 13th Nov 2001

Fire Safety & Shelter Bureau
Civil Defence Complex
91 Ubi Avenue 4 (408827)
DID: 8481406
FAX: 8481493

President, Singapore Institute of Architects (SIA)
President, Institution of Engineers, Singapore (IES)
President, Association of Consulting Engineers, Singapore (ACES)

Dear Sirs,

REQUIREMENTS FOR BASEMENT HOUSEHOLD SHELTER, HOUSEHOLD SHELTER BENEATH AN INTERNAL STAIRCASE, AND HOUSEHOLD SHELTER TOWER

Arising from a review on the "Technical Requirements for Household Shelters 1997" jointly carried out by the Fire Safety & Shelter Bureau of SCDF and Civil Defence Shelter Engineering Department (CDSD) of BCA, we have introduced a set of technical requirements for a household shelter (HS) located in the basement storey, a HS beneath an internal staircase and HS tower. These concepts and designs, which are not covered in the current "Technical Requirements for Household Shelters 1997", have become more common and have gained popularity in landed dwelling units. In the past, these types of HS plans were processed and accepted on a case-by-case basis

2 The salient technical requirements for a basement HS, a HS beneath an internal staircase and HS tower are given in the following paragraphs. The minimum HS size as specified in our circular titled "Revisions to Household Shelter Sizes, Household Shelter Walls – Setback Distance and Thickness Requirements" dated 26th Apr 2001) is also applicable to the above two types of HS.

A BASEMENT HOUSEHOLD SHELTER IN A LANDED DWELLING UNIT

3 A basement HS refers to a HS located in the basement storey of a landed dwelling unit (See FIGURE 1). The basement HS shall be located within the footprint of the habitable space of the first storey of the same dwelling unit.

4 The minimum setback distance of a basement HS wall shall be in accordance with the following:

a No setback distance requirement (See FIGURES 2 and 3) if it is:

(i) in direct contact with earth throughout its full height; or

(ii) facing a reinforced concrete basement storey wall in direct contact with earth throughout its full height; or

(iii) facing a reinforced concrete basement storey wall without full-height earth backing and with no openings within the influence zone, subject to a minimum clear distance of 1500 mm between the external faces of these two walls.

b TABLE 1 if it is facing a reinforced concrete basement storey wall with opening(s) within the influence zone (See FIGURES 2 and 3).

TABLE 1: MINIMUM SETBACK DISTANCE OF BASEMENT HS WALL (FACING REINFORCED CONCRETE BASEMENT STOREY WALL WITH OPENING (S) WITHIN THE INFLUENCE ZONE)

Storey Height (mm)	Setback Distance of HS Wall (mm)
$2500 \leq Ht \leq 2800$	2750
$2800 < Ht \leq 3000$	2900
$3000 < Ht \leq 3500$	3100
$3500 < Ht \leq 4000$	3300

5 The thickness of the basement HS wall depends on the internal clear height of the basement HS and/or the setback distance of that wall. It shall be in accordance with the following :

a 200 mm if the basement HS wall is facing a reinforced concrete basement storey wall without any opening within the influence zone.

b TABLE 2 if the basement HS wall is in direct contact with earth throughout its entire height.

c TABLE 3 if the basement HS wall is facing a reinforced concrete basement storey wall with opening (s) within the influence zone.

TABLE 2: MINIMUM THICKNESS OF BASEMENT HS WALL IN DIRECT CONTACT WITH EARTH THROUGHOUT ITS ENTIRE HEIGHT

HS Clear Height (mm)	HS Wall Thickness (mm)
$2400 \leq Ht \leq 2700$	250
$2700 < Ht \leq 2900$	275
$2900 < Ht \leq 3900$	300

TABLE 3: MINIMUM THICKNESS OF BASEMENT HS WALL (FACING REINFORCED CONCRETE BASEMENT STOREY WALL WITH OPENING (S) WITHIN THE INFLUENCE ZONE)

HS Clear Height (mm)	Setback Distance of HS Wall (mm)	HS Wall Thickness (mm)
$2400 \leq Ht \leq 2700$	≤ 6000	250
	> 6000	200
$2700 < Ht \leq 2900$	≤ 6000	275
	> 6000	225
$2900 < Ht \leq 3900$	≤ 6000	300
	> 6000	250

6 The HS door should be located either on the basement HS wall with the minimum setback distance in accordance with TABLE 1 or on the basement HS wall facing a reinforced concrete basement storey wall with no opening within the influence zone.

HS BENEATH AN INTERNAL STAIRCASE

7 The technical requirements for the HS size, setback distance and thickness of HS walls as specified in our circular titled “Revisions to Household Shelter Sizes, Household Shelter Walls – Setback Distance and Thickness Requirements” dated 26 Apr 2001 are also applicable to a HS located beneath an internal staircase. In addition, the following requirements are to be complied with (See FIGURE 4):

a For the purpose of determining the minimum internal floor area of the HS, only the portion of the floor with a clear height of at least 1500 mm shall be taken into account.

b For the purpose of determining the minimum internal volume of the HS, the entire enclosed space may be used.

c The minimum thickness of the HS slab and the minimum waist of the staircase shall be 300 mm.

HS TOWER

8 Arising from the review of the "Technical Requirements for Household Shelters 1997", we have also simplified the existing clause 3.4.3: "HS Tower Stability" requirements as follows:

a For a HS tower of 6 storeys or more, every wall on the critical section of HS tower shall be removed, one at a time (See FIGURE 5 – dimension A, B, C or D), to determine the stress of the remaining walls of the HS tower. The allowable stress of the concrete and reinforcement is derived from the characteristic strength divided by a partial safety factor of 1.3 and 1.0 respectively. For purpose of calculating the allowable stress, the design load supported by the HS tower shall be 1.2 times the characteristic dead load (including superimposed dead load), live load and lateral load, where applicable.

b For a HS tower of 6 storeys or more and founded on piled foundation, each HS tower shall be supported by a minimum of two piles.

9 The above technical requirements for a basement HS in a landed dwelling unit, a HS beneath an internal staircase and HS tower shall be implemented with immediate effect.

10 Please contact Cpt Chong Kim Yuan at 8481470 or me should you require any further clarifications.

11 We would appreciate it if you could disseminate the contents of this circular to members of your Institution or Association.

Yours faithfully,

Maj Chan Keen Mun
Head Shelter Branch
for Director Fire Safety & Shelter Bureau
HQ Singapore Civil Defence Force

cc

CEO, BCA - Attn: Deputy CEO (Building Control)
Director (Special Functions)
Senior Manager (CDSD)
Manager (CDAS)

Members of FSB Standing Committee
President, REDAS
President, IFE
President, SISV

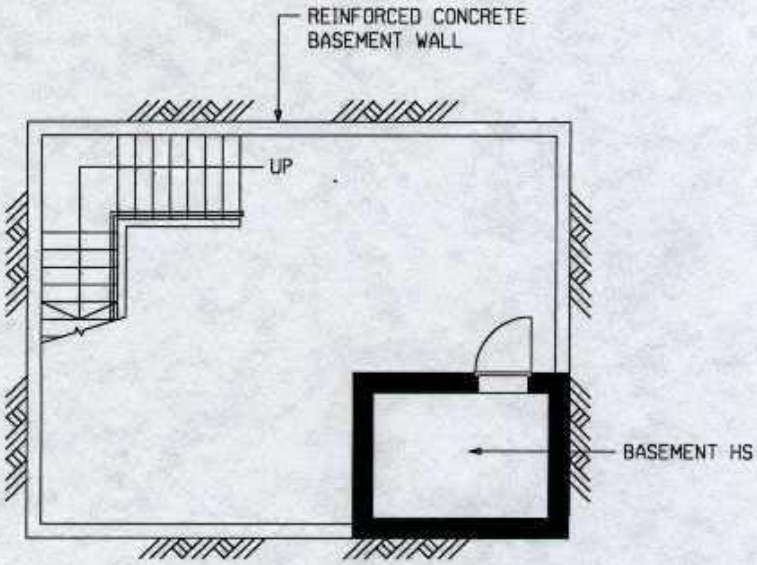

FIGURE 1 BASEMENT HS IN A LANDED DWELLING UNIT

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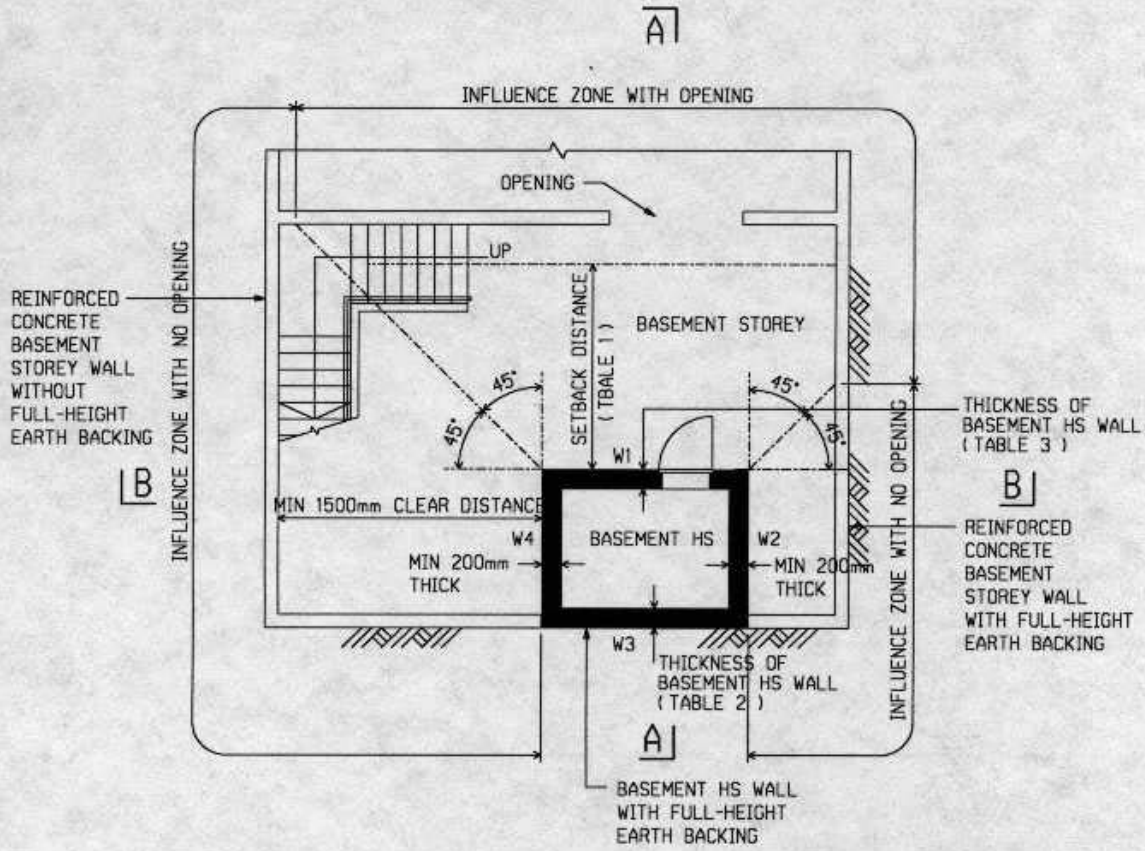

FIGURE 2 PLAN OF A BASEMENT HS

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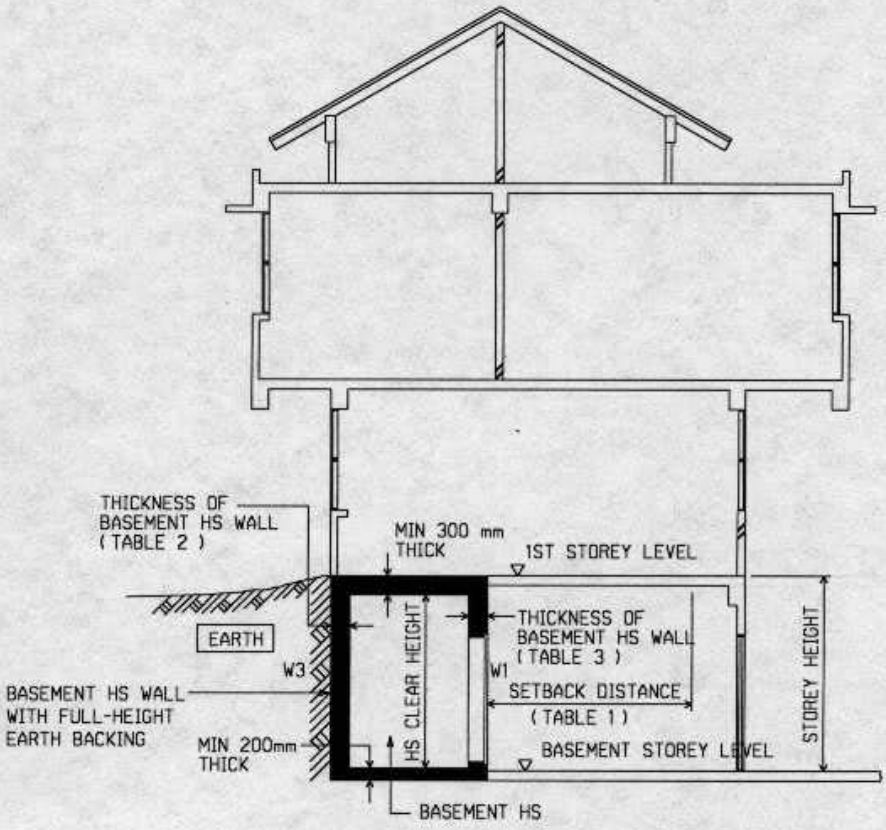
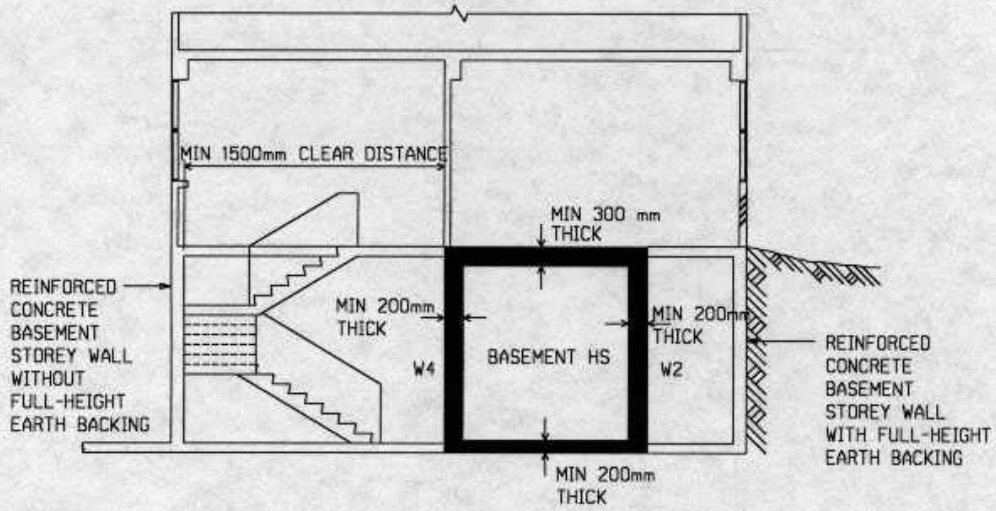


SECTION A - A



SECTION B - B

FIGURE 3 SECTIONAL VIEW OF A BASEMENT HS

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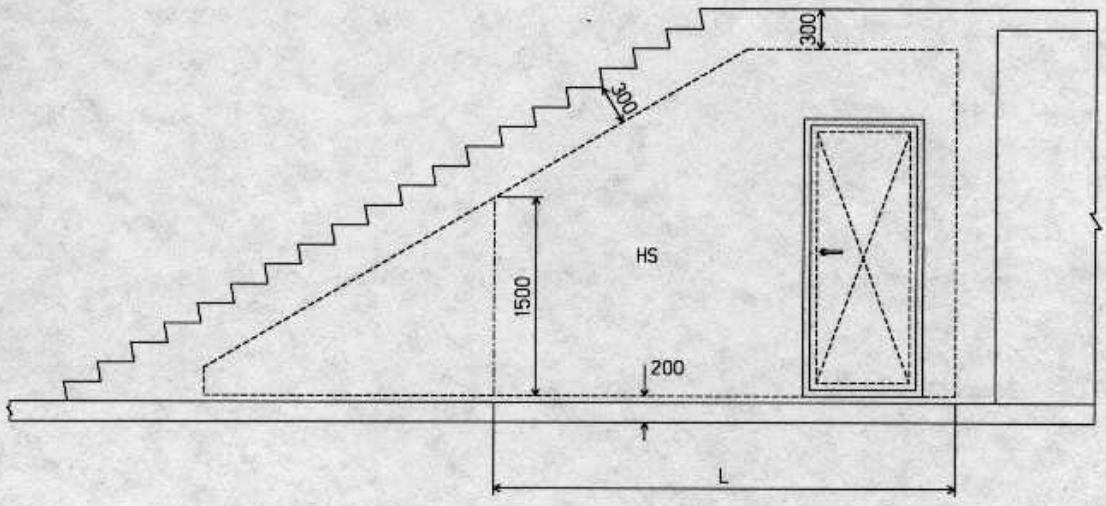

SECTIONAL ELEVATION

NOTE :

THE DIMENSION, L OF THE FLOOR SHALL BE USED FOR COMPUTING THE INTERNAL HS FLOOR AREA.

FIGURE 4 HS BENEATH AN INTERNAL STAIRCASE

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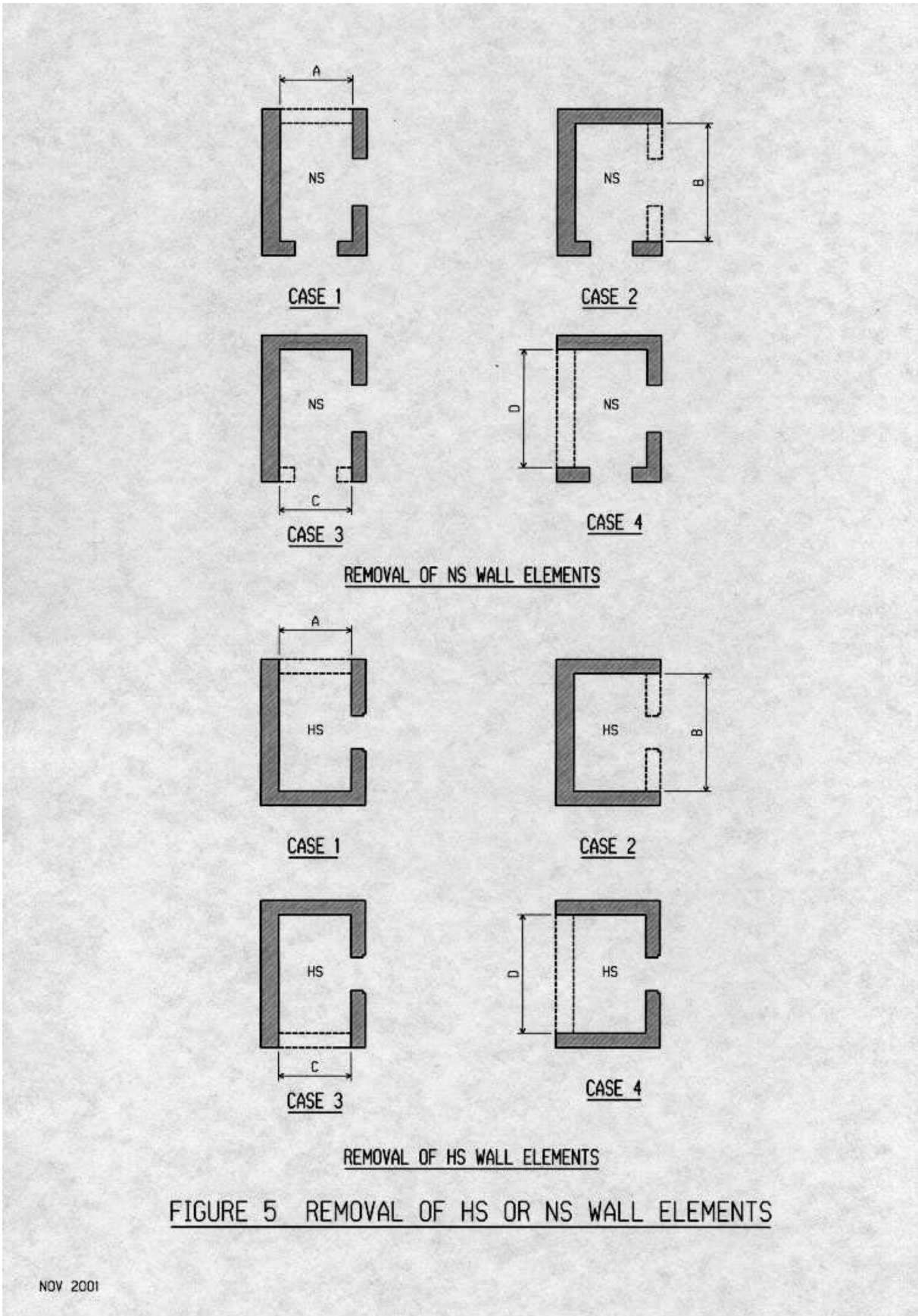

FIGURE 5 REMOVAL OF HS OR NS WALL ELEMENTS