

## Appendix A.4

# Aboveground, Door-Covered Shelter

### PROTECTION PROVIDED

**Against fallout radiation:** Protection Factor about 200 (PF 200) if covered with 30 in. of earth. (A person in the open outside this shelter would receive about 200 times more fallout radiation than if he were inside.) The drawing at the end of Appendix A.4 shows the earth cover only 20 in. thick, resulting in a PF of about 100.

**Against blast:** Better protection than most homes. Blast tests have indicated that this shelter would be undamaged at least up to the 5-psi overpressure range from large explosions. Without blast doors the shelter's occupants could be injured at this overpressure range, although probably not fatally.

**Against fire:** Fair, if the cloth in the entries is covered with mud and if the shelter is sufficiently distant from fires producing carbon monoxide and toxic smoke.

### WHERE PRACTICAL

In locations where holes 14 inches deep can be dug quite easily, but the water table or rock is too close to the surface for a covered-trench shelter to be feasible.

### FOR WHOM PRACTICAL

For a family or other group with two or more members able to work hard for most of 36 hours. Very little building skill is needed.

### CAPACITY

The shelter illustrated in Fig. A.4 is the minimum length for 4 persons. It is roofed with 6 doors.

For each additional person, add another door. (If more than about 7 persons are to be sheltered, build 2 or more separate shelters.)

### BUILDING INSTRUCTIONS

1. Before beginning work, study the drawing and read ALL of the following instructions. Divide the work so that some will be digging while others are building an air pump, storing water, etc. **CHECK OFF EACH STEP WHEN COMPLETED.**

2. By the time the shelter is finished, plan to have completed a ventilating pump (a 16-in.-wide by 24-in.-high KAP—essential except in cold weather) and the storage of 15 gallons of water per occupant. (See Appendix B and Chapter 8.)

3. Start to assemble the materials and tools needed. For the illustrated 4-person shelter, these are:

#### A. Essential Materials and Tools

- Six doors. Boards or plywood at least  $\frac{5}{8}$ -in. thick can be used to replace one or more of the doors.
- At least 4 double-bed sheets for each of the first four persons, and 3 double-bed sheets for each additional person to be sheltered—or enough pieces of fabric and/or of plastic to cover at least as large an area as the sheets would cover. (This material is for making aboveground shelter walls, to serve as sand bags.)
- Rainproofing materials (plastic film, shower curtains, plastic tablecloths, mattress protectors, etc.)—15 square yards for the first 4 persons and  $2\frac{1}{2}$  square yards for each additional person.

- A shovel (one shovel for each two workers is desirable). A pick or mattock if the ground is very hard.
- A knife (the only essential tool for making a small shelter-ventilating KAP) and materials for a KAP 16 in. wide and 24 in. high. (See Appendix B.)
- Containers for storing water. (See Chapter 8.)

### B. Useful Materials and Tools

- Two or more buckets, large cans and/or large pots with bail handles—to carry earth, and later to store water or wastes.
  - Saw (or ax or hatchet)—to cut a few boards or small poles.
  - Hammer and at least 15 small nails (at least 2½ in. long).
  - Tape measure, yardstick, or ruler.
  - Additional cloth and/or plastic—equivalent in size to 2 more double-bed sheets for each person.
  - Additional waterproof material—2 more square yards per person.
  - Pillowcases, or cloth or plastic bags—to serve as earth-filled sand bags. The more, the better.
4. To save time and work, sharpen all tools and keep them sharp.
  5. Wear gloves from the start, to help prevent blisters and infections.
  6. Select a building site where there is little or no chance of the ground being covered with water, and where the water table (groundwater level) is not likely to rise closer than 18 inches to the surface.
  7. To avoid the extra work of digging among roots, select a site away from trees, if practical.
  8. To lessen the dangers of fire and smoke from nearby houses or trees that might catch fire, locate your shelter as far as is practical from houses and flammable vegetation.
  9. Before staking out your shelter, provide one door per person to roof the main room plus one additional door for each of the two entries. Be sure the door knobs have been removed. Use the two widest doors to roof the entries.
  10. To be sure that all the walls will be in the proper positions to be roofed with the available doors, lay all the doors on the ground, touching each other and in the same relative positions they will have when used to roof the shelter. When all the roof doors are on the ground, side by side, determine the exact length of the shelter room. (Note that Fig. A.4 illustrates a shelter sized for only 4 persons.)
  11. Stake out the shelter.
  12. Make the earth-filled “rolls” that will form the aboveground walls of your shelter. To make walls out of the rolls:
    - (1) Use doors as vertical forms to hold the earth-filled rolls in place until the walls are completed. (These are the same doors that you will use later to roof the shelter.)
    - (2) Brace the door-forms with 36-in.-long braces (boards or sticks) that press against the doors, as shown in Fig. A.4. Nail only the upper braces, using only very small nails.
    - (3) After the forms for the two inner sides of the shelter have been finished, put parts of the long sides of bedsheets on the ground, as illustrated. (Or use other equally wide, strong cloth or plastic material.) About a 2-ft width of cloth should be on the ground, and the rest of each sheet should be folded up out of the way, over the outsides of the door-forms. Adjacent sheets should overlap about 1 ft when making a roll than is longer than one sheet.
    - (4) Shovel earth onto the parts of the sheet on the ground to the height of the rolls you are making, as shown. Note that the roll to be made on one side is 2 in. higher than the roll on the other side.
    - (5) Shape the surface of the shoveled-on earth as illustrated, to hold the “hooks” of cloth to be formed when the exposed sides of the sheets are folded down.
    - (6) Fold down the upper side of each sheet while pulling on it to keep it tight and without wrinkles. It should lie on the

- prepared earth surface, including the small narrow trench, as illustrated in the first section of this appendix.
- (7) Pack earth onto the part of the folded-down sheet that is in the narrow, shallow trench. Then, as shown in the sketches at the bottom of the accompanying drawing, fold back the loose edge over this small amount of packed earth to form a "hook." (The hook keeps the weight of the earth inside a roll from pulling the cloth out of its proper position.)
  - (8) Make a roll first on one side of the shelter, then on the other, to keep the heights of the earth **on both sides** of the shelter **about equal**. This will keep the unequal heights of earth from pushing the door-forms out of their vertical positions.
  - (9) Add additional earth on top of the rolls so that the height of the level earth surface, out to the full width of a roll, is the same as the height of the cloth-covered part of the roll that is against the door-form.
  - (10) When the roll walls have been raised to their planned heights on both sides of the shelter, remove the braces and the door-forms—being careful to keep the brace nails from damaging the doors.
  - (11) The door-forms of the side-walls of the shelter can be removed before building the end-walls.
13. When smoothing the earth surfaces of the final tops of the roll walls on both sides, check to see that they have the same slope as the lower sides of the roof doors will have after they are placed on the roll walls. (A slope is necessary so that rainwater reaching the waterproof covering to be placed over the doors will run off the lower side.) Study Fig. A.4.
  14. After the side-walls have been completed (except for their ends that form the sides of an entry) and after the door-forms have been removed, use the same doors for forms to build the two 22-in.-wide entries.
  15. Use earth-filled "sand bags" (made of pillowcases or sacks, and/or the tucked-in ends of earth-filled rolls) to make the outer ends of each entryway.
  16. Make the two doorway frames if lumber, nails, and a saw are available. Make each frame as high as the wall on each side of it, and slope the top board of each frame so that it will press flat against the door to be supported. (If materials for a frame are lacking, place a single 2 by 4-in. board—or a pole about 6 ft. long—across the top of the entry, in the position shown in Fig. A.4 for the top of the doorway frame.)
  17. After carefully removing all the temporary braces from the door-forms and the doors themselves, improve the slopes of the tops of all supporting walls so that the doors will be supported evenly and, without being twisted, will make contact with the smooth, sloping earth or cloth upon which they will rest.
  18. If more than enough waterproof plastic or similar material is available to cover all the roof doors, also cover the tops of the walls on which the roof doors will rest. This will keep the doors from absorbing water from damp earth.
  19. Dig the illustrated 14-in.-deep, 36-in.-wide trench inside the shelter. (If the water table is too high to dig down 14 in., in some locations the walls can be raised to a height of 38 in. by cutting turf sods and laying them on top of the walls. Another way the wall height can be increased is by making additional rolls.)
  20. Place the roof doors in their final positions, and cover them with waterproof material (if available). Be sure the waterproof material is folded under the higher edges of the doors—to keep the material from slipping downward on the sloping doors as earth is shoveled onto the roof.
  21. Extend the waterproof material on top of the doors a couple of feet beyond the lower ends of the doors—if enough material is available to cover all of the roof doors.
  22. When shoveling the first layer of earth onto the rainproof material protecting the doors, avoid hitting and possibly puncturing it with rocks or sharp pointed roots in the earth.
  23. To make earth arching more effective in supporting most of the earth to be placed on the roof doors, first mound earth on and near the ends of the doors.
  24. Cover the roof with at least 20 in. of earth. Make sure that there also is a thickness of at least 20 in. of earth at the corners of both the room and entries.

25. To prevent surface water from running into the shelter if it rains hard, mound packed earth about 5 in. high just inside the two entries. Rain can be kept out by a small canopy or awning that extends 2 or 3 ft in front of the outermost edge of a doorway that roofs an entry.
26. If any waterproof material remains, use it to cover the floor of the shelter.
27. If the weather is warm or hot, install a 16-in.-wide by 24-in.-high air pump (a KAP). Attach its hinges to the board across the roof of the entry into which outside air is moving naturally at the time.
28. Cover all exposed combustible material with mud, earth, or other fireproof material, to reduce the chance of exposed cloth being ignited from a nuclear explosion or heat from a nearby fire.
29. Fill all available water containers, including pits which have been dug and lined with plastic, then roofed with available materials. If possible, disinfect all water stored in expedient containers, using one scant teaspoon of a chlorine bleach, such as Clorox, for each 10 gallons of water. Even if only muddy water is available, store it. If you do not have a disinfectant, it may be possible to boil water when needed.
30. As time and materials permit, continue to improve your chances of surviving by doing as many of the following things as possible;
  - (1) Make a homemade fallout meter, as described in Appendix C.
  - (2) Make expedient lights.

