THE ULTIMATE SHELTER GUIDE

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SHELTER SITE SELECTION

When you are in a survival situation and realize that shelter is a high priority, start looking for shelter as soon as possible. As you do so, remember what you will need at the site. Two requisites are--

- It must contain material to make the type of shelter you need.
- It must be large enough and level enough for you to lie down comfortably.

When you consider these requisites, however, you cannot ignore your tactical situation or your safety. You must also consider whether the site--

- Provides concealment from enemy observation.
- Has camouflaged escape routes.
- Is suitable for signaling, if necessary.
- Provides protection against wild animals and rocks and dead trees that might fall.
- Is free from insects, reptiles, and poisonous plants.
- Avoid flash flood areas in foothills.
- Avoid avalanche or rockslide areas in mountainous terrain.
- Avoid sites near bodies of water that are below the high water mark.

In some areas, the season of the year has a strong bearing on the site you select. Ideal sites for a shelter differ in winter and summer. During cold winter months you will want a site that will protect you from the cold and wind, but will have a source of fuel and water. During summer months in the same area you will want a source of water, but you will want the site to be almost insect free. When considering shelter site selection, use the word BLISS as a guide.

B - Blend in with the surroundings.
L - Low silhouette.
I - Irregular shape.
S - Small.
S - Secluded location.

Your environment and the equipment you carry with you will determine the type of shelter you can build. You can build shelters in wooded areas, open country, and barren areas. Wooded areas usually provide the best location, while barren areas have only snow as building material. Wooded areas provide timber for shelter construction, wood for fire, concealment from observation, and protection from the wind.

Note: In extreme cold, do not use metal, such as an aircraft fuselage, for shelter. The metal will conduct away from the shelter what little heat you can generate.

Shelters made from ice or snow usually require tools such as ice axes or saws. You must also expend much time and energy to build such a shelter. Be sure to ventilate an enclosed shelter, especially if you intend to build a fire in it. Always block a shelter's entrance, if possible, to keep the heat in and the wind out. Use a rucksack or snow block. Construct a shelter no larger than needed. This will reduce the amount of space to heat. A fatal error in cold weather shelter construction is making the shelter so large that it steals body heat rather than saving it. Keep shelter space small. Never sleep directly on the ground. Lay down some pine boughs, grass, or other insulating material to keep the ground from absorbing your body heat.

CARBON MONOXIDE POISONING

Never fall asleep without turning out your stove or lamp. Carbon monoxide poisoning can result from a fire burning in an unventilated shelter. Carbon monoxide is a great danger. It is colorless and odorless. Any time you have an open flame, it may generate carbon monoxide. Always check your ventilation. Even in a ventilated shelter, incomplete combustion can cause carbon monoxide poisoning. Usually, there are no symptoms. Unconsciousness and death can occur without warning. Sometimes, however, pressure at the temples, burning of the eyes, headache, pounding pulse, drowsiness, or nausea may occur. The one characteristic, visible sign of carbon monoxide poisoning is a cherry red coloring in the tissues of the lips, mouth, and inside of the eyelids. Get into fresh air at once if you have any of these symptoms.

EXPEDIENT SHELTERS

SNOW CAVE SHELTER

The snow cave shelter (Figure 15-4) is a most effective shelter because of the insulating qualities of snow. Remember that it takes time and energy to build and that you will get wet while building it. First, you need to find a drift about 3 meters deep into which you can dig. While building this shelter, keep the roof arched for strength and to allow melted snow to drain down the sides. Build the sleeping platform higher than the entrance. Separate the sleeping platform from the snow cave's walls or dig a small trench between the platform and the wall.

This platform will prevent the melting snow from wetting you and your equipment. This construction is especially important if you have a good source of heat in the snow cave. Ensure the roof is high enough so that you can sit up on the sleeping platform. Block the entrance with a snow block or other material and use the lower entrance area for cooking. The walls and ceiling should be at least 30 centimeters thick. Install a ventilation shaft. If you do not have a drift large enough to build a snow cave, you can make a variation of it by piling snow into a mound large enough to dig out.

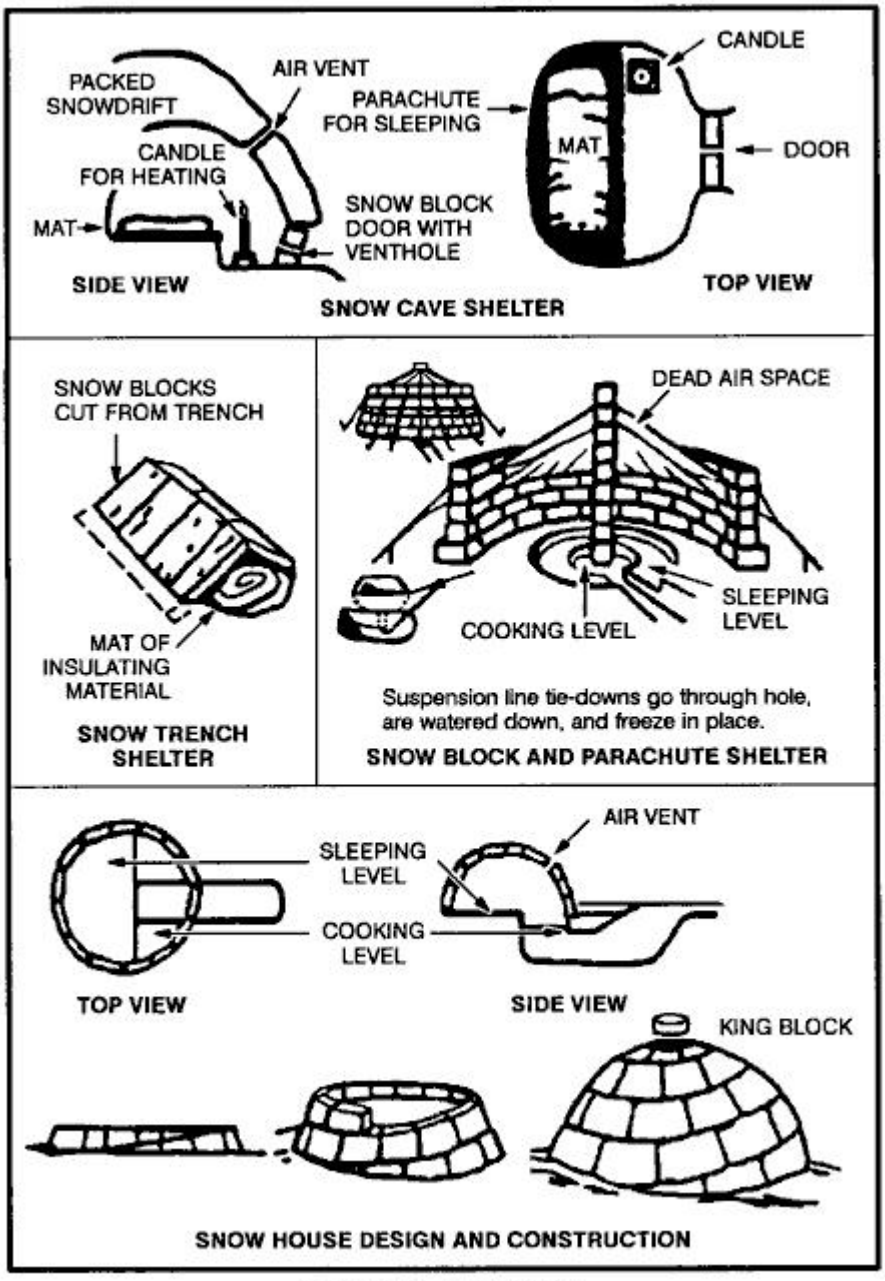


Figure 15-4. Snow houses.

SNOW TRENCH SHELTER

The idea behind this shelter (Figure 15-4) is to get you below the snow and wind level and use the snow's insulating qualities. If you are in an area of compacted snow, cut snow blocks and use them as overhead cover. If not, you can use a poncho or other material. Build only one entrance and use a snow block or rucksack as a door.

SNOW BLOCK AND PARACHUTE SHELTER

Use snow blocks for the sides and parachute material for overhead cover (Figure 15-4). If snowfall is heavy, you will have to clear snow from the top at regular intervals to prevent the collapse of the parachute material.

SNOW HOUSE OR IGLOO

In certain areas, the natives frequently use this type of shelter (Figure 15-4) as hunting and fishing shelters. They are efficient shelters but require some practice to make them properly. Also, you must be in an area that is suitable for cutting snow blocks and have the equipment to cut them (snow saw or knife).

LEAN-TO SHELTER

Construct this shelter in the same manner as for other environments; however, pile snow around the sides for insulation (Figure 15-5).

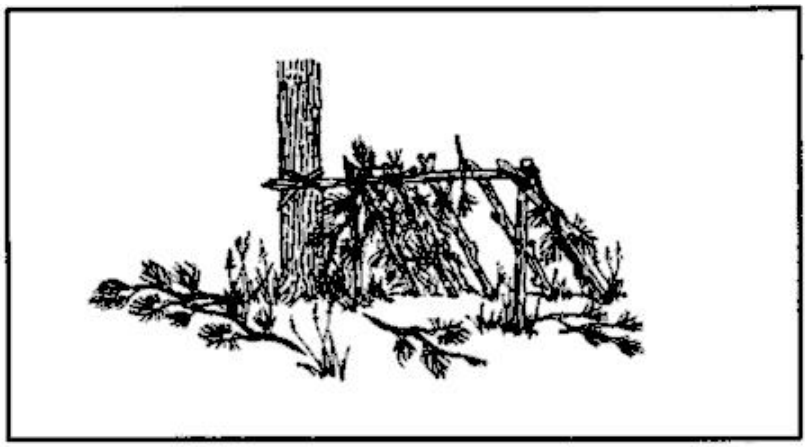


Figure 15-5. Lean-to made from natural shelter.

FALLEN TREE SHELTER

To build this shelter, find a fallen tree and dig out the snow underneath it (Figure 15-6). The snow will not be deep under the tree. If you must remove branches from the inside, use them to line the floor.

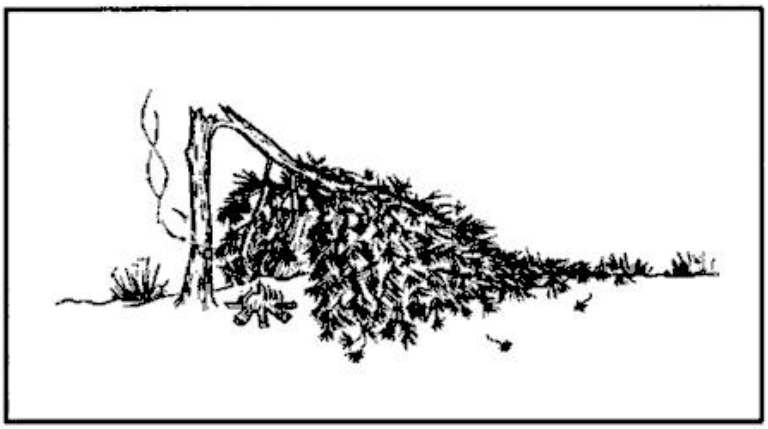


Figure 15-6. Fallen tree as shelter.

TREE-PIT SHELTER

Dig snow out from under a suitable large tree. It will not be as deep near the base of the tree. Use the cut branches to line the shelter. Use a ground sheet as overhead cover to prevent snow from falling off the tree into the shelter. If built properly, you can have 360-degree visibility

20-MAN LIFE RAFT

This raft is the standard overwater raft on U.S. Air Force aircraft. You can use it as a shelter. Do not let large amounts of snow build up on the overhead protection. If placed in an open area, it also serves as a good signal to overhead aircraft.

PONCHO LEAN-TO

It takes only a short time and minimal equipment to build this lean-to (Figure 5-1). You need a poncho, 2 to 3 meters of rope or parachute suspension line, three stakes about 30 centimeters long, and two trees or two poles 2 to 3 meters apart. Before selecting the trees you will use or the location of your poles, check the wind direction. Ensure that the back of your lean-to will be into the wind.

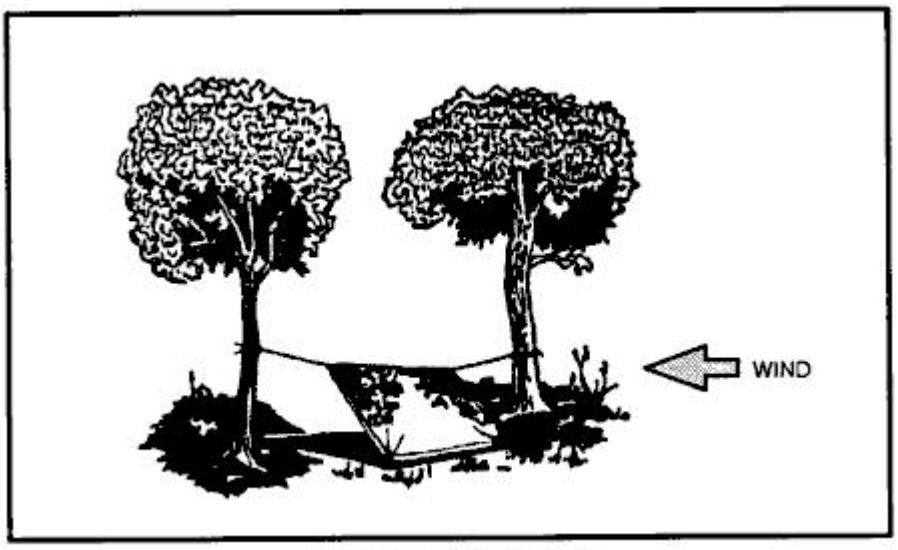


Figure 5-1. Poncho lean-to.

To make the lean-to--

- Tie off the hood of the poncho. Pull the drawstring tight, roll the hood longways, fold it into thirds, and tie it off with the drawstring.
- Cut the rope in half. On one long side of the poncho, tie half of the rope to the corner grommet. Tie the other half to the other corner grommet.
- Attach a drip stick (about a 10-centimeter stick) to each rope about 2.5 centimeters from the grommet. These drip sticks will keep rainwater from running down the ropes into the lean-to. Tying strings (about 10 centimeters long) to each grommet along the poncho's top edge will allow the water to run to and down the line without dripping into the shelter.
- Tie the ropes about waist high on the trees (uprights). Use a round turn and two half hitches with a quick-release knot.
- Spread the poncho and anchor it to the ground, putting sharpened sticks through the grommets and into the ground.

If you plan to use the lean-to for more than one night, or you expect rain, make a center support for the lean-to. Make this support with a line. Attach one end of the line to the poncho hood and the other end to an overhanging branch. Make sure there is no slack in the line.

Another method is to place a stick upright under the center of the lean-to. This method, however, will restrict your space and movements in the shelter. For additional protection from wind and rain, place some brush, your rucksack, or other equipment at the sides of the lean-to. To reduce heat loss to the ground, place some type of insulating material, such as leaves or pine needles, inside your lean-to.

Note: When at rest, you lose as much as 80 percent of your body heat to the ground.

To increase your security from enemy observation, lower the lean-to's silhouette by making two changes. First, secure the support lines to the trees at knee height (not at waist height) using two knee-high sticks in the two center grommets (sides of lean-to). Second, angle the poncho to the ground, securing it with sharpened sticks, as above.

PONCHO TENT

This tent (Figure 5-2) provides a low silhouette. It also protects you from the elements on two sides. It has, however, less usable space and observation area than a lean-to, decreasing your reaction time to enemy detection. To make this tent, you need a poncho, two 1.5- to 2.5-meter ropes, six sharpened sticks about 30 centimeters long, and two trees 2 to 3 meters apart.

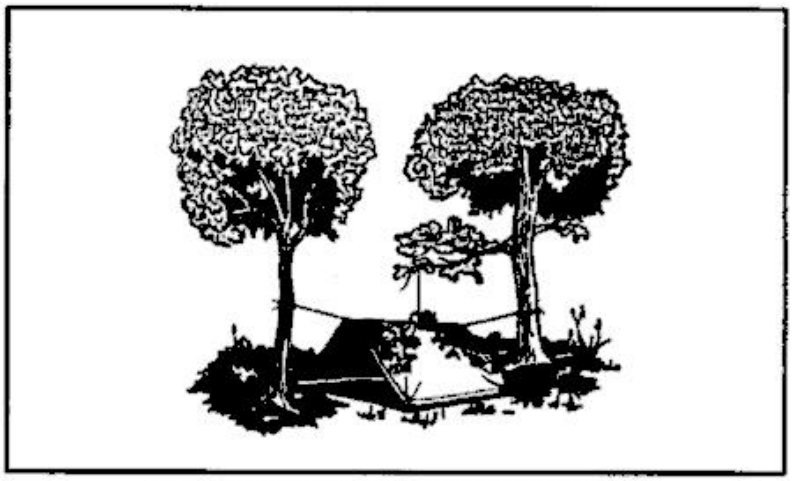


Figure 5-2. Poncho tent using overhanging branch.

To make the tent--

- Tie off the poncho hood in the same way as the poncho lean-to.
- Tie a 1.5- to 2.5-meter rope to the center grommet on each side of the poncho.
- Tie the other ends of these ropes at about knee height to two trees 2 to 3 meters apart and stretch the poncho tight.
- Draw one side of the poncho tight and secure it to the ground pushing sharpened sticks through the grommets.
- Follow the same procedure on the other side.

If you need a center support, use the same methods as for the poncho lean-to. Another center support is an A-frame set outside but over the center of the tent (Figure 5-3) . Use two 90- to 120-centimeter-long sticks, one with a forked end, to form the A-frame. Tie the hood's drawstring to the A-frame to support the center of the tent.

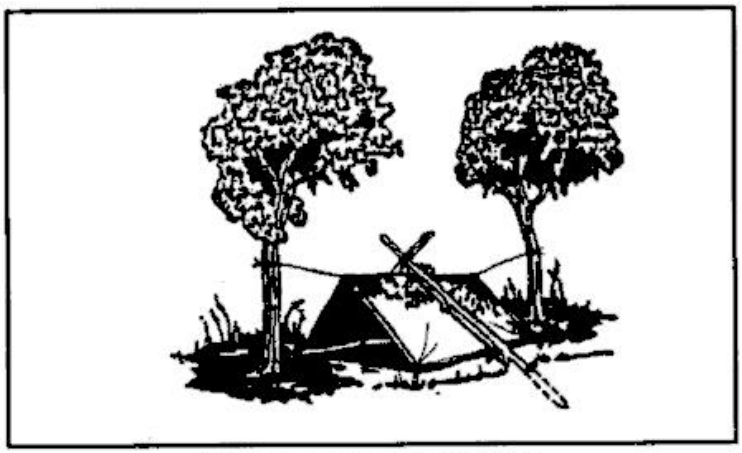


Figure 5-3. Poncho tent with A-frame.

THREE-POLE PARACHUTE TEPEE

If you have a parachute and three poles and the tactical situation allows, make a parachute tepee. It is easy and takes very little time to make this tepee. It provides protection from the elements and can act as a signaling device by enhancing a small amount of light from a fire or candle. It is large enough to hold several people and their equipment and to allow sleeping, cooking, and storing firewood. You can make this tepee using parts of or a whole personnel main or reserve parachute canopy. If using a standard personnel parachute, you need three poles 3.5 to 4.5 meters long and about 5 centimeters in diameter. To make this tepee (Figure 5-4)--

- Lay the poles on the ground and lash them together at one end.
- Stand the framework up and spread the poles to form a tripod.
- For more support, place additional poles against the tripod. Five or six additional poles work best, but do not lash them to the tripod.
- Determine the wind direction and locate the entrance 90 degrees or more from the mean wind direction.
- Lay out the parachute on the "backside" of the tripod and locate the bridle loop (nylon web loop) at the top (apex) of the canopy.
- Place the bridle loop over the top of a free-standing pole. Then place the pole back up against the tripod so that the canopy's apex is at the same height as the lashing on the three poles.
- Wrap the canopy around one side of the tripod. The canopy should be of double thickness, as you are wrapping an entire parachute. You need only wrap half of the tripod, as the remainder of the canopy will encircle the tripod in the opposite direction.
- Construct the entrance by wrapping the folded edges of the canopy around two free-standing poles. You can then place the poles side by side to close the tepee's entrance.
- Place all extra canopy underneath the tepee poles and inside to create a floor for the shelter.
- Leave a 30- to 50-centimeter opening at the top for ventilation if you intend to have a fire inside the tepee.

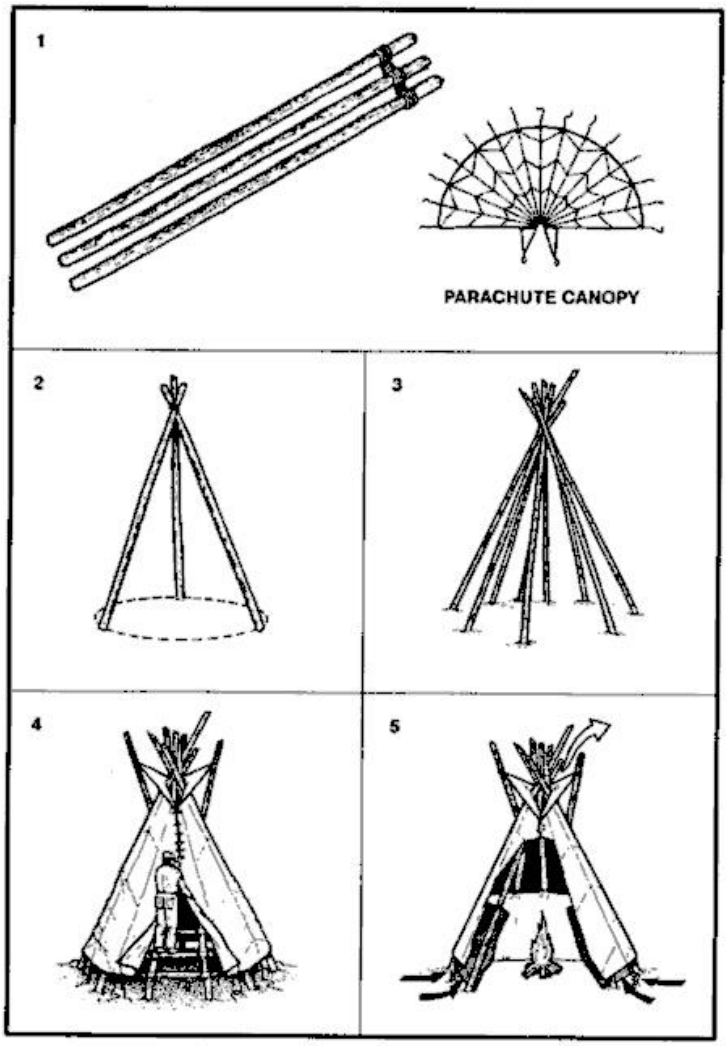


Figure 5-4. Three-pole parachute tepee.

ONE-POLE PARACHUTE TEPEE

You need a 14 -gore section (normally) of canopy, stakes, a stout center pole, and inner core and needle to construct this tepee. You cut the suspension lines except for 40- to 45-centimeter lengths at the canopy's lower lateral band. To make this tepee (Figure 5-5)--

- Select a shelter site and scribe a circle about 4 meters in diameter on the ground.
- Stake the parachute material to the ground using the lines remaining at the lower lateral band.
- After deciding where to place the shelter door, emplace a stake and tie the first line (from the lower lateral band) securely to it.
- Stretch the parachute material taut to the next line, emplace a stake on the scribed line, and tie the line to it.
- Continue the staking process until you have tied all the lines.
- Loosely attach the top of the parachute material to the center pole with a suspension line you previously cut and, through trial and error, determine the point at which the parachute material will be pulled tight once the center pole is upright.

- Then securely attach the material to the pole.
- Using a suspension line (or inner core), sew the end gores together leaving 1 or 1.2 meters for a door.

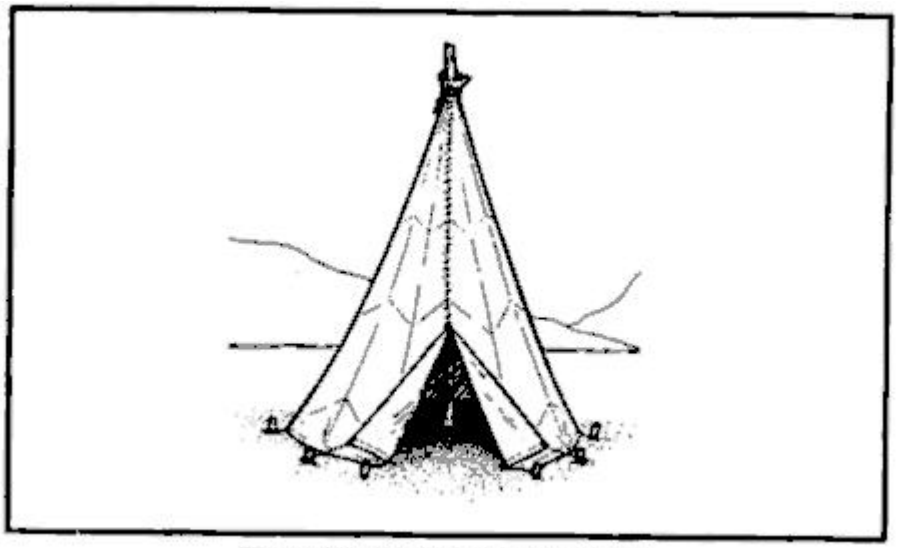


Figure 5-5. One-pole parachute tepee.

NO-POLE PARACHUTE TEPEE

You use the same materials, except for the center pole, as for the one-pole parachute tepee. To make this tepee (Figure 5-6)--

- Tie a line to the top of parachute material with a previously cut suspension line.
- Throw the line over a tree limb, and tie it to the tree trunk.
- Starting at the opposite side from the door, emplace a stake on the scribed 3.5- to 4.3-meter circle.
- Tie the first line on the lower lateral band.
- Continue emplacing the stakes and tying the lines to them.
- After staking down the material, unfasten the line tied to the tree trunk, tighten the tepee material by pulling on this line, and tie it securely to the tree trunk.

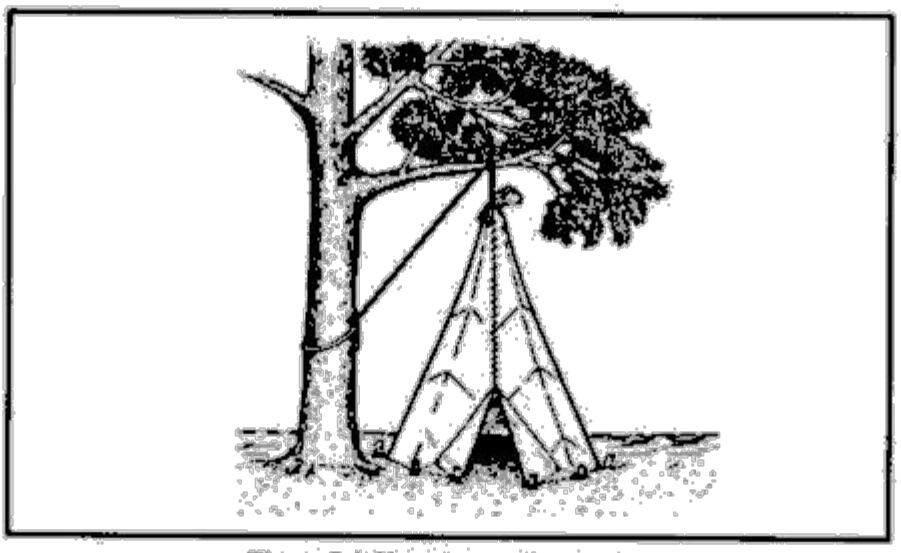


Figure 5-6. No-pole parachute tepee.

ONE-MAN SHELTER

A one-man shelter you can easily make using a parachute requires a tree and three poles. One pole should be about 4.5 meters long and the other two about 3 meters long. To make this shelter (Figure 5-7)--

- Secure the 4.5-meter pole to the tree at about waist height.
- Lay the two 3-meter poles on the ground on either side of and in the same direction as the 4.5-meter pole.
- Lay the folded canopy over the 4.5 meter pole so that about the same amount of material hangs on both sides.
- Tuck the excess material under the 3-meter poles, and spread it on the ground inside to serve as a floor.
- Stake down or put a spreader between the two 3-meter poles at the shelter's entrance so they will not slide inward.
- Use any excess material to cover the entrance.

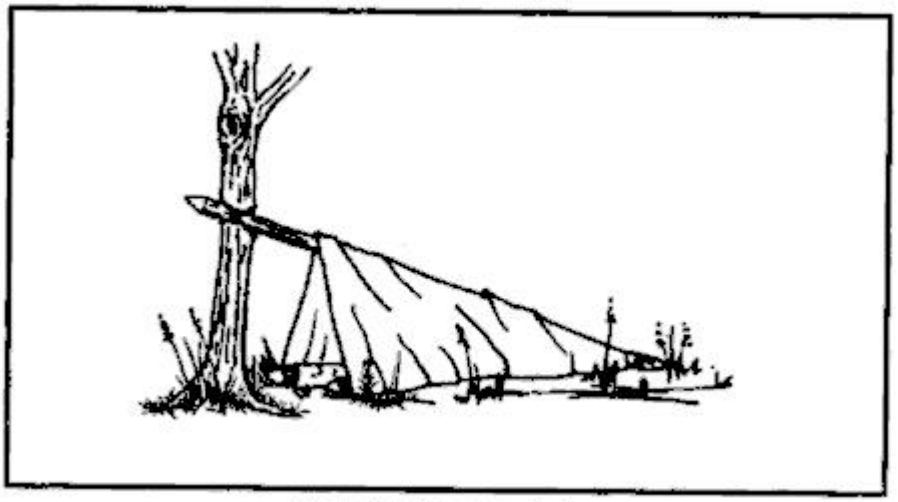


Figure 5-7. One-man shelter.

The parachute cloth makes this shelter wind resistant, and the shelter is small enough that it is easily warmed. A candle, used carefully, can keep the inside temperature comfortable. This shelter is unsatisfactory, however, when snow is falling as even a light snowfall will cave it in.

PARACHUTE HAMMOCK

You can make a hammock using 6 to 8 gores of parachute canopy and two trees about 4.5 meters apart (Figure 5-8).

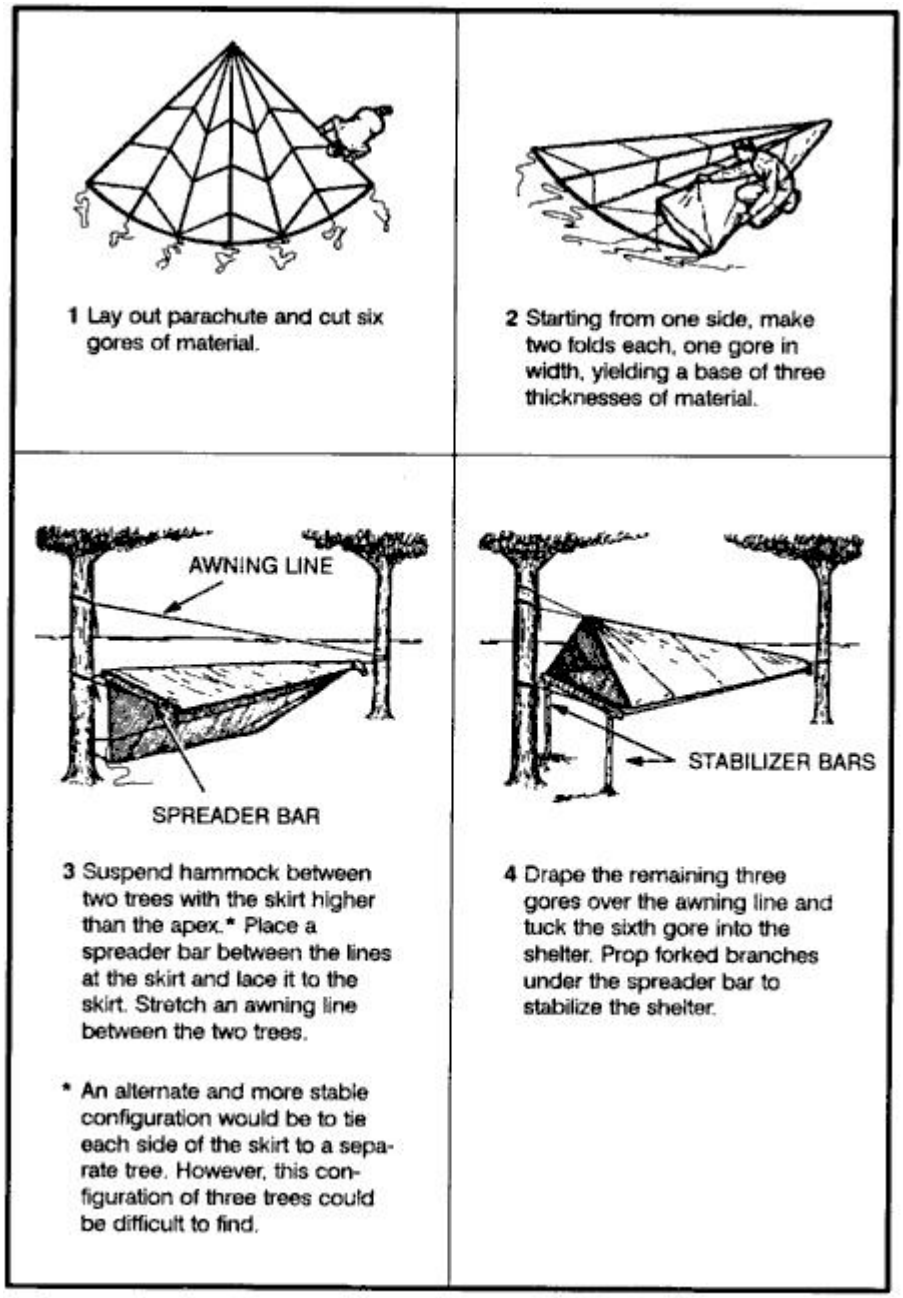


Figure 5-8. Parachute hammock.

FIELD-EXPEDIENT LEAN-TO

If you are in a wooded area and have enough natural materials, you can make a field-expedient lean-to (Figure 5-9) without the aid of tools or with only a knife. It takes longer to make this type of shelter than it does to make other types, but it will protect you from the elements.

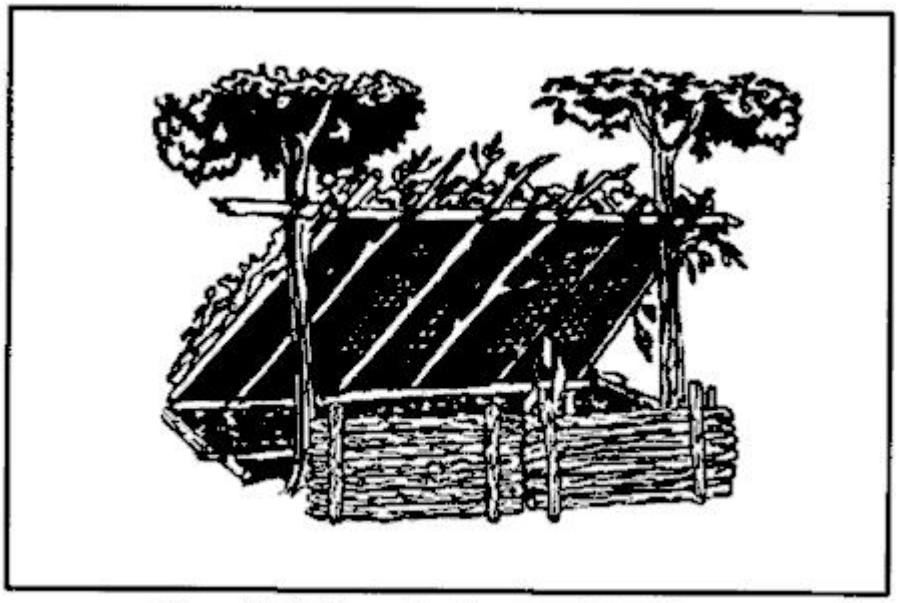


Figure 5-9. Field-expedient lean-to and fire reflector.

You will need two trees (or upright poles) about 2 meters apart; one pole about 2 meters long and 2.5 centimeters in diameter; five to eight poles about 3 meters long and 2.5 centimeters in diameter for beams; cord or vines for securing the horizontal support to the trees; and other poles, saplings, or vines to crisscross the beams. To make this lean-to--

- Tie the 2-meter pole to the two trees at waist to chest height. This is the horizontal support. If a standing tree is not available, construct a biped using Y-shaped sticks or two tripods.
- Place one end of the beams (3-meter poles) on one side of the horizontal support. As with all lean-to type shelters, be sure to place the lean-to's backside into the wind.
- Crisscross saplings or vines on the beams.
- Cover the framework with brush, leaves, pine needles, or grass, starting at the bottom and working your way up like shingling.
- Place straw, leaves, pine needles, or grass inside the shelter for bedding.

In cold weather, add to your lean-to's comfort by building a fire reflector wall (Figure 5-9). Drive four 1.5-meter -long stakes into the ground to support the wall. Stack green logs on top of one another between the support stakes. Form two rows of stacked logs to create an inner space within the wall that you can fill with dirt. This action not only strengthens the wall but makes it more heat reflective. Bind the top of the support stakes so that the green logs and dirt will stay in place.

With just a little more effort you can have a drying rack. Cut a few 2- centimeter-diameter poles (length depends on the distance between the lean-to's horizontal support and the top of the fire reflector wall). Lay one end of the poles on the lean-to support and the other end on top of the reflector wall. Place and tie into place smaller sticks across these poles. You now have a place to dry clothes, meat, or fish.

SWAMP BED

In a marsh or swamp, or any area with standing water or continually wet ground, the swamp bed (Figure 5-10) keeps you out of the water. When selecting such a site, consider the weather, wind, tides, and available materials.

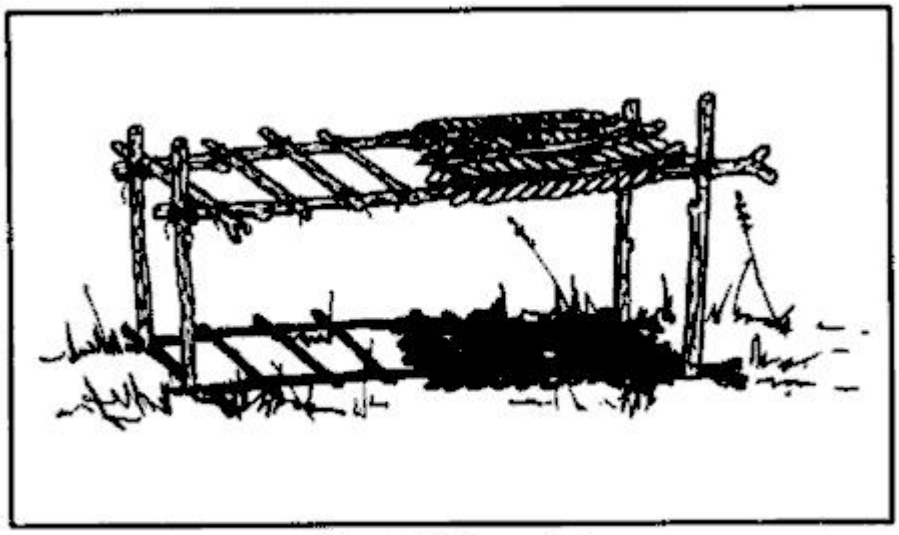


Figure 5-10. Swamp bed.

To make a swamp bed--

- Look for four trees clustered in a rectangle, or cut four poles (bamboo is ideal) and drive them firmly into the ground so they form a rectangle. They should be far enough apart and strong enough to support your height and weight, to include equipment.
- Cut two poles that span the width of the rectangle. They, too, must be strong enough to support your weight.
- Secure these two poles to the trees (or poles). Be sure they are high enough above the ground or water to allow for tides and high water.
- Cut additional poles that span the rectangle's length. Lay them across the two side poles, and secure them.
- Cover the top of the bed frame with broad leaves or grass to form a soft sleeping surface.
- Build a fire pad by laying clay, silt, or mud on one comer of the swamp bed and allow it to dry.

Another shelter designed to get you above and out of the water or wet ground uses the same rectangular configuration as the swamp bed. You very simply lay sticks and branches lengthwise on the inside of the trees (or poles) until there is enough material to raise the sleeping surface above the water level.

NATURAL SHELTERS

Do not overlook natural formations that provide shelter. Examples are caves, rocky crevices, clumps of bushes, small depressions, large rocks on leeward sides of hills, large trees with low-hanging limbs, and fallen trees with thick branches. However, when selecting a natural formation--

- Stay away from low ground such as ravines, narrow valleys, or creek beds. Low areas collect the heavy cold air at night and are therefore colder than the surrounding high ground. Thick, brushy, low ground also harbors more insects.
- Check for poisonous snakes, ticks, mites, scorpions, and stinging ants.
- Look for loose rocks, dead limbs, coconuts, or other natural growth than could fall on your shelter.

DEBRIS HUT

For warmth and ease of construction, this shelter is one of the best. When shelter is essential to survival, build this shelter. To make a debris hut (Figure 5-11)--

- Build it by making a tripod with two short stakes and a long ridgepole or by placing one end of a long ridgepole on top of a sturdy base.
- Secure the ridgepole (pole running the length of the shelter) using the tripod method or by anchoring it to a tree at about waist height.
- Prop large sticks along both sides of the ridgepole to create a wedge-shaped ribbing effect. Ensure the ribbing is wide enough to accommodate your body and steep enough to shed moisture.
- Place finer sticks and brush crosswise on the ribbing. These form a latticework that will keep the insulating material (grass, pine needles, leaves) from falling through the ribbing into the sleeping area.
- Add light, dry, if possible, soft debris over the ribbing until the insulating material is at least 1 meter thick--the thicker the better.
- Place a 30-centimeter layer of insulating material inside the shelter.
- At the entrance, pile insulating material that you can drag to you once inside the shelter to close the entrance or build a door.
- As a final step in constructing this shelter, add shingling material or branches on top of the debris layer to prevent the insulating material from blowing away in a storm.

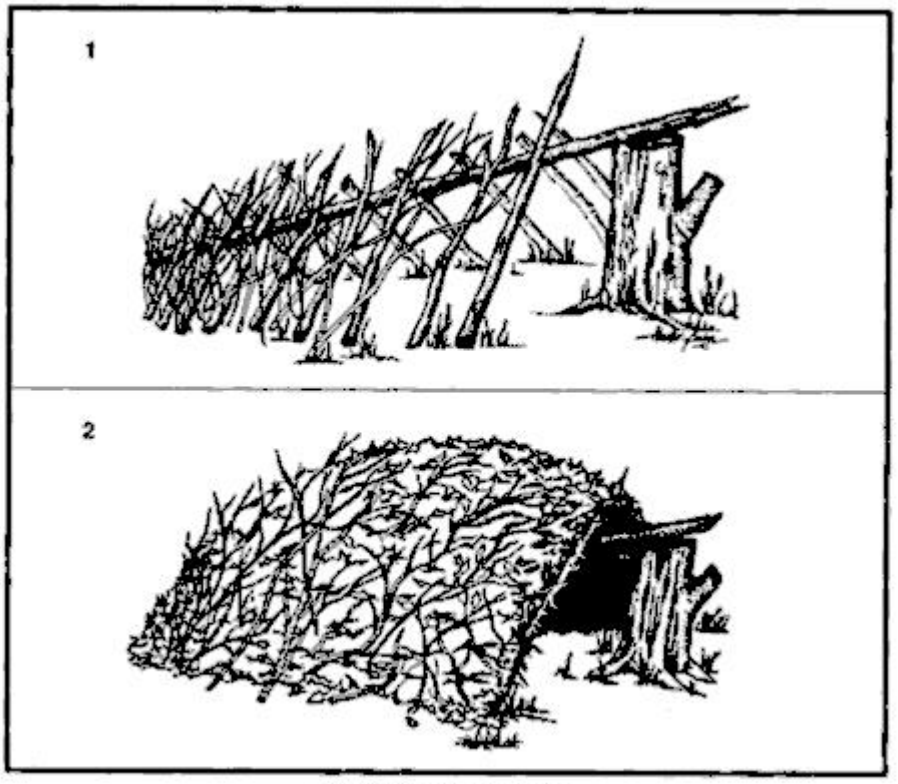


Figure 5-11. Debris hut.

TREE-PIT SNOW SHELTER

If you are in a cold, snow-covered area where evergreen trees grow and you have a digging tool, you can make a tree-pit shelter (Figure 5-12).

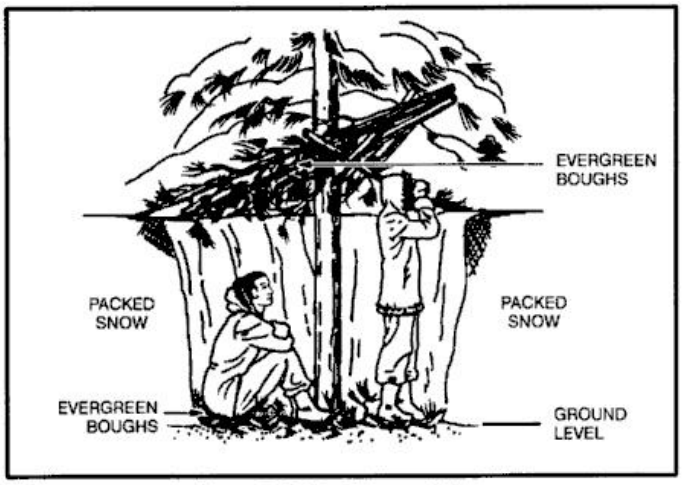


Figure 5-12. Tree-pit snow shelter.

To make this shelter--

- Find a tree with bushy branches that provides overhead cover.
- Dig out the snow around the tree trunk until you reach the depth and diameter you desire, or until you reach the ground.
- Pack the snow around the top and the inside of the hole to provide support.
- Find and cut other evergreen boughs. Place them over the top of the pit to give you additional overhead cover. Place evergreen boughs in the bottom of the pit for insulation.

BEACH SHADE SHELTER

This shelter protects you from the sun, wind, rain, and heat. It is easy to make using natural materials. To make this shelter (Figure 5-13)--

- Find and collect driftwood or other natural material to use as support beams and as a digging tool.
- Select a site that is above the high water mark.
- Scrape or dig out a trench running north to south so that it receives the least amount of sunlight. Make the trench long and wide enough for you to lie down comfortably.
- Mound soil on three sides of the trench. The higher the mound, the more space inside the shelter.
- Lay support beams (driftwood or other natural material) that span the trench on top of the mound to form the framework for a roof.
- Enlarge the shelter's entrance by digging out more sand in front of it.
- Use natural materials such as grass or leaves to form a bed inside the shelter.

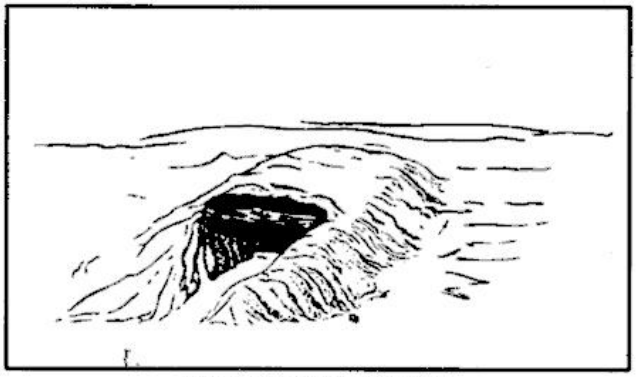


Figure 5-13. Beach shade shelter.

DESERT SHELTERS

In an arid environment, consider the time, effort, and material needed to make a shelter. If you have material such as a poncho, canvas, or a parachute, use it along with such terrain features as rock outcropping, mounds of sand, or a depression between dunes or rocks to make your shelter.

Using rock outcroppings--

- Anchor one end of your poncho (canvas, parachute, or other material) on the edge of the outcrop using rocks or other weights.
- Extend and anchor the other end of the poncho so it provides the best possible shade.

In a sandy area--

- Build a mound of sand or use the side of a sand dune for one side of the shelter.
- Anchor one end of the material on top of the mound using sand or other weights.
- Extend and anchor the other end of the material so it provides the best possible shade.

Note: If you have enough material, fold it in half and form a 30-centimeter to 45-centimeter airspace between the two halves. This airspace will reduce the temperature under the shelter.

A belowground shelter (Figure 5-14) can reduce the midday heat as much as 16 to 22 degrees C (30 to 40 degrees F). Building it, however, requires more time and effort than for other shelters. Since your physical effort will make you sweat more and increase dehydration, construct it before the heat of the day.

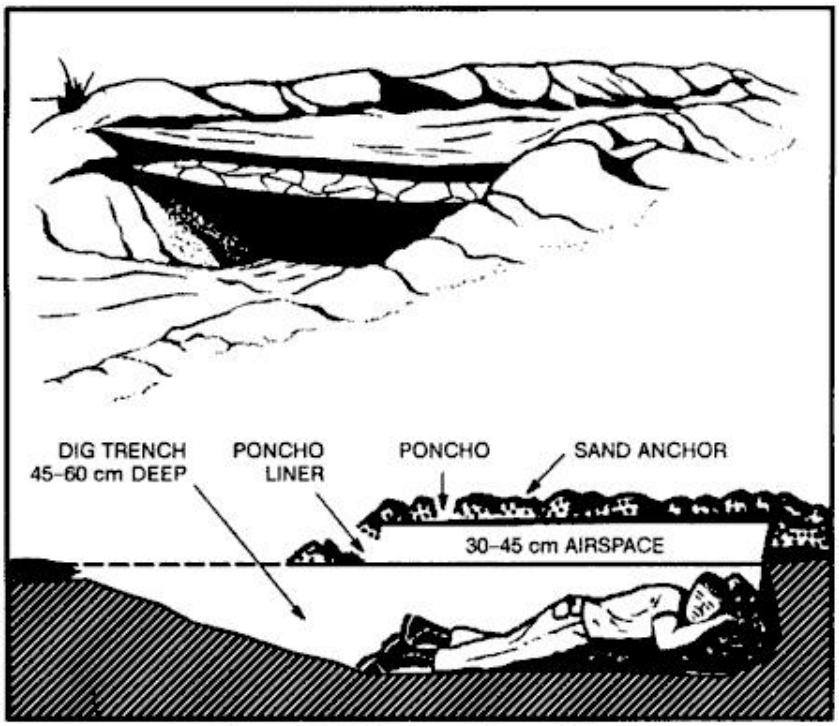


Figure 5-14. Belowground desert shelter.

To make this shelter--

- Find a low spot or depression between dunes or rocks. If necessary, dig a trench 45 to 60 centimeters deep and long and wide enough for you to lie in comfortably.
- Pile the sand you take from the trench to form a mound around three sides.
- On the open end of the trench, dig out more sand so you can get in and out of your shelter easily.
- Cover the trench with your material.
- Secure the material in place using sand, rocks, or other weights.

If you have extra material, you can further decrease the midday temperature in the trench by securing the material 30 to 45 centimeters above the other cover. This layering of the material will reduce the inside temperature 11 to 22 degrees C (20 to 40 degrees F).

Another type of belowground shade shelter is of similar construction, except all sides are open to air currents and circulation. For maximum protection, you need a minimum of two layers of parachute material (Figure 5-15). White is the best color to reflect heat; the innermost layer should be of darker material.

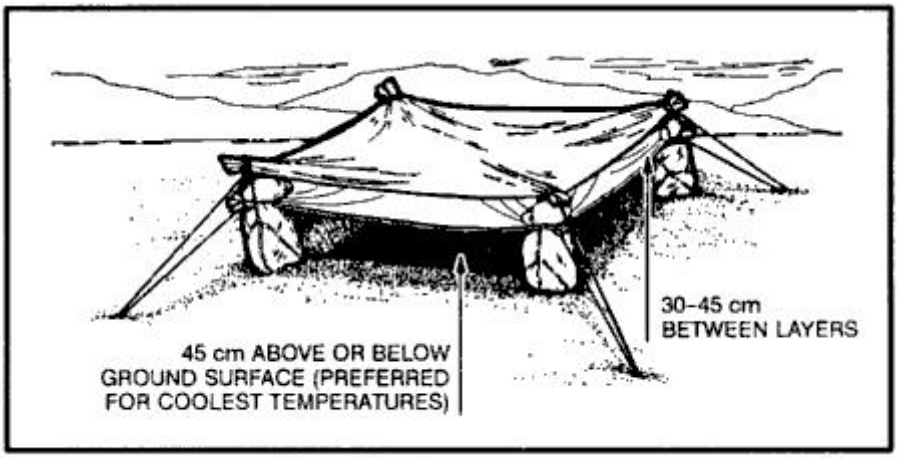


Figure 5-15. Open desert shelter.

SEVEN PRIMITIVE SURVIVAL SHELTERS THAT COULD SAVE YOUR LIFE

QUINTZE HUT

Properly constructed, this poor man's igloo can be body-heated to above freezing on a 20-below day, higher if you light a candle.

Step One Build up snow to a depth of at least 8 inches and pack it down to make a floor.
Step Two Heap loose snow onto the floor. Piling the snow over a backpack or mound of branches will let you create a hollow, which hastens the excavation process, but it isn't necessary. Let the snow consolidate for an hour or more, until it is set up hard enough to form snowballs.
Step Three Tunnel through the mound at opposite ends to dig out the center efficiently, fill in the unused entrance, and crawl inside to shape the interior. Ideally, the quintze should be narrow at the foot end, with a bed long enough to lie down on, and just tall enough at the head end for you to sit up. The walls and roof need to be at least a foot thick (check this with a stick).
Step Four Poke out an air vent overhead and dig a well at the entrance for the cold air to settle into. Cut a snow block for a door. Glaze interior walls with a candle to prevent dripping.

OPEN SHELTERS

Bough structures that reflect a fire's warmth are the most important shelters to know how to build. They can be erected without tools in an hour provided you are in an area with downed timber-"less if you find a makeshift ridgepole such as a leaning or partly fallen tree to support the boughs.

POLE AND BOUGH LEAN-TO

One of the most ancient shelters, the single wall of a lean-to serves triple duty as windbreak, fire reflector, and overhead shelter.
Step One Wedge a ridgepole into the crotches of closely growing trees (one end can rest on the ground if necessary), or support each end of the ridgepole with a tripod of upright poles lashed together near the top. **Step Two** Tilt poles against the ridgepole to make a framework. To strengthen this, lace limber boughs through the poles at right angles.
Step Three Thatch the lean-to with slabs of bark or leafy or pine-needle branches, weaving them into the framework. Chink with sod, moss, or snow to further insulate.

A-FRAME

The pitched roof of the A-frame bough shelter offers more protection against the wind than a lean-to and can still be heated by fire at the entrance. One drawback is that the occupant can't lie down parallel to the fire for even warmth.

Step One Lift one end of a log and either lash it or wedge it into the crotch of a tree. Tilt poles on either side to form an A-frame roof.
Step Two Strengthen and thatch the roof as you would a bough lean-to.

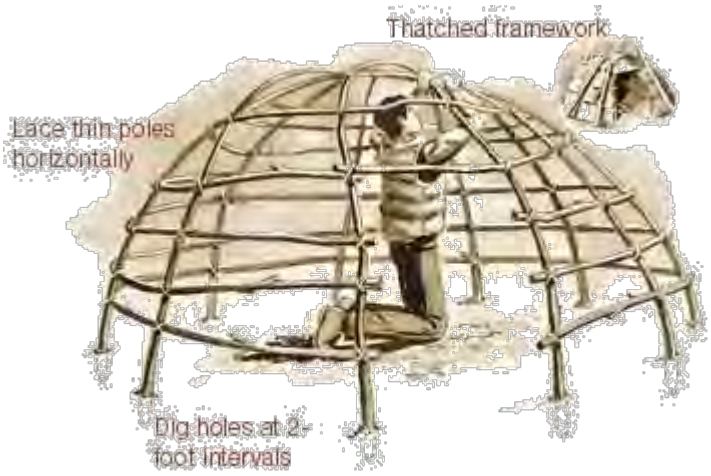
ENCLOSED SHELTERS

These take more time to build than open shelters (at least three hours), but your efforts will be doubly rewarded. Not only can the shelter be warmed by a small fire, reducing the need to collect a huge pile of wood, but the firelight reflects off the walls, providing cheery illumination for sitting out a long winter night.

WICKIUP

This forerunner of the tepee remains the quintessential primitive shelter-"sturdy enough to blunt prevailing winds, weatherproof, quickly built for nomadic hunters, but comfortable enough to serve as a long-term home. It can be partially enclosed or fully enclosed and vented to permit an inside fire.

Step One Tilt three poles together in tripod form and bind them together near the top. If you can find one or more poles with a Y at one end, tilt the others against the crotch, eliminating the need for cordage.
Step Two Tilt other poles against the wedges formed by the tripod in a circular form and thatch, leaving a front opening and a vent at the top for smoke.



WIGWAM

A complex version of the wickiup, this is built with long, limber poles bent into a dome-shaped framework to maximize interior space.

Step One Inscribe a circle and dig holes at 2-foot intervals to accommodate the framing poles. **Step Two** Drive the butt ends of the poles into the holes and bend the smaller ends over the top. Lash or weave the tops together, forming a dome-shaped framework. **Step Three** Lace thin green poles horizontally around the framework for rigidity. **Step Four** Thatch the framework, leaving entrance and vent holes.

SALISH SUBTERRANEAN SHELTER

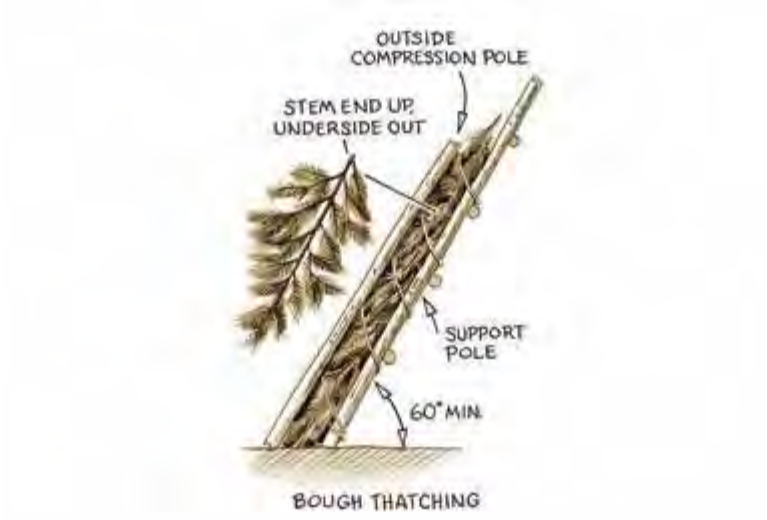
Used by pacific tribes from alaska to present-day california, pit shelters are impractical unless you have a digging implement, but they offer better protection from extreme heat and cold than aboveground shelters.

step one dig a pit the circumference of the intended shelter to a depth of 3 feet.
step two build a supporting tripod of poles, strengthening the framework with horizontally laced limbs.
step three thatch the shelter, leaving a hole at the center to serve as both a laddered entrance and a smoke vent. use earth removed from the pit to sod and insulate the shelter walls.

HOW TO MAKE A TWO-STRAND CORD

Many plant materials, including grasses that resist breaking when bent and the inner barks of shrubs and willows, can make strong enough cordage to lash thatching onto shelters. Thin willow wands, flexible capillary tree roots, rawhide cut from animal skins, and sinew strands that encase animal muscle make stronger cord, suitable for snare traps, bowstrings, and bindings.

Directions Holding the cordage material between your thumbs and first fingers, twist it to form a kink in the middle. Now twist each half separately in a clockwise direction, then pass them around each other in a counterclockwise direction as shown. (A strand can be composed of one or more fibers, depending upon the diameter of the cordage material available.) Weave in more strands for greater length.

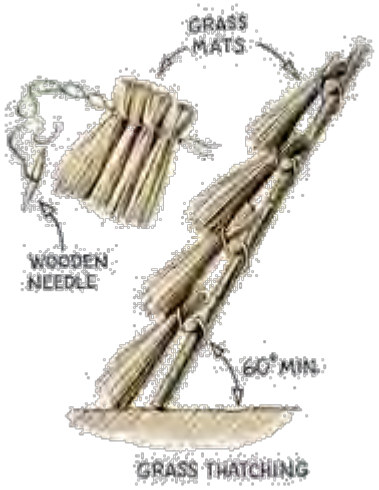


MAKING SHINGLE AND THATCH WEATHERPROOFING

Weatherproof materials should be stacked onto the framework, then bound with cordage or held in position by more poles. Wall angle depends upon the thatching; the more porous the materials, the steeper the walls.

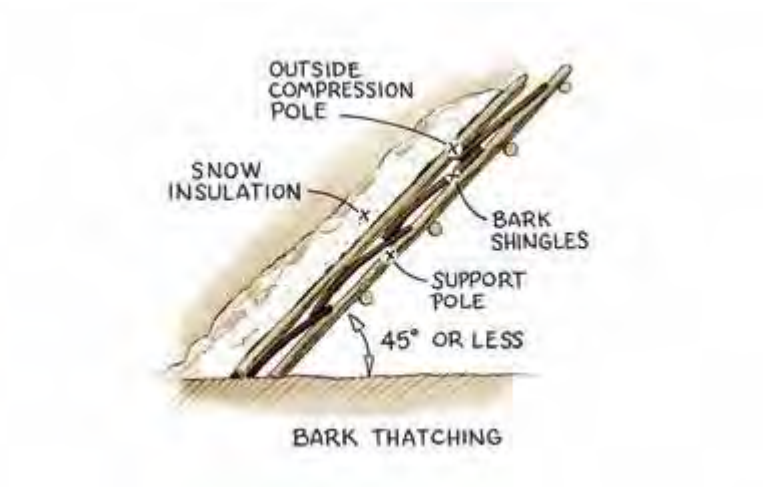
BOUGH THATCHING

Overlay the framework with a mat of evergreen boughs oriented tips down, with the undersides of the needles facing out. For the best protection, compress the thatching with poles and pack over with snow. Pine and spruce boughs offer meager water resistance and are better reserved for the steeper walls of lean-tos and wickiups.



GRASS THATCHING

Suitable for dome-shaped shelters, water-resistant grass mats can be formed by sewing together bunches of similar size. (Longer -grasses can be cross-hatched and woven; overlap the ends irregularly to make a continuous warp and weft.) Lash thatching to support poles with rope or natural cordage.



BARK SHINGLES

Birch bark is one of the best natural materials for shingle making. Use it if it's available. When you're building a bark wall, make sure the bottom of each shingle layer overlaps the top of the row below it. Keep rows in place with poles and insulate over the top with moss or snow. The walls can be pitched at less than a 45-degree angle.

It's cold enough to freeze whiskey, and you're stuck in the woods without a bag? Make like a pot roast and construct a life-saving fire bed.

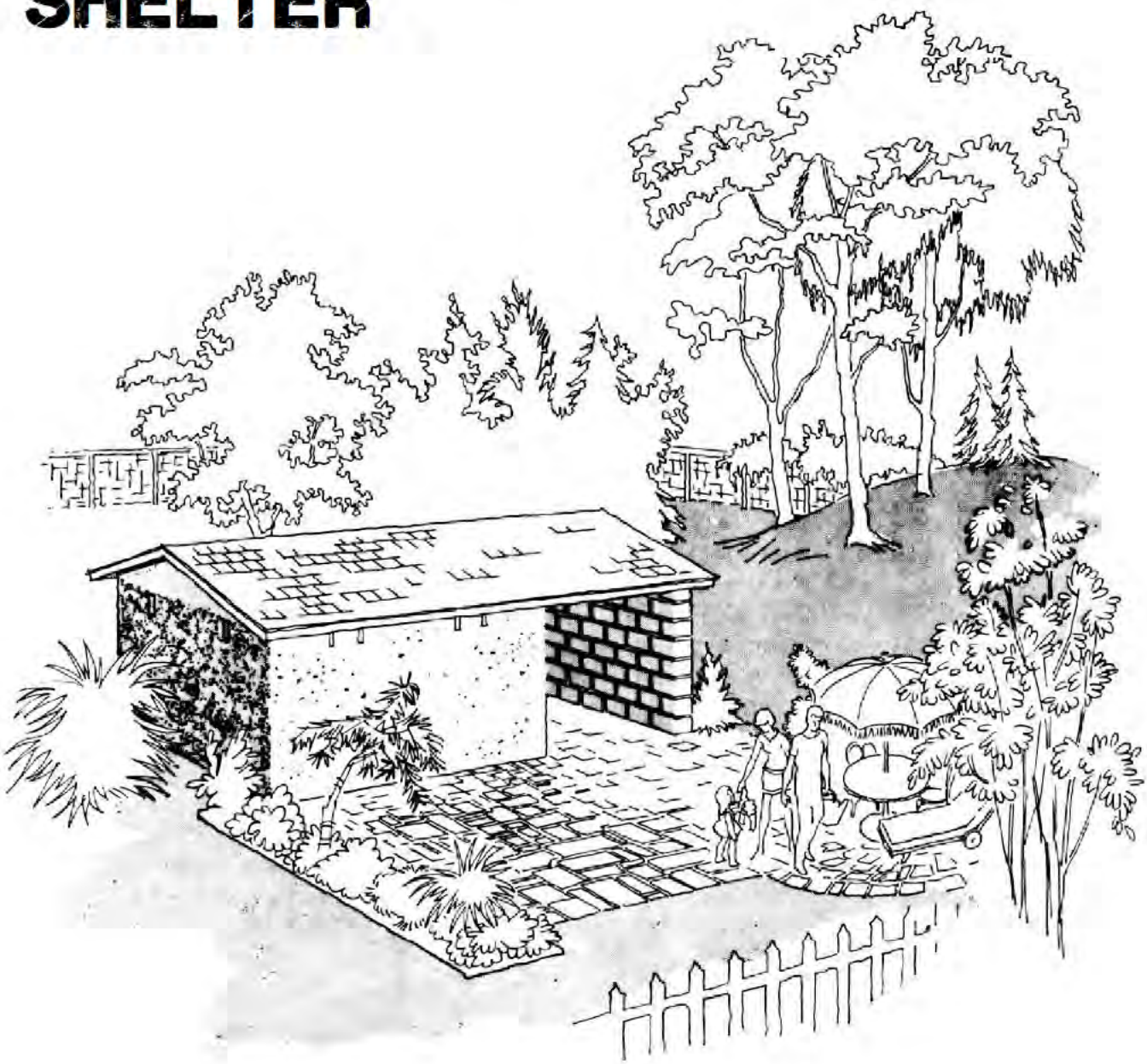
[BRACKET "1"] Scrape out a trench in the dirt about a foot wide and 8 inches deep. Line it with very dry, egg- to fist-size stones (wet rocks from a stream or lake can explode when heated).

[BRACKET "2"] Next, burn a fire down to coals and spread a layer throughout the trench. Cover this with at least 4 inches of dirt and tamp it down with your boot. Wait one hour. If the ground warms in less than an hour, add more dirt.

[BRACKET "3"] Check the area twice for any loose coals that could ignite a makeshift mattress. Then spread out a groundsheet of canvas, plastic, or spare clothing. Pine needles or evergreen boughs will work in a pinch.

[BRACKET "4"] Ease onto your fire bed and snooze away.

ABOVE GROUND HOME SHELTER



GENERAL INFORMATION

This family shelter is intended for persons who prefer an aboveground shelter or, for some reason such as a high water table, cannot have a belowground shelter. In general, belowground shelter is superior and more economical than an aboveground shelter.

The shelter is designed to meet the standard of protection against fallout radiation that has been established by the Federal Emergency Management Agency for public fallout shelters. It can also be constructed to provide significant protection from the effects of hurricanes, tornadoes, and earthquakes, and limited protection from the blast and fire effects of a nuclear explosion. 1/ It has sufficient space to shelter six adults.

The shelter can be built of two rows of concrete blocks, one 12” and one 8”, filled with sand or grout, or of poured reinforced concrete. Windows have been omitted; therefore, electric lights are recommended for day to day use.

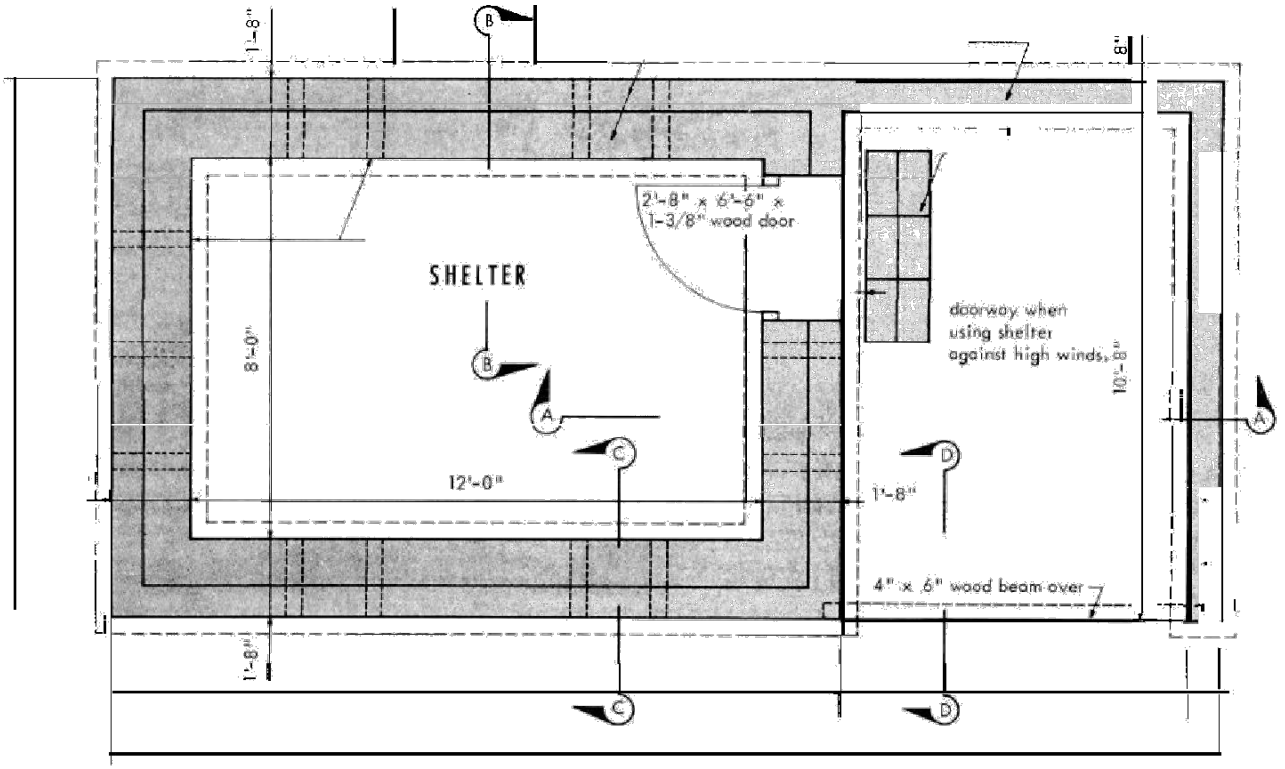
The details and construction methods are considered typical. If materials other than shown are selected -- for example, concrete block faced with brick -- care should be taken to provide at least the same weight of materials per square foot: 200 lb. per sq. ft. in the walls and 100 lb. per sq. ft. in the roof. The wood frame roof over the reinforced concrete ceiling probably would be blown off by extremely high winds such as caused by a blast wave or tornado. However, the wood frame roof is intended primarily for appearance; the concrete ceiling provides the protection. When using the shelter for protection against high winds, DO NOT place the concrete blocks in the doorway or windows.

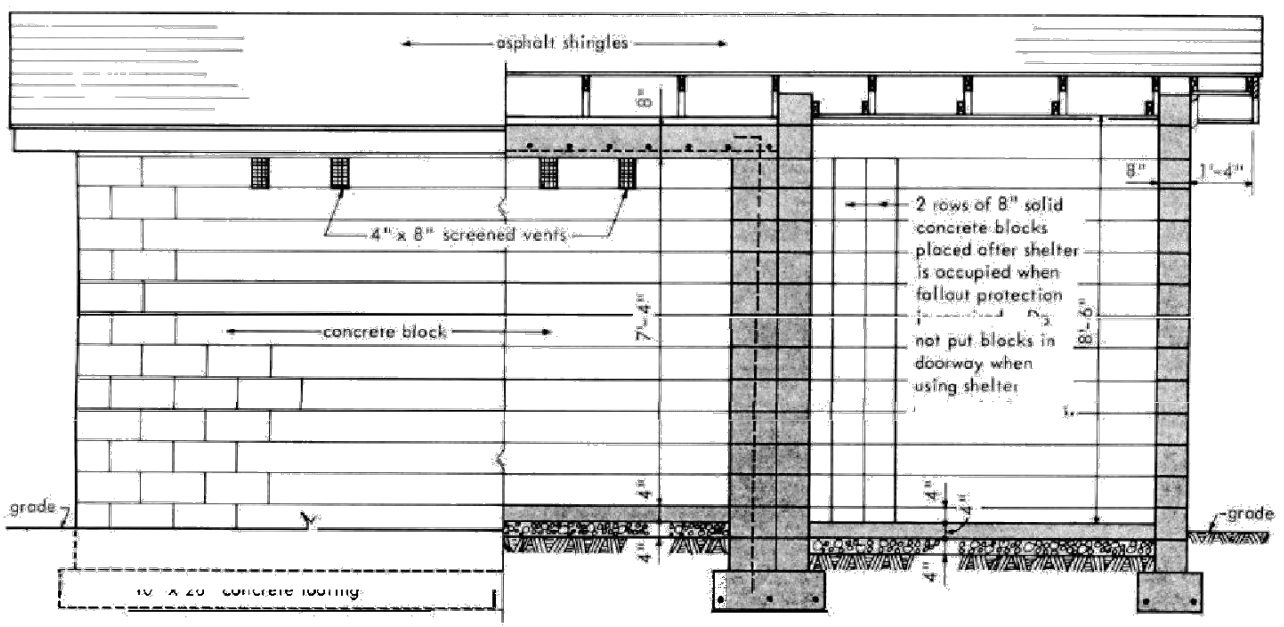
This structure has been designed for areas where frost does not penetrate the ground more than 20 inches. If 20 inches is not a sufficient depth for footings, one or two additional courses of concrete blocks may be used to lower the footings. Average soil bearing pressure is 1,500 lb. per sq. f t . Most soils can be assumed to support this pressure without special testing or investigation.

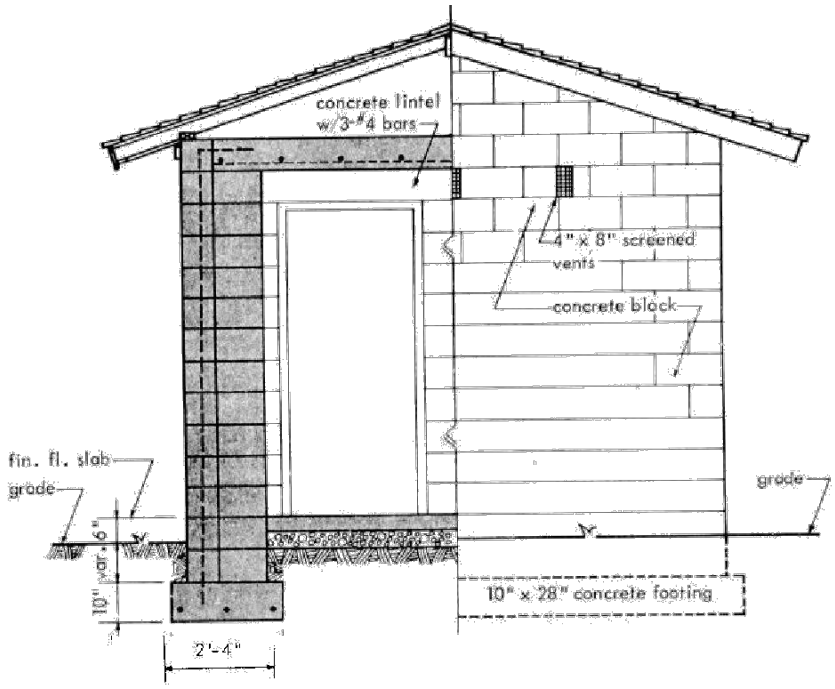
The baffle wall outside the entrance to the shelter is extended out 7’-4” to allow storage of lawn equipment such as wheelbarrows and lawn mowers. If additional space is desired, extend this dimension.

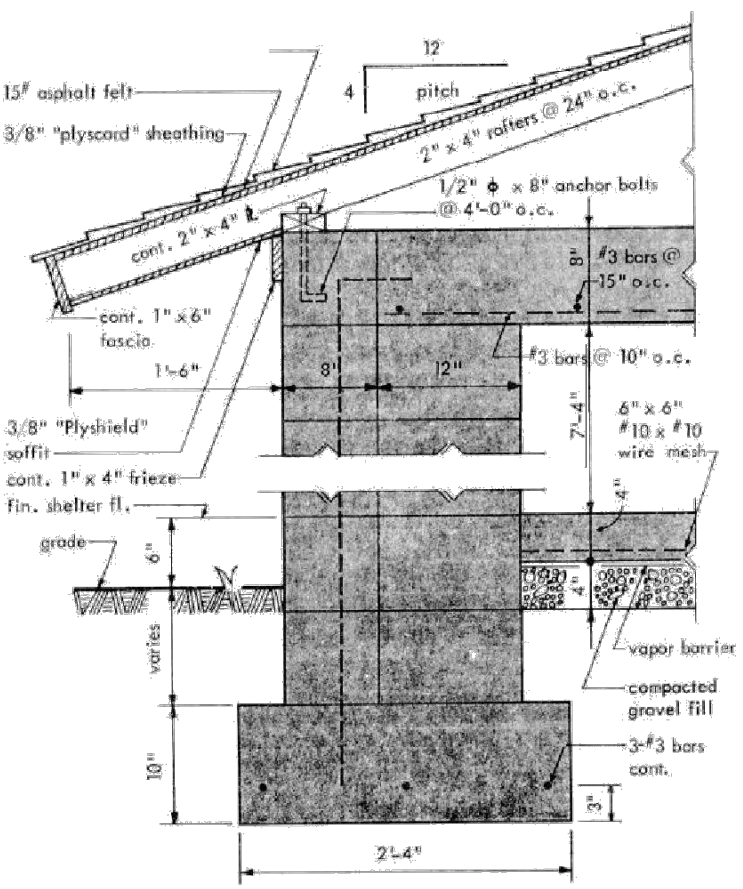
Before starting to build the shelter, make certain that the plan conforms to the local building code. Obtain a building permit if required. If the shelter is to be built by a contractor, engage a reliable firm that offers protection from any liability or other claims arising from its construction.

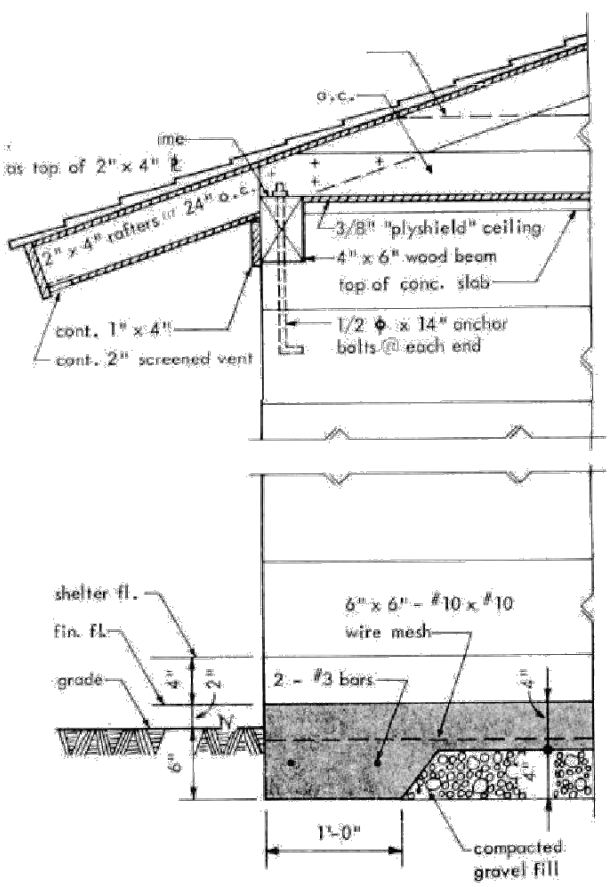
I/ This shelter will withstand over-pressures of up to 5 p.s.i.

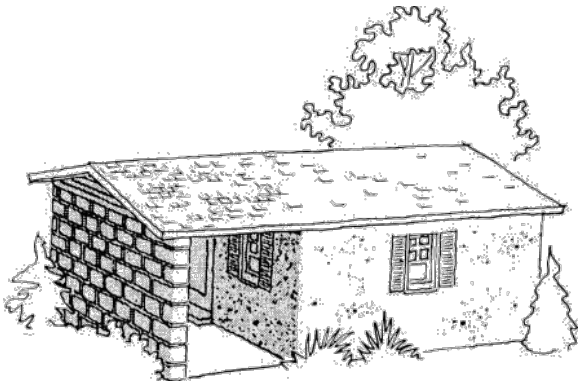

1'-8"
B
8"
2'-8" x 6'-6" x
1-3/8" wood door
SHELTER
8'-0"
B
A
C
12'-0"
doorway when
using shelter
against high winds
10'-8"
A
D
1'-8"
4" x 6" wood beam over
1'-8"
C
D


asphalt shingles
8"
8"
1'-4"
4" x 8" screened vents
2 rows of 8" solid
concrete blocks
placed after shelter
is occupied when
fallout protection
not put blocks in
doorway when
using shelter
concrete block
7'-4"
8'-6"
4"
4"
4"
4"
4"
grade
grade
10' x 20' concrete footing

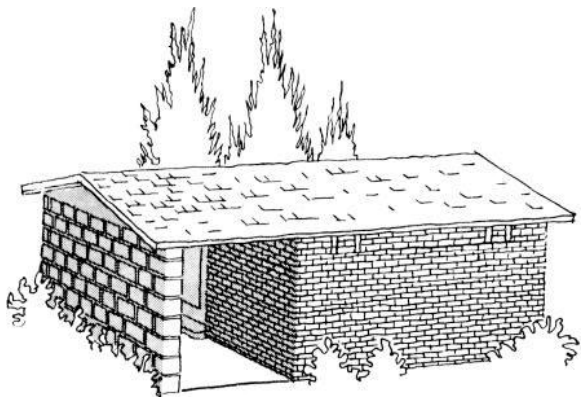

concrete lintel
w/3-#4 bars
4" x 8" screened
vents
concrete block
fin. fl. slab
grade
var. 6"
10"
grade
10" x 28" concrete footing
2'-4"


12
4
pitch
15# asphalt felt
3/8" "plyscord" sheathing
2" x 4" rafters @ 24" o.c.
1/2" ϕ x 8" anchor bolts
@ 4'-0" o.c.
cont. 2" x 4"
8"
#3 bars @
15" o.c.
cont. 1" x 6"
fascia
1'-6"
8"
12"
#3 bars @ 10" o.c.
7'-4"
6" x 6"
#10 x #10
wire mesh
3/8" "Plyshield"
soffit
cont. 1" x 4" frieze
fin. shelter fl.
grade
6"
4"
4"
4"
vapor barrier
compacted
gravel fill
varies
10"
3-#3 bars
cont.
3"
2'-4"


o.c.
ime
as top of 2" x 4"
2" x 4" rafters @ 24" o.c.
3/8" "plyshield" ceiling
4" x 6" wood beam
top of conc. slab
cont. 1" x 4"
cont. 2" screened vent
1/2 ϕ x 14" anchor
bolts @ each end
shelter fl.
fin. fl.
grade
4"
2"
6" x 6" - #10 x #10
wire mesh
2 - #3 bars
4"
6"
4"
1'-0"
compacted
gravel fill

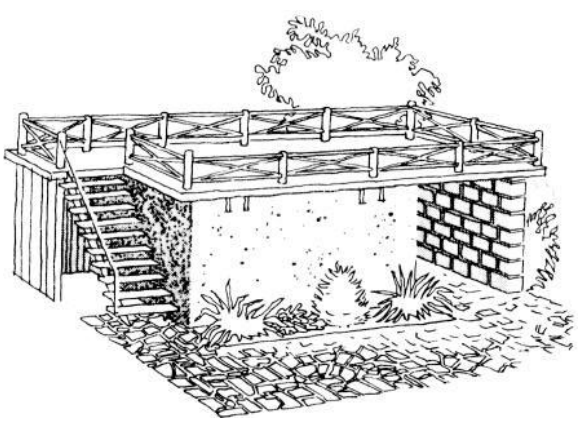


FIRST ALTERNATE indicates windows in the workshop area. Solid blocks equal to a thickness of 12 inches, should be available to fill these openings to provide adequate fallout protection. Window sizes should be kept small. When using the shelter for protection against high winds, do not place the concrete blocks in the doorway or windows.



SECOND ALTERNATE shows the cement block faced with bricks. Use one course 4-inch brick and two courses of 8-inch cement block to obtain the required weight per unit area.

THIRD ALTERNATE is to attach the tool shed or workshop to the house, with a covered area between. In this case, the facing materials should match the house.



FOURTH ALTERNATE is to install built- up roofing of asphalt or tar, or other wearing surface, on top of the concrete deck.

GUIDE TO CONTRACTS AND SPECIFICATIONS

It is generally advisable to have a written contract with your contractor as well as pecifications to supplement the drawing. a widely used and convenient contract form for construction of this size is aia document a 107, “short form for small construction contract stipulated sum, ” which is available from the american institute of architects, 1785 mass. ave., washington, d.c. 20036. it would be impractical to write a specification to suit every local condition; however, the following summary of generally accepted construction materials and practices is a useful guide:

CONCRETE

For details of concrete construction, follow “Building Code Requirements for Reinforced Concrete (AC l-3 18-71). ” This publication can be obtained from the American Concrete Institute, Detroit, Michigan 48219.

DAMPPROOFING

Dampprcofing the bottom slab is necessary to make the room more comfortable in most areas. Any contractor will be accustomed to compacting gravel and applying a polyethylene vapor barrier course. In areas that regularly experience high humidity, the outside walls of the block or concrete should be treated with a colourless type of protective coating material which is readily available at building supply stores. In areas of very low humidity, dampproofing might be omitted.

VENTILATION

Ventilation is obtained by natural convection. Air will enter the doorway and be exhausted through the holes at the ceiling. If a roof exhaust ventilation system is desired, the following manufacturer makes units that will meet the requirements:

Penn Ventilator Co.*/
Red Lion and Gantry Rd.
Philadelphia, Pennsylvania 19115

*/The listing of a specific manufacturer of equipment does not denote a preference for his products.

OPTIONS

To accommodate additional persons, increase the shelter length 2’ -6” for each two shelter spaces. Do not increase the 8’ -0” width.

Lighting and receptacles may be installed with electric service obtained from a separate residence circuit. A branch circuit breaker should be installed inside the shelter.

MATERIALS LIST

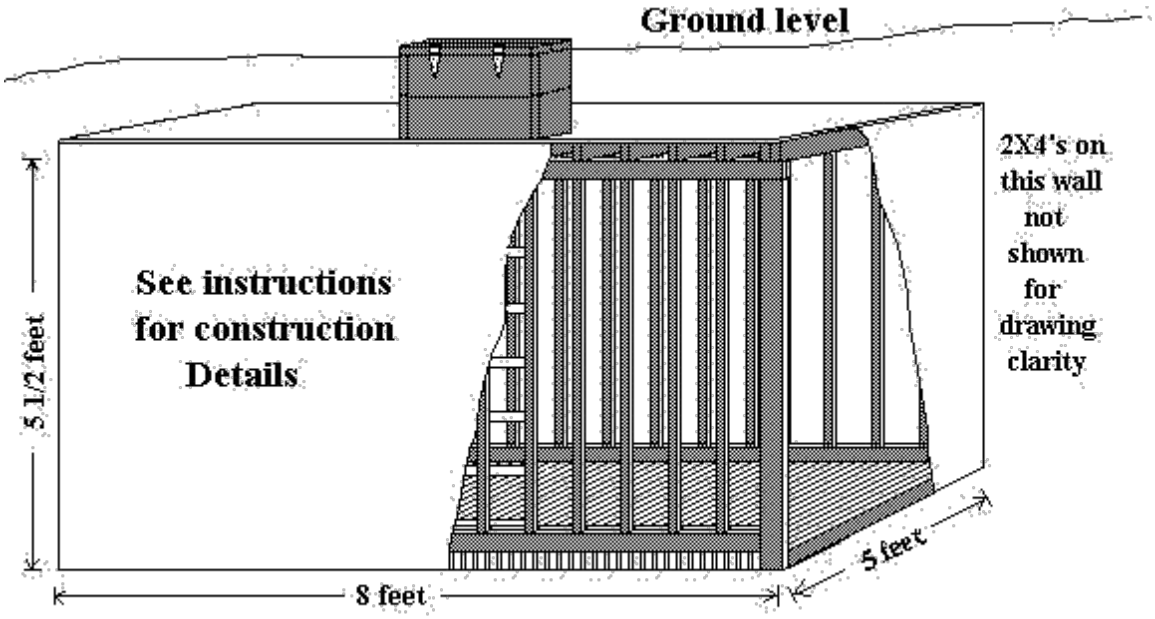
Item	Quantity
Concrete:	
footings	4.5 cu. yd.
floor	2.3 cu. yd.
cei l ing	3.4 cu. yd.
	Total : 10.2 cu. yd.
Steel Reinforcing:	
footings (3# deformed bars)	198 Iin. ft.
ceiling (3# deformed bars)	257 lin. ft.
walls (4# deformed bars for hurricane, tornado, or earthquake resistance)	approx. 300 lin. ft.
	Tota I : 755 lin. ft.
tie wire	100 lin. ft.
Masonry:	
8” X 8” X 16” hollow concrete blocks	800
12” X 8” X 16” hollow concrete blocks	430
8” X 8” X 16” solid concrete blocks	75
sand (to fill cores)	12-1/2 yd.
Mortar:	
sand	1-1/2 yd.
portland cement	9 bags
lime	2 bags
Lumber: (“construction”grade)	
2” X 4” X 8’-0” roof rafters	32 pcs.
1 ” X 6” ridge	26 l i n . f t .
2” X 4” X 12’-0” ceiling joists	5 pcs.
4” X 6” X 8’-0” beam	1 pcs.
2”X 4” bearing plate	36 l i n . f t .
4’-0” X 8’-0” X 3/8” “plyscord” sheathing	13 sheets
4’-0” X 8’-0” X 3/8” “plyshield” soffit & ceiling	6 sheets
1” x 4” x 3/4”	48 l i n . f t .
1” X 6” X 3/4”	84 Iin. f t .
3/4” -1/4$	24 l i n . f t .
2’-8” X 6’-6” X 1 3/8” solid core wood door	1
2’-8” X 6’-6” X 5 1/2” wood iamb	1

MISCELLANEOUS:

15# roofing felt	4 1/2 squares
21O# asphalt shingles	4 1/2 squares
1/2” o X 8” anchor bolts	12
1/2” o X 14” anchor bolts	2
copper screen	20 sq . ft.
6” X 6” - #1OX #10 wire mesh	200 sq. f t .
polyethylene vapor barrier (4 mil)	200 sq. f t .
gravel fill	2 1/2 yds.
4” butts w/screws	3
lockset	1
16d common nai Is	25 lb.
8d common nails	20 lb.
6d common nails	IO lb.
8d casing nails	5 lb.
exterior paint, primer	5 gal.
exterior paint, 2 coats	6 gal.
interior paint, primer	4 gal.
interior paint, 2 coats	5 gal.

A MODERN UNDERGROUND STORAGE CELLAR

This is a great example of what can be done as just about anyone who owns even a small piece of ground can make and use it.



Underground Storage Room, Cutaway View

Things went well as he dug the hole by hand until he unexpectedly struck bedrock at seven feet down. He would have liked to go deeper. In actuality, (unlike the drawing) his floor has a step in it, following the uneven bedrock. The level of the bedrock also forced him to make his roof 6 inches lower than he planned. The entrance way is a box 2 feet square and centered on one of the long walls. It is made from 2X10 lumber with the hatch made of the same material and hinged to the entrance boards. A ladder descends to the floor of his cellar for easy entry and exit.

Construction: The floor consists of pressure treated 2x4s using the bedrock as a foundation. The 2x4s are spaced with gaps, to allow any spills to flow down into the bedrock. The walls are made of 3/4 inch plywood supported by 2X4's spaced on 9" centers. The bottom support beams (to the bedrock) are pressure treated 4x4s. The ceiling is supported again by 2X4s on 9 inch centers. The top is made from two layers of 1/2 inch plywood.

It was finished by waterproofing it with two layers of heavy duty landscaping plastic, staggered to overlap significantly. It was first wrapped around the sides, then draped over the top and down the sides. Finally, tarpaper was layered over the

top and down the sides to protect the plastic from any rocks during the backfilling operation which just about completed this little project except for relandscaping the area. Only a foot of dirt covers the roof. Initially two feet was planned for, but again, the unexpected bedrock altered these plans.

Before the roof went on, two 55 gallon water barrels were set in one end of the shelter. After construction was complete, buckets of preserved foods were stacked on the other side. Between the barrels of water and the buckets, a set of deep shelves was made opposite the ladder for other goods. Note that none of these items are shown in the drawing.

A final note: Even with only 1 foot of dirt, the builder is getting a maximum temperature of 70 degrees in his shelter on 95+ degree F days with the cellar area in the full sun. As this only lasts for four months out of the year, it will be cooler during the other seasons.

PLYWOOD SHELTER - 2

Ideally, one or a few of those Sea Box type-shipping containers would be great shelter design, but at US$4,000+ each, that's not within a lot of peoples grasp. Wood frames can withstand a great amount of wind, but they also have their limits.

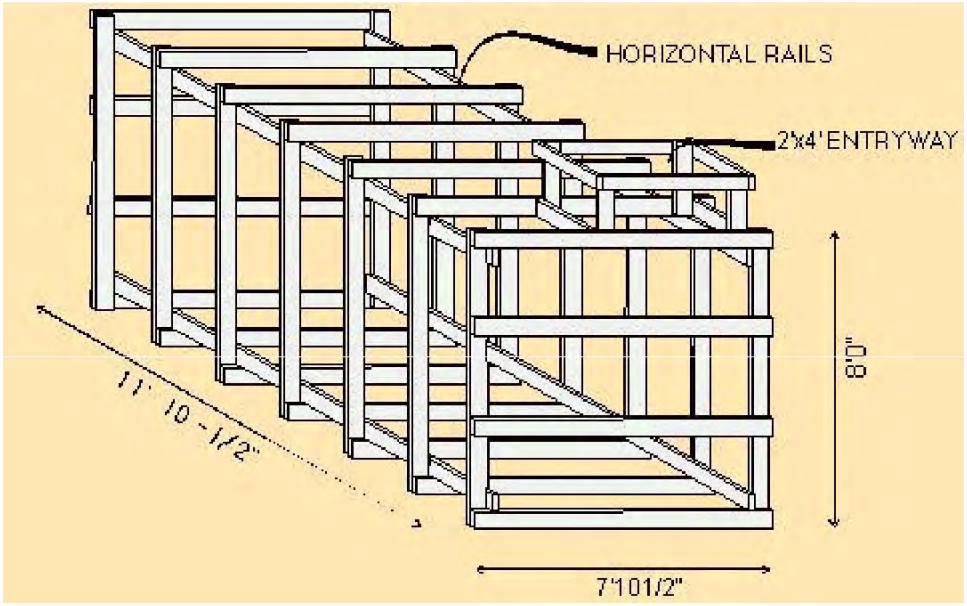
Here are plans for a simple box, that can be put, or more likely built in a hole. Properly covered, it will withstand a great deal of adverse conditions. Since money is by no means plentiful in our lives today, this is planned as simply as possible. Once decent shelter is achieved, comforts can bedded as the materials are acquired.

UNDERGROUND, WATERPROOF? WINDPROOF? EARTHQUAKE RESISTANT? SHELTER

Most of us are physically able to dig a hole by hand with a shovel, pick and pry bar. The hole has to be about twelve feet wide, by sixteen feet long. Depth is up to you. The deeper, obviously, the better. Save what dirt that comes out of the hole, as it can be used to cover your box. Based upon experience, in packed soil, with six-inch rock, a four feet deep hole took me four days of unforgettable hard labor. Many hands make for light work. GET HELP!!

The simplest waterproofing would be by using landscape plastic. Six mil would be the best. But if that's not available, the heaviest you can get is better than none. You are going to wrap the entire box in plastic, then fill in the hole around the box and cover it also. This is why deeper is better. Before you begin putting your frame together, line the hole with the plastic. You will be assembling the frame over the plastic, so be careful not to puncture it.

The box, as shown in Figure 1, is made up of five ribs, and two ends.



The box will be seven feet, ten and one half inches wide, eight feet tall, and eleven feet, ten and one half inches long. The shaft for the entryway is two feet wide by four feet long by two feet high.

MATERIALS

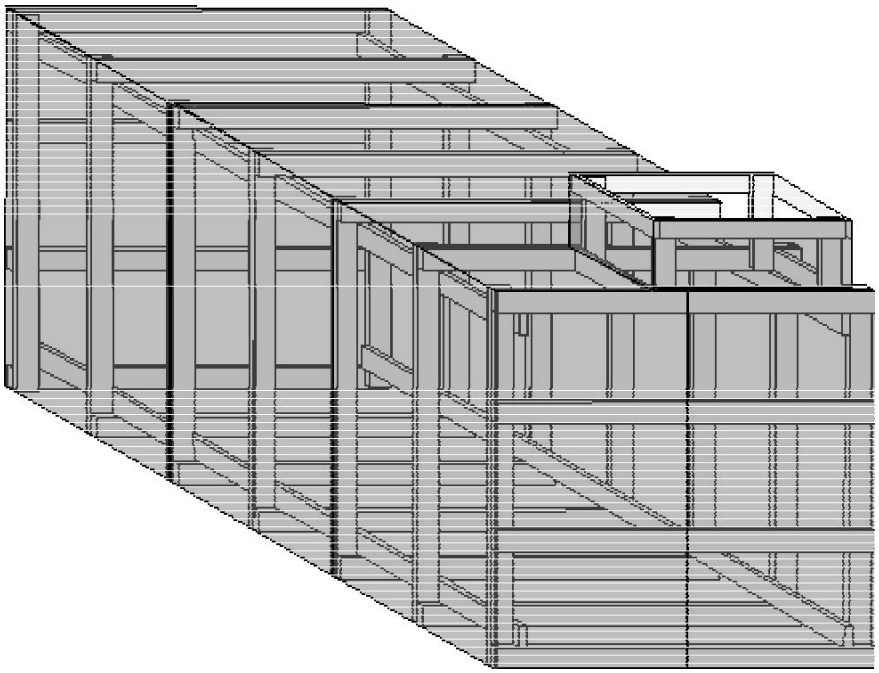
- 40 -- 2 x 6 - 8'
- 17 -- 4' x 8' x ?" Wafer Board (this is like particleboard, but with larger chunks of wood. It's cheap!!)

Materials should be around $500.00 for this project. This does not include the hardware to fasten this thing together. A roll of black, 6 mil plastic, 20 feet wide by one hundred feet long is $50.00. If plastic is not available, no reason why a lot of paint and caulk won't work just as good. Worse case scenario, and if nothing is available, don't cover it.

As far as fastening this thing together, if I have power available, I plan to use 3" deck screws to fasten the 2x6's together and 2" deck screws to attach the wafer board to the frame. If there is no power, then a good old hammer and nails will have to do. 10d cement coat box nails if possible, for everything. The problem with hammer and nails is that things tend to vibrate and loosen with such a frame. Have a good heavy brace on the other side of what you're nailing, like an eight-pound sledgehammer.

The horizontal members of the ribs and end pieces should be cut to seven feet, ten and one half inches long. All vertical members are to be eight feet. This allows for the overlap of the top panels over the side panels. See Figure 2 below.

Construct the ribs and ends, and using the horizontal rails, fasten the frame together. Everything must work in two feet increments, so the panels will match the frame. be as meticulous as you can in making the frame square. Everything will fit better, if you do. Remember that your panels are four feet wide, and must butt together in the center of the rib.



Oonce the frame is complete, your panels can be fastened to the frame. do one end first, then the sides, working from one end to the other.

Before you do the remaining end and the top, cut your floor panels to six feet, ten inches long, place them inside, and fasten them down. finish the remaining end.

You can now put the two whole top panels in place, and then cut the last panel to fit around the entryway. the last panel you have will be used to cover the access way chimney. I did this to help keep debris from falling inside. Make the hatch cover three inches bigger than the outside of the chimney, and frame it with the last 2x6. It will cover the hatch, and fastened down with hook and eyes, will provide some security.

The dimensions for the chimney are left out. just measure and cut to fit.

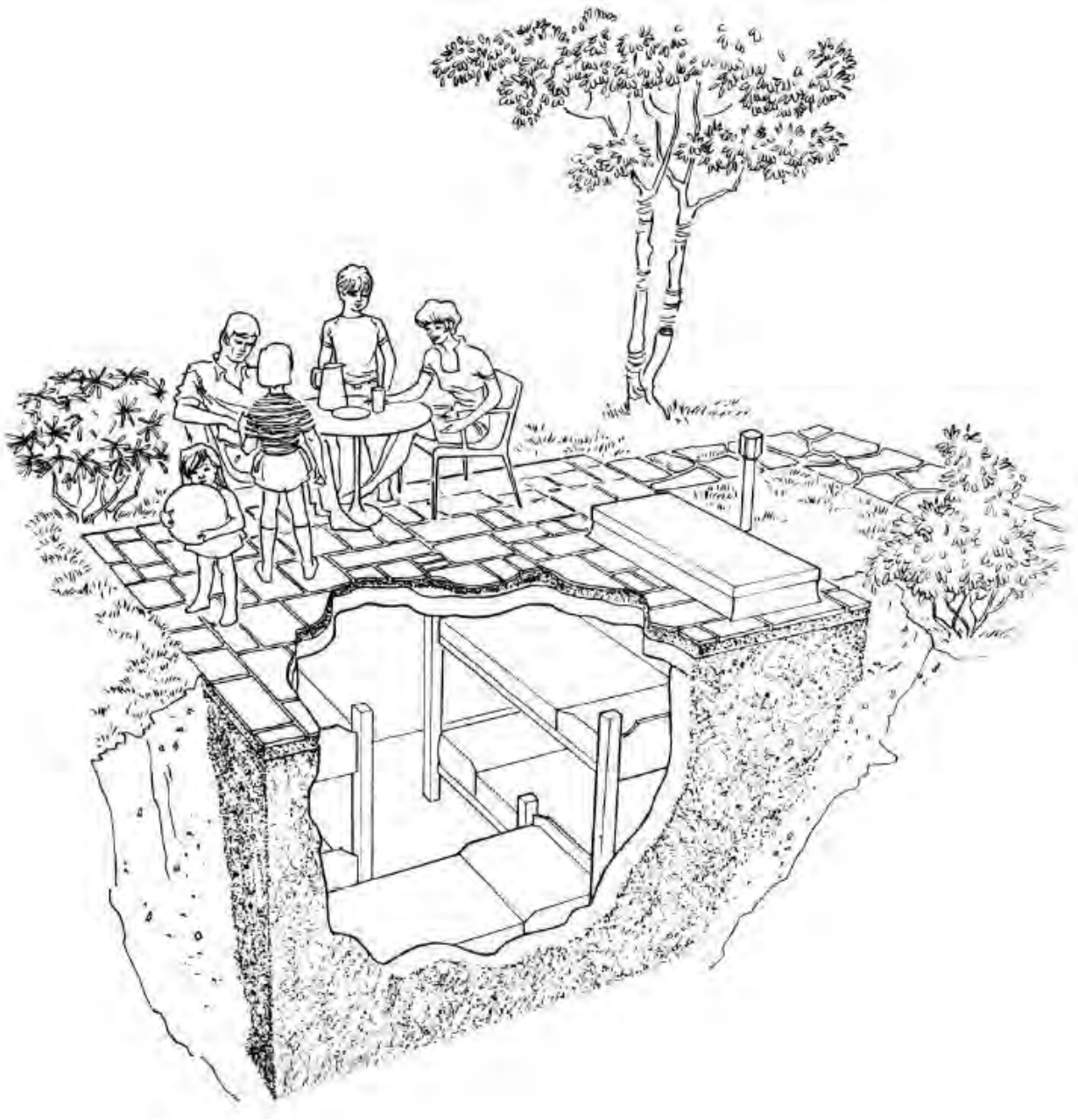
When you have reached this point, and have a ladder inside for access, finish wrapping the plastic around everything. back fill your dirt around the box and cover it about a foot and a half on top. pack it down as best you can so it won't blow away.

The inside can be finished with wood frame bunks for sleeping and storage. the exposed interior studs are easy to work with. whatever framework you may add inside, fasten it

as much as possible, to the sides, top and/or bottom. this will serve to reinforce the entire structure.

Since the entire box is covered in plastic, it won't breath very well. A lot of bodies generate moisture. With nowhere to evaporate, this will eventually become a problem in moister climates. The hatch ventilation may or may not be sufficient.

HOME SHELTER



GENERAL INFORMATION

This family fallout shelter, designed primarily for homes without basements, is a permanent home shelter to be placed in the yard. It is designed to have a protection factor of at least 40, which is the minimum standard of protection for public shelters throughout the United States. This assures that persons inside the shelter will be protected against radioactive fallout following a nuclear attack, and will also have some protection against blast and fire effect of nuclear explosions.

Following are detail drawings of the shelter, which is capable of housing six adults.

It can be built of poured reinforced concrete, precast concrete slabs, or a combination of concrete blocks and poured concrete. If it is built as detailed with the top near ground level, the roof slab can be used as an outdoor patio. T h e shelter is accessible by a hatch-door and wood stairway. Fresh air is provided by a hand-operated centrifugal blower and two ventilating pipes that extend above ground level. In areas where there is poor drainage or where the ground water table is close to the surface, the fourth modification on page 5 should be used.

Before starting to build the shelter, make certain that the plan conforms to the local building code. Obtain a building permit if required. If the shelter is to be built by a local contractor, engage a reliable firm that will do the work properly and offer protection from any liability or other claims arising from its construction.

GUIDE TO CONTRACTS AND SPECIFICATIONS

It is generally advisable to have a written contract with your contractor, as well as technical specifications to supplement the drawing. A widely used and convenient contract form for construction of this size is the AIA Document A 107, “Short Form For Small Construction Contract -Stipulated Sum, " which is available from the American Institute of Architects, 1785 Massachusetts Ave., Washington, D. C. 20036. It would be impractical to write a technical specification to suit every local condition; however, the following summary of generally accepted construction materials and practices should be a useful guide.

EXCAVATION

The excavation should have side slopes gradual enough to prevent caving, or appropriate shoring should be provided. Materials used for backfill and embankment should have debris, roots and large stones removed before placement. The subgrade for the floor slab should be level for ease in placing waterproofing membrane and to provide uniform bearing conditions for the structure. The area surrounding the patio should be sloped away at a minimum grade of 1 inch per 10 feet to provide good drainage.

This shelter will withstand overpressures of up to 5psi, and provides excellent protection from tornadoes.

CONCRETE

For details of concrete construction, the “Building Code Requirements for Reinforced Concrete/ (ACI 318 - 71)” should be followed. This publication can be obtained from the American Concrete Institute, Detroit, Michigan 48219.

WATERPROOFING

Waterproofing specifications may be obtained from the nearest FHA (Federal Housing Administration) office, or those of a reputable manufacturer of waterproofing materials may be used.

VENTILATION

The ventilation piping for the shelter should be installed in accordance with the practices outlined in the “National Plumbing Code (ASA A40.8 - Latest Edition). "

This publication may be secured from the American Society of Mechanical Engineers, New York, N.Y. 10018. All pipe and fittings shall be galvanized. Suitable ventilating blowers and roof ventilators are available from many sources of supply. Fabrication details and consequently the installation requirements will differ for equipment furnished by the various manufacturers. Positive-displacement blowers having both electric motor and geared hand-crank drives have been manufactured by:

Centaur Forge, Ltd.
P. 0. Box 239 117 N. Spring St.
Burlington, Wisconsin 53105

TEMET USA, Inc.
9417 Brian Jac Lane
Great Falls, VA 22066

Roof exhaust and supply ventilators are manufactured by:

Penn Ventilator Co.
Red Lion and Gantry Rd.
Philadelphia, PA 19115

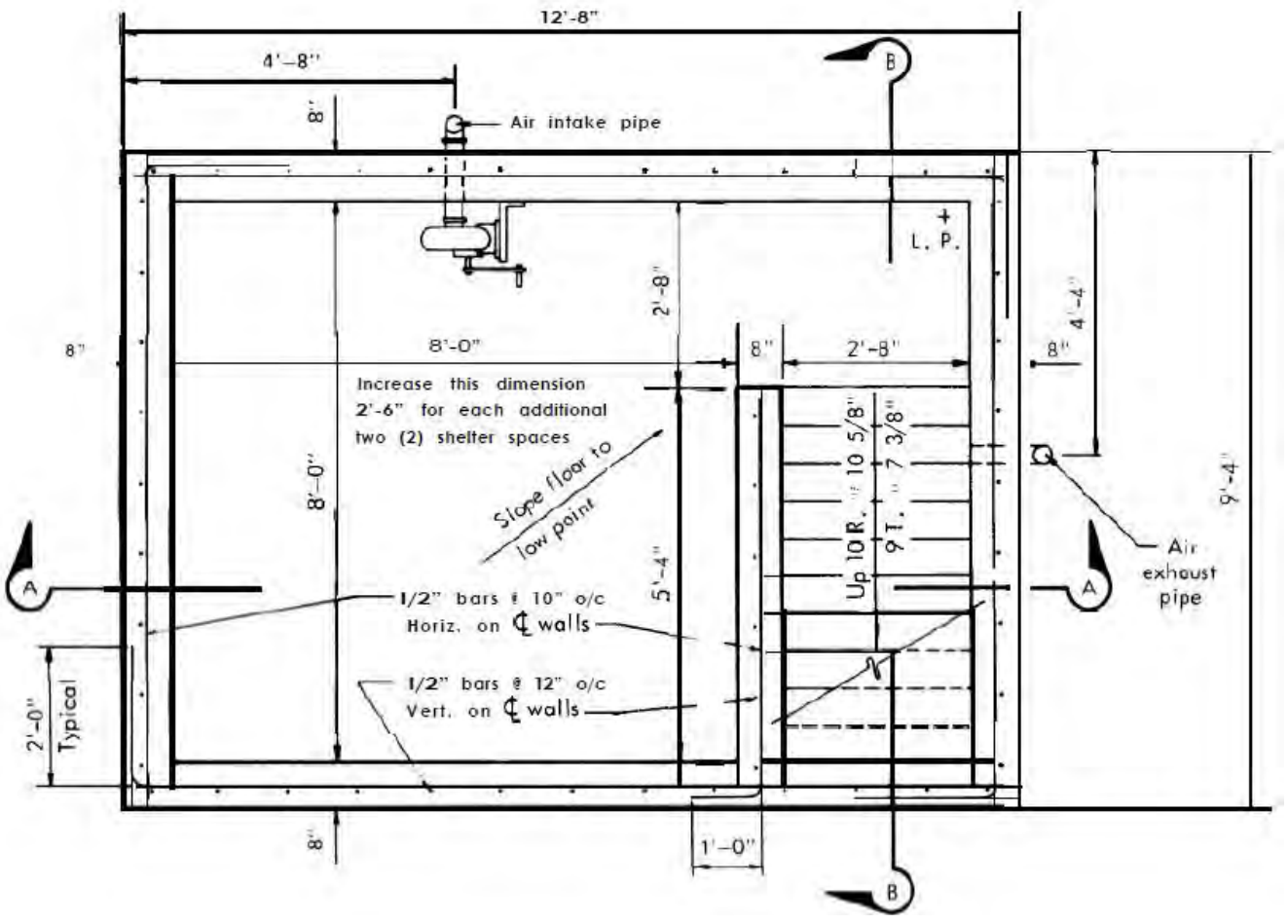
The names of specific manufacturers of equipment are given only as examples, and do not denote a preference for their products.

OPTIONS

To accommodate additional persons, increase the shelter length 2’-6” for each two (2) shelter spaces. Do not increase the 9’-4” width.

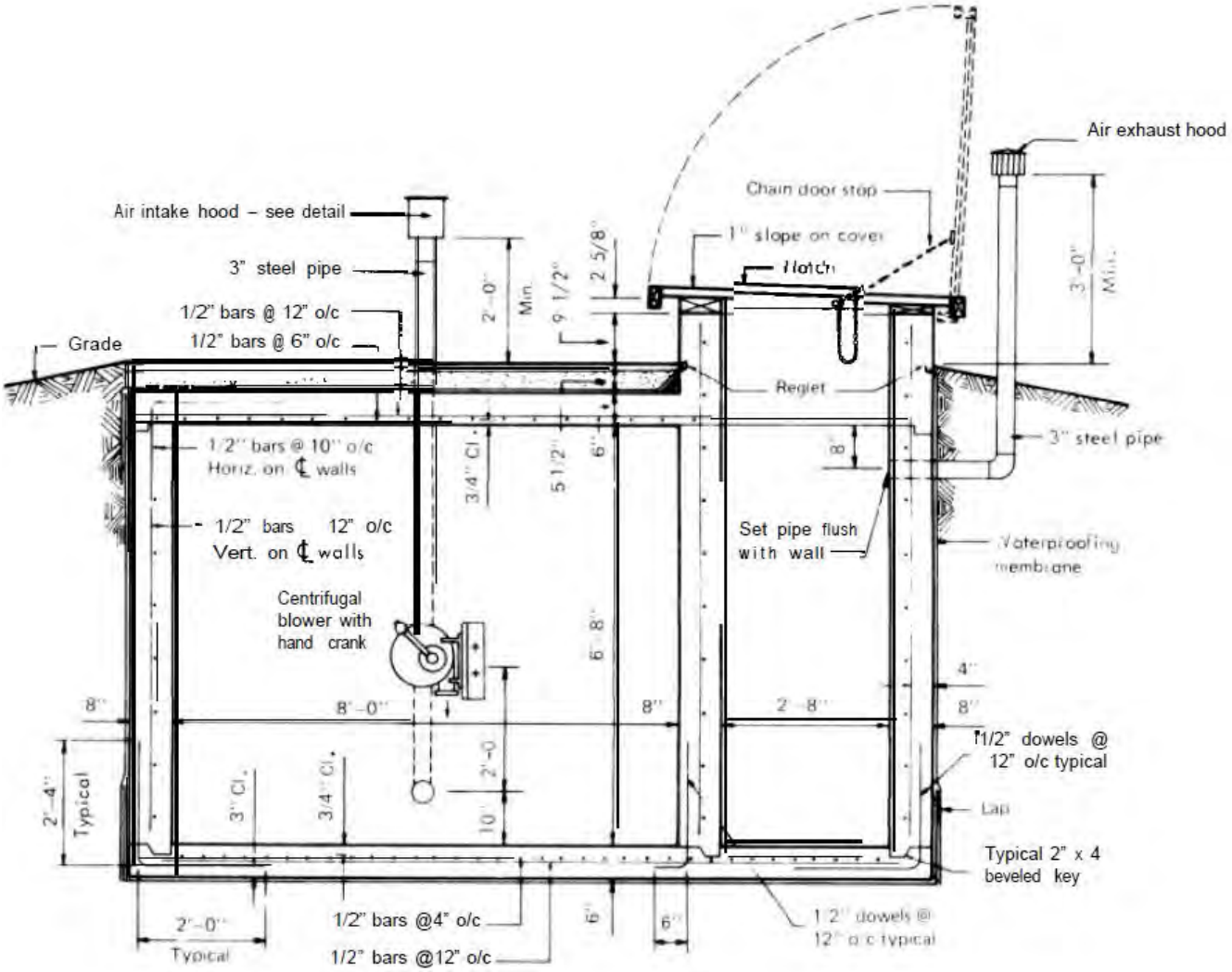
Electrical serv ice for lighting and outlets may be installed in the shelter from a separate residence circuit. A branch circuit breaker should be installed inside the shelter.
Additional lighting and outlets may be provided from this circuit’for the patio above.

An electric motor and pully may be installed to operate the centrifugal hand-crank blower by virtue of the electrical service option.

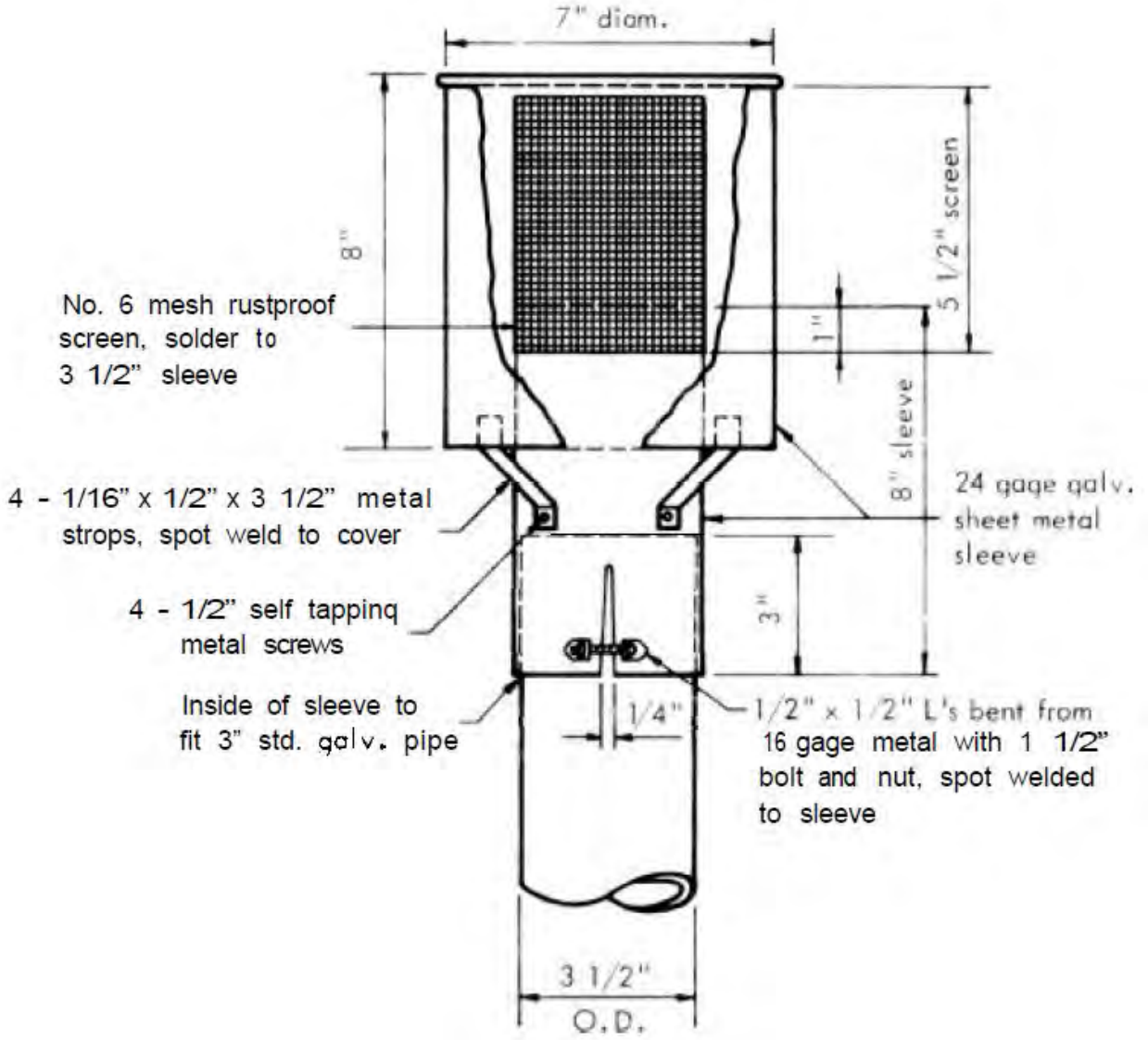


NOTES

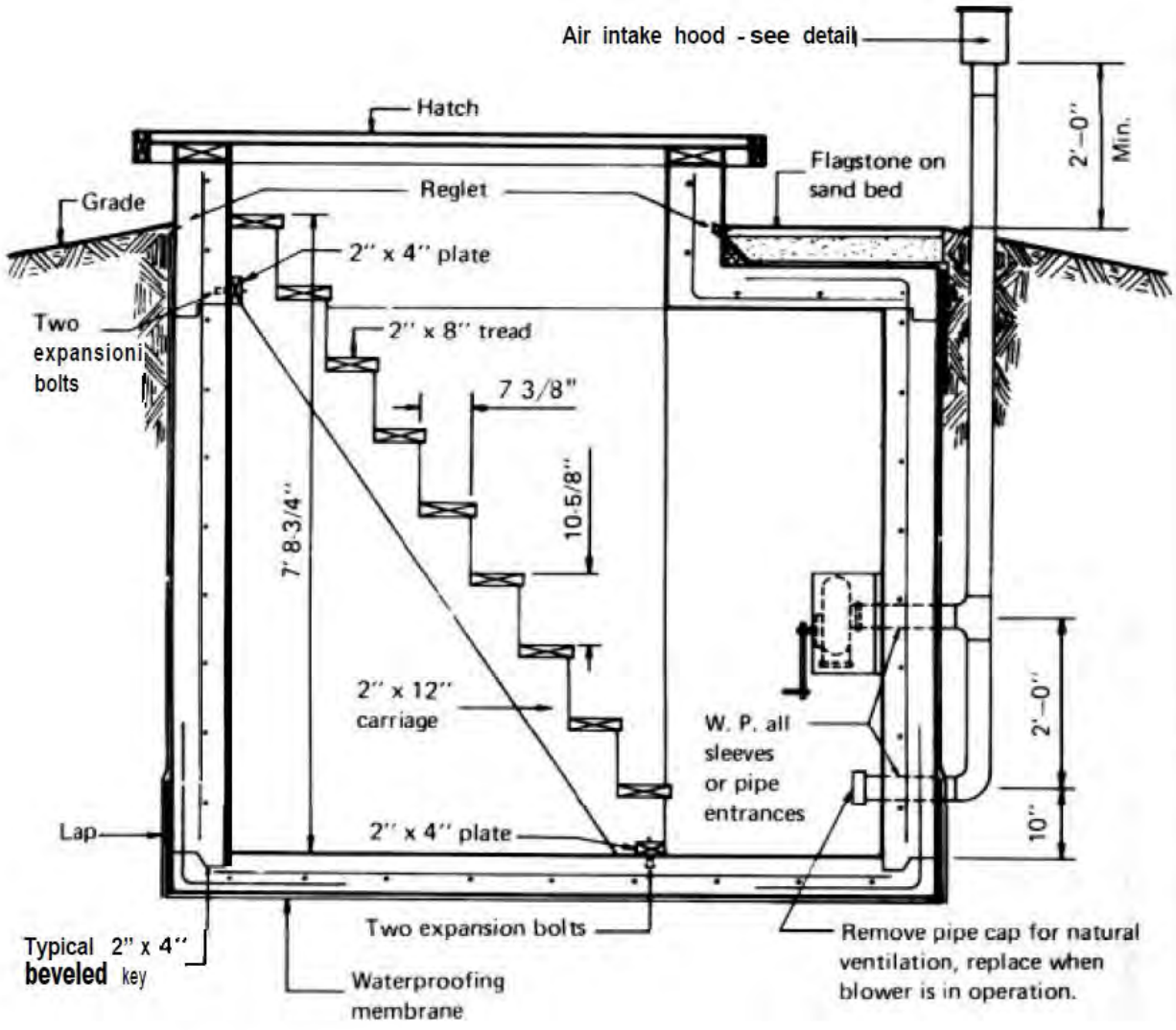
Exterior walls, roof slab and under floor slab shall be waterproofed with a 3-ply membrane waterproofing system. This provides a continuous blanket which seals the entire area of surface to be protected. The membrane shall be protected from backfill damage and when completing other stages of construction.
Place flagstone or bricks on a sand bed when using the roof slab as a patio.
There are a number of commercially produced metal roof hatches that will adequately serve as a shelter door. However, as long as the door is weatherproof and durable, a job-made, galvanized sheet metal covered wood door is suitable.
Bevel all exposed corners of concrete 3/4” at Structural design data:
Steel = 20,000 psi
Concrete = 2,500 psi
Soil (minimum) = 600 psf, to withstand downward pressure



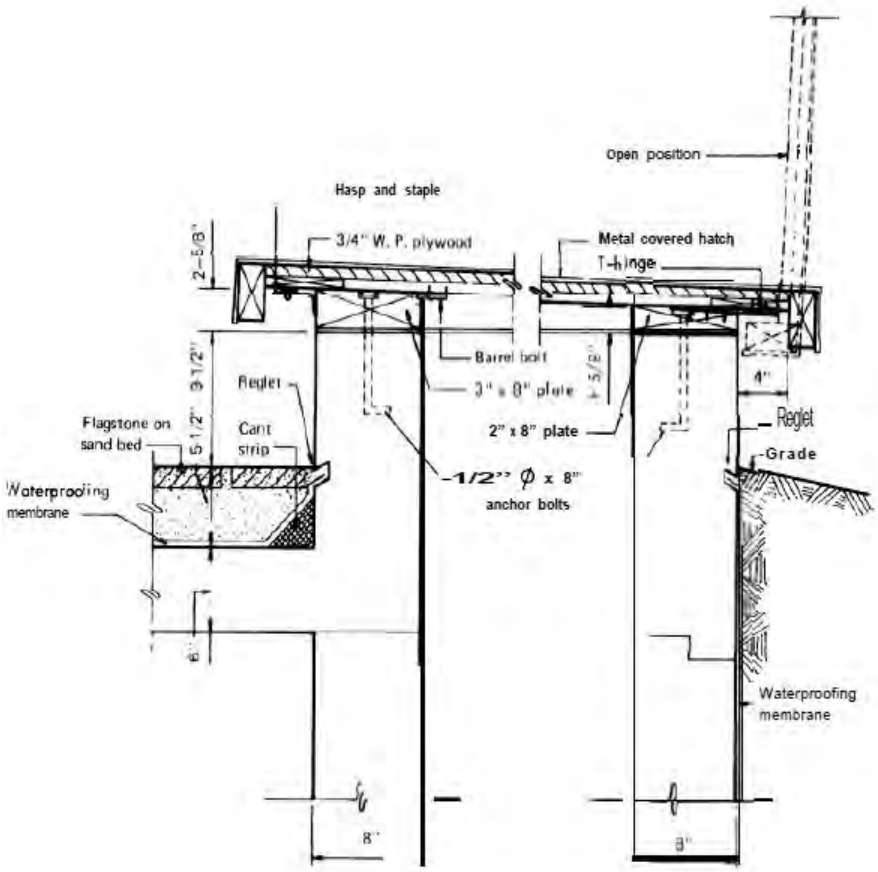
SECTION A- A



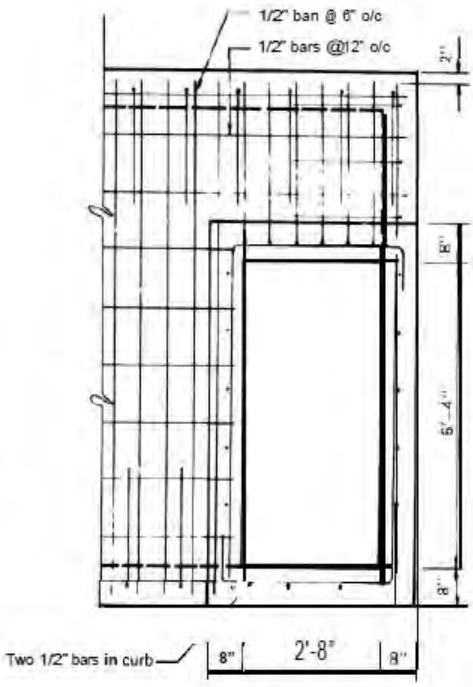
AIR INTAKE HOOD DETAIL


Air intake hood - see detail
Hatch
Flagstone on sand bed
2'-0" Min.
Grade
Reglet
2" x 4" plate
Two expansion bolts
2" x 8" tread
7 3/8"
10-5/8"
7' 8-3/4"
2" x 12" carriage
W. P. all sleeves or pipe entrances
2'-0"
10"
Lap
2" x 4" plate
Two expansion bolts
Remove pipe cap for natural ventilation, replace when blower is in operation.
Typical 2" x 4" beveled key
Waterproofing membrane

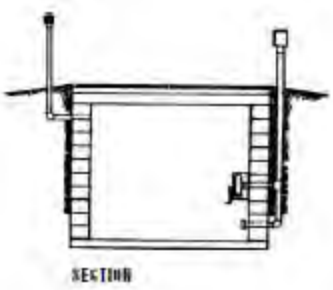
SECTION B-B

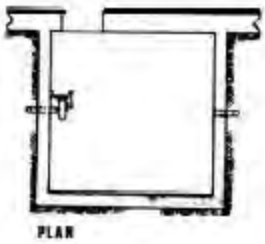


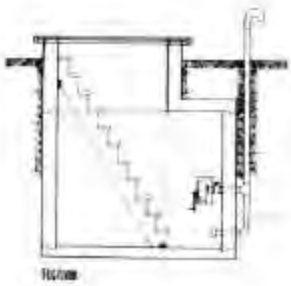
HATCH DETAIL

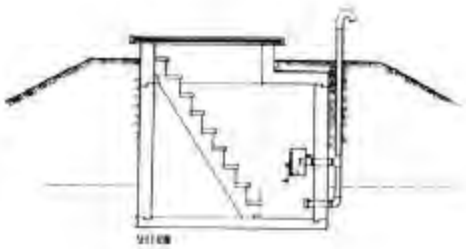


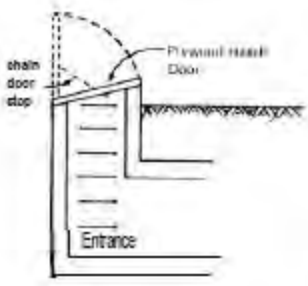
HATCH FRAMING











MODIFICATIONS

This first modification utilizes 12-inch concrete masonry units for walls instead of reinforced concrete. The floor, roof and entranceway are the same as in the basic shelter, and the amount of protection provided is essentially the same.

If a basement is available, the shelter may either be separate from it, or attached. In this modification, an attached shelter is entered through the basement of the house, thereby permitting dual use of the shelter space. Other advantages of this modification include flexibility of shape and design to conform to the house design and the use of the same kind of building materials as used in the construction of P L A N the house.

If the topography permits, the shelter can be built into a hillside or embankment. This modification increases the protection factor by the addition of an earth mound over the shelter. A maximum of 3 feet of earth cover is recommended.

The principal advantage of this shelter modification is that it can be erected with a minimum of excavation in locations where there is poor drainage or where the ground water table is close to the surface. However, the exposure of the shelter above ground requires the addition of earth mounding around all sides.

This shelter modification permits the chain design and construction of a shelter with door
stop a fairly small hatch entry. The iron rungs placed in the concrete wall will also
maximize the useable shelter area.

MATERIAL LIST

Item	Quantity
Concrete:*	
floor	60 cu. ft.
wal Is	235 cu. ft.
roof	50 cu. ft.
	345 cu. ft.
	Total 13 cu. yds.
Steel Reinforcing:	
floor	580 lin. ft.
wal Is	945 lin. ft.
roof	260 lin. ft.
	Total 1,785 lin. ft.
Miscellaneous:	
tie wire - 6" coils	2
hand blower w/mounting bracket	1
3" galv. steel pipe	16 lin. ft.
3" galv. ells	2
3" galv. tee	1
3" galv. cap	1
intake hood, w/screen	1
exhaust hood, w/screen	1
wood carriages, 2" x 12" x 10'	1
wood treads, 2" x 8" x 2'-8"	9
wood plates, 2" x 4" x 2'-8"	2
hatch door, metal covered	1
wood plate, 2" x 8" x 7'	1
wood plate, 3" x 8" x 14'	1
T-hinges, 8" x E. H., galv.	3
hasp and staple, galv.	1
chain door stop, galv.	1
anchor bolts, 1/2" x 8"	8
expansion shields and bolts, 3/8" x 4"	4
waterproofing membrane	715 sq. ft.
flagstone	100 sq. ft.
sand	1.5 cu. yds.
cant strip	12 lin. ft.

*Form work not included.