

## Appendix A.2

# Pole-Covered Trench Shelter

### PROTECTION PROVIDED

**Against fallout radiation:** Protection Factor 300 (PF 300)—a person in the open outside this shelter would receive 300 times more fallout radiation than he would if he were inside.

**Against blast:** Quite good protection if built in stable earth. Blast tests have indicated that this shelter, if built in stable earth, would not be seriously damaged by blast effects of large explosions at least up to the 7-psi overpressure range. (At 7 psi, most buildings would be demolished.) Without blast doors, occupants of the shelter could be injured, although probably not fatally.

**Against fire:** Excellent, if sufficiently distant from fires producing carbon monoxide and toxic smoke.

### WHERE PRACTICAL

In wooded areas with small trees, for builders who have an ax or a bow saw, crosscut or chain saw, and digging tools. Or in any location where the necessary poles may be obtained.

In stable earth, where the water table or rock is more than  $4\frac{1}{2}$  ft below the surface.

### FOR WHOM PRACTICAL

For a family or other group with two or more members able to work hard for most of 2 days.

### CAPACITY

The shelter illustrated is the minimum length recommended for 4 persons. For each additional person, add at least  $2\frac{3}{4}$  ft to the length of the shelter room. If more than about 10 persons are to be sheltered, build 2 or more separate shelters.

### BUILDING INSTRUCTIONS

1. Before beginning work, study the drawings and read ALL of the following instructions. Divide the work so that some people will be digging while others are cutting and hauling poles. CHECK OFF EACH STEP WHEN COMPLETED.
2. By the time the shelter is finished, plan to have completed: (1) a ventilating pump, and (2) the storage of at least 15 gallons of drinking water per occupant (see Appendix B and Chapter 8).
3. Start to assemble materials and tools. Those listed are for the illustrated 4-person shelter with a room 11 ft long.

#### A. Essential Materials and Tools

- Saw (bow saw or crosscut preferred) and/or ax for cutting poles to the lengths and diameters illustrated.
- Shovels (one for each two workers).
- Pick (if the ground is hard).
- Rainproof roof materials (very important in rainy, cold weather). At least 2 square yards of such material per person would be required; 3 square yards per person would be better. Shower curtains, plastic tablecloths, plastic mattress covers, canvas, and the like can be used. Also needed are 2 pieces of plastic or tightly woven cloth, each about  $6\frac{1}{2} \times 6\frac{1}{2}$  ft, to make canopies over the two shelter openings.
- Materials and tools for building a simple shelter-ventilating pump, a KAP 22 in. wide and 36 in. long. (See Appendix B.) Only in cold or continuously breezy, cool weather

can tolerable temperatures and humidities be maintained for days in a crowded underground shelter that lacks an air pump.

- Containers for storing adequate water. (See Chapter 8.)

#### B. Useful Materials and Tools

- Large cans, buckets, and/or pots with bail handles—in which to carry earth and later to store drinking water and human wastes.
  - Two bedsheets and two pillowcases per person for covering cracks between roofing logs, making “sandbags,” and improvising bedsheet-hammocks and bedsheet-chairs.
  - A file.
  - A measuring tape, yardstick, or ruler.
  - Rope, or strong wire (100 ft)—to make earth-retaining pole walls close to the shelter openings (as explained in step 19) and for hammock supports, etc.
  - Chain saw, pick-mattock, hammer, hatchet, pliers.
  - Kerosene, turpentine, or oil—to keep hand saws from sticking in gummy wood.
  - Expedient life-support items recommended in this book.
  - Mosquito netting or window screen to cover the openings, if mosquitoes or flies are likely to be a problem.
4. To save time and work, **SHARPEN ALL TOOLS AND KEEP THEM SHARP.**
  5. Wear gloves from the start—even tough hands can blister after hours of chopping and digging, and become painful and infected.
  6. If possible, select a location for the shelter that is in the open and at least 50 ft from a building or woods. Remember that on a clear day the thermal pulse (flash of heat rays) from a very large nuclear explosion may cause fires as far away as 25 miles.
  7. If the site chosen is on a steep slope, locate the shelter with its length crosswise to the direction of the slope.
  8. Stake out the outlines of the trench, driving stakes as indicated in Fig. A.2.1 at the end of Appendix A.2. If more than 4 persons are to be sheltered, increase the length of the shelter room by 2 ft 9 in. for each additional person.
  9. Clear the ground of saplings and tall grass within 10 ft of the staked outlines so that later the excavated earth can be easily shoveled back onto the completed shelter roof.
  10. Start digging, throwing the first earth about 10 ft beyond the staked outlines of the trench. Less able members of the family should do the easier digging, near the surface. Those members who can use an ax and saw should cut and haul poles. See the introductory section of this appendix for the know-how to make this hard work easier.
  11. Pile all excavated earth at least 2 ft beyond the edges of the trench, so roofing poles can be laid directly on the ground. To make sure that the trenches are dug to the specified full widths at the bottoms, cut and use two sticks—one 42 in. long and the other 22 in. long—to check trench widths repeatedly.
  12. At the far end of the shelter dig the ventilation trench-emergency exit, making it 22 in. wide and 40 in. deep. This will help provide essential ventilation and cooling. In cold weather or when fallout is descending, canvas or plastic curtains should be hung in the two openings to control the air flow.
  13. Make and install threshold boards, to keep the edges of earth steps and earth ledges from being broken off. (In damp earth, it is best to install threshold boards before roofing the shelter.) If boards are lacking, use small poles.
  14. Unless the weather is cold, build a shelter-ventilating pump—a KAP 20 in. wide × 36 in. high. (If the weather is *cold*, building a KAP can be safely delayed until after the shelter is completed.) A KAP should be made before a crisis, or, if possible, before leaving home.
  15. Obtain fresh-cut green poles, or, as a second choice, sound, dry, untreated poles. Use no poles smaller in diameter than those specified in the accompanying drawings. For ease in hauling, select poles no more than 50% larger in diameter than those specified.

16. Lay the poles side by side over the trench. Alternate the large and small ends to keep the poles straight across the trench. If roof poles 9 ft long are being used to roof a 5-ft-wide trench, be sure to place the roof poles so that their ends extend 2 ft farther beyond one side of the trench than beyond the other side. This will enable shelter occupants, after the stoop-in shelter is completed, to widen the shelter room 2 ft on one side. First, it can be widened to provide a 2-ft-wide sleeping ledge. Later, it can be further deepened to make space for additional expedient hammocks or for double-bunk beds of poles or boards built on each side of the shelter.
17. For ease and safety later when hanging expedient bedsheet-hammocks and bedsheet-chairs in the completed shelter, place **loose** loops around roof poles in the approximate locations given by the diagram on the second shelter drawing, Fig. A.2.2. Make these loose loops of rope, or strong wire, or 16-in-wide strips of strong cloth, such as 50% polyester bedsheet rolled up to form a "rope". (For making hammocks and seats, see Chapter 14. These are not essential, although decidedly useful.)
18. Cover the cracks between the logs with cloth, leaves, clay, or any other material that will keep dirt from falling down between the cracks. **CAUTION: DO NOT** try to rainproof this flat roof, and then simply cover it with earth. Water will seep through the loose earth cover, puddle on the flat roofing material, and leak through the joints between pieces of roofing material or through small holes.
19. Place 6-ft-long poles, one on top of the other, next to the entrances. This will keep earth to be placed on top of the entryway trenches from falling into the openings. Secure these poles with wire or rope. (See View A-A<sup>1</sup> in Fig. A.2.1.) If wire or rope is not available, make earth-filled "rolls" to hold the earth nearly vertical on the trench roof next to each opening. (See the introductory section of this appendix.)
20. Mound earth to a center depth of about 18 in. over the shelter roof (as shown in View B-B<sup>1</sup> in Fig. A.2.1) to form the surface of the future "buried roof." Be sure to slope both sides of the mound. Then smooth its surface and remove sharp roots and stones that might puncture thin rainproofing materials to be placed upon it.
21. Place the waterproofing material on the "buried roof." If small pieces must be used, lay them in shingle-like fashion, starting at the lower sides of the mounded earth.
22. Cover the buried roof with another 18 in. of mounded earth, and smooth this final earth surface.
23. Finish the entrances by placing some shorter poles between the two longer poles next to each entryway. Bank and pack earth at least 6 in. deep around the sides of the entrances, so that rainwater on the ground cannot run into the shelter entrances.
24. Dig surface drainage ditches around the outside of the mounded earth and around the entrances.
25. Place a piece of water-shedding material over each of the entrances, forming an open-ended canopy to keep fallout and rain from the shelter openings. (See Fig. A in the introductory section of Appendix A.) Almost all fallout would settle on these suspended canopies, rather than falling into shelter openings—or would fall off their edges and onto the ground like sand.
26. Hang the KAP from the roof of the trench opening into which outdoor air can be felt flowing, so that air will be pumped in the direction of the natural flow of air.
27. 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.
28. 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.
  - (3) Make and hang expedient bedsheet-hammocks and bedsheet-chairs, following the installation diagram shown in Fig. A.2.2.
  - (4) Install screens of mosquito netting over the two openings, if mosquitoes or flies are a

problem. Remember, however, that screen or netting reduces the air flow through a shelter—even when the air is pumped through with a KAP.

- (5) Dig a stand-up hole near the far end of the shelter. Make the hole about 15 in. in diameter and deep enough to permit the tallest of the shelter occupants to stand erect occasionally.



