

CIVIL DEFENCE

**HOW TO
BUILD
A SHELTER**



Department of
National Health and Welfare
Ottawa

How to build a

SHELTER



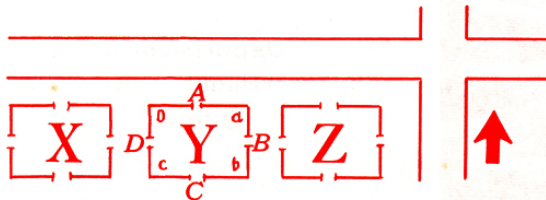
A. BASEMENT SHELTER

To provide a basement shelter in your own home there are a number of points to note:

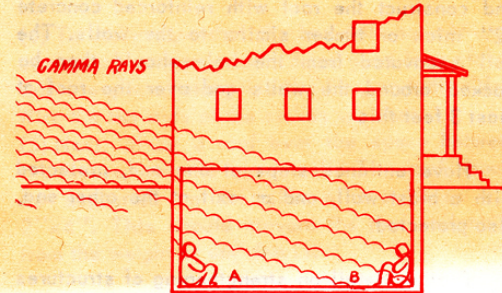
- (1) Select most suitable corner of the basement,
- (2) Reinforce it against collapse,
- (3) Put in emergency food and supplies,
- (4) Provide a protected exit.

Selection of Shelter Site

(a) If houses X and Z were to collapse, they might pile debris over the window openings on B and D sides of house Y. It is important that, besides your normal basement outlet, you have an emergency exit. Consequently, it is better to use windows at A or C.



(b) No one can be sure where an atom bomb will explode, but it is reasonable to assume that it will be aimed to burst over that part of the city which is most heavily populated and which contains the industrial and business sections. In this case we are assuming that it will burst in the direction of the arrow. If the bomb bursts in that direction, the blast is liable to crumple side C and the window on side A would probably provide the best emergency exit.



(c) An A-bomb burst carries a triple-threat: heat flash, blast and radiation. The basement would protect against the direct effects of the blast and heat flash, but the radiation is liable to penetrate it. If you were in position B, the rays might pass through the basement walls, and you could be affected by them. However, if you were in position A, besides having to pass through the wall, the rays would also have to travel through a good many feet of earth and, consequently, you would probably escape the radiation hazard. Relating this to the first illustration, it would seem that

the shelter should be in either of the corners marked "d" and "a".

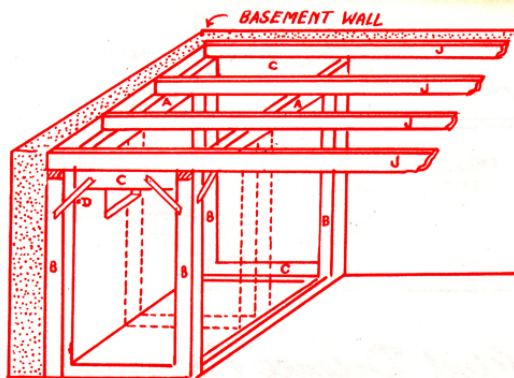
The main purpose of building a basement shelter, apart from its value in shielding you against radiation and heat flash, is to afford protection in the event of the house collapsing.

If you had not reinforced a corner of your basement you might possibly be crushed, or at least seriously injured.

Reinforcing a Basement

Generally speaking the best way of reinforcing your basement against collapse is as follows:

- (1) Nail stringers (A) under the joists (J)—the stringer should be about 6"x6";
- (2) Support the stringers by struts (B)—these should be about the same size as the stringers;



- (3) To prevent the stringers and struts sliding into the shelter space, you should fit some distance pieces (C). The distance pieces on the floor of the basement should be 2"x4", or 2"x6". The distance pieces reinforcing the joist, struts and stringers should be about 2"x8".

- (4) Reinforce the structure with supporting arms (D).

- (5) The broken lines indicate where additional struts might be placed if it is felt necessary to reinforce the structure.

The size of the shelter in your basement will depend on the size of your family and the use to which it will be put, e.g. will the occupants use it only following a warning—will they use it to sleep in—do they want to make it into a liveable room? The size indicated here is for a small family sitting with their backs to the basement wall.

Emergency Food and Supplies for your Shelter

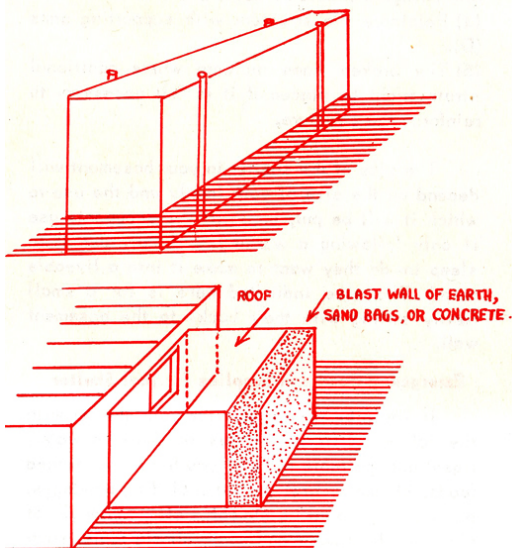
It would be wise to provide your shelter with the following items:—bottles of drinking water; flashlight; portable radio if you have one; tinned foods; blankets; first aid kit including bandages, antiseptics, burn ointment, etc.; change of clothing; detergents and soap; simple tools, such as a wrecking bar and hammer; water and sand, to extinguish fires.

Many of these items can be put into a container and kept in the shelter at all times.

Providing a Shelter Exit

Having provided a basement shelter, prepare

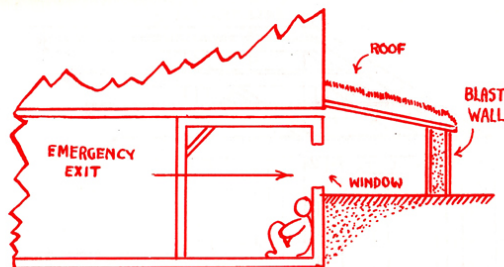
a window to serve as an emergency exit. Replace its glass with plywood or some such material, and then make sure that it opens *into* the shelter and not outwards. If it opens outwards and something were to block it following an attack, you would not be able to get out. But if the window opened *into* the shelter, you could probably find some way to get out through the rubble.



Having ensured that the window opening is satisfactory, build a blast wall approximately two to three feet from the window. Cover the intervening space with boards so that falling debris will not block the exit.

The blast wall can be made with reinforced concrete about 12 inches thick, but the most economical method is to build a blast wall of earth held together with boards, and supported by sturdy poles or stakes driven well into the ground. The thickness of the earth wall should be about 2 feet. The roof should be covered over with about a foot of earth. The procedure is quite simple:-

- (1) Make a simple box, like a concrete pouring form, about 4 feet high and 6 feet long.
- (2) Dig a trench the width of the box, and about a foot deep.
- (3) Place the box in the trench, and fill it with earth and stones. Pack it well as you are filling it.
- (4) To make sure that the box will not collapse over your emergency exit, drive good long stakes into the ground alongside the box, on both sides. Wire the top ends of the stakes together.
- (5) Next, place a roof over the space between the house and the blast wall. The roof should be supported on the side of the house with 2"x4". This should prevent the roof collapsing from the weight of any debris.



B. OUTSIDE SHELTER

If you build an outside shelter near your home, select a dry site, dig a hole approximately 5 feet deep and 5 feet wide, or large enough to accommodate your family.

Have the walls built with either reinforced concrete 6" thick, or timber 2" thick which is well supported by square frames about one foot apart, much in the same manner as if you were excavating for a sewer line in mud or loose ground. Have all the timbers well nailed together and braced.

Make the shelter approximately 70" high and construct the roof with reinforced concrete 12" thick or timber similar to the walls. The soil excavated from the hole should then be packed around the walls and over the roof at least 3 feet thick.

Have entrance steps at one end, protected with a blast wall, and an exit at the other end, also protected.

Further detail on strengthening of structures against collapse will be found in Civil Defence Manual No. 9, "Technical Guidance on the Provision of Air Raid Shelter".

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