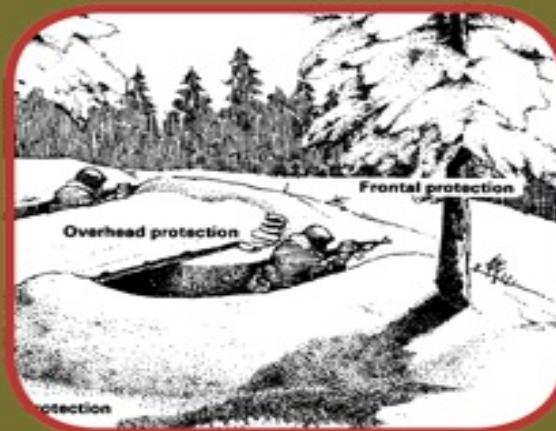
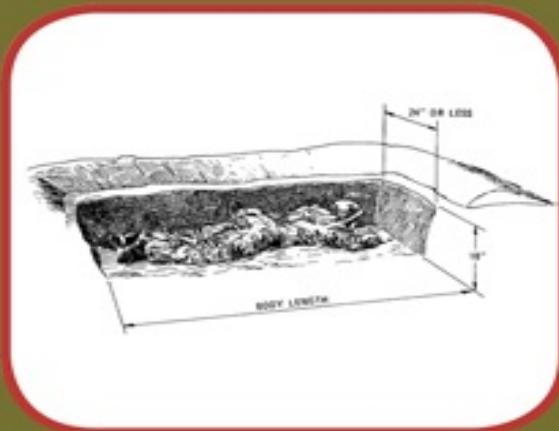
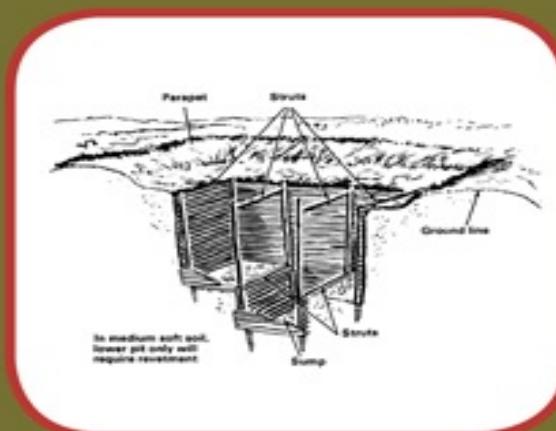
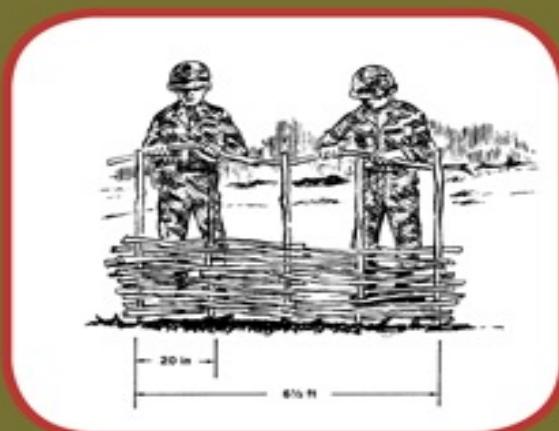


# U.S. ARMY SURVIVAL SERIES

## THE COMPLETE GUIDE TO SHELTER SKILLS, TACTICS, AND TECHNIQUES



**BUILDING SHELTERS IN ANY ENVIRONMENT • LEAN-TOS, PITS,  
BUNKERS, AND MORE • SURVIVING NUCLEAR BLASTS • PLANNING  
POSITIONS FOR COMBAT • DETAILED CONSTRUCTION DIAGRAMS**

DEPARTMENT OF THE ARMY • EDITED BY JAY MCCULLOUGH

U.S. Army Survival Series

The Complete Guide to  
**Shelter**  
Skills, Tactics, and Techniques

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The Complete Guide to  
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Edited by  
Jay McCullough



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# Foreword

Survival is in many ways a matter of degree. An individual or group of people can survive the scarcity, or even complete removal, of many life-critical necessities, for a short time. But the more drastic the circumstances, over time, the chances for survival go down until the bitter end.

Shelter is critical to survival for a number of reasons. In acute circumstances, it can provide concealment, or effective protection from small-arms fire and explosives. Over the long run, it can augment survival probability by protecting against the loss of body heat, wind chill, bone-chilling precipitation and dew, the unrelenting rays of the sun, and by providing a comfortable place to sleep. Without effective shelter, a person is subject to radiant heat loss, convective wind chill, bullets, the discomfort and additional conductive heat loss from being wet, detection, sunburn, hunger from exposure, and to being harried by loss of life-sustaining sleep. Drip by drip, the chances for survival go down: survival, a matter of degrees.

In *The Complete Guide to U.S. Army Shelter Skills, Tactics, and Techniques*, we have a variety of U.S. Army-inspired shelter examples, from the most rudimentary and easily-constructed lean-to, to foxholes and Führerbunkers. In my estimation, the simplest examples are timeless and are the most useful to the outdoor sportsman or lost hiker. One would be well-advised to commit these to memory. Foxholes, trenches, and makeshift protection from bombs may also prove useful in unusual circumstances.

At the date of this writing, for a North American audience, it may seem to most readers that the construction of a Maginot Line-style defensive structure for a Mad Max-style hellscape would seem wholly unnecessary. Or, that if you need to build a bombproof bunker, a bug-out and rapid redeployment strategy may increase the odds of survival. But different readers have different necessities, and necessities for large populations can change with time. The especially vicious drug war in Mexico has driven many people to a bunker mentality; narcotraffickers, law enforcement, and innocent bystanders alike. It is not inconceivable that in an escalating bid for dominance—survivalevence—violence and social disorder of that type may eventually spill across the border. Reading the headlines, it is similarly conceivable that a financial disruption, or food or

energy scarcity, or world events could drastically change our outlook. Laugh as we may at the nuclear bomb shelters of the 1950s, the armaments still remain. And recall that as recently as the 1940s, many Londoners relied on backyard bomb shelters during the blitz. The ordinary citizens of the 1930s could be forgiven for building backyard bomb shelters, when contemplating the folly of their betters leading up to World War II.

Despite this, some facts, as I see them, appear to be irrefutable for the foreseeable future. A thermonuclear world war does not appear to me to be survivable, or worth surviving. And preparing for an all-out assault, for any reason, against law enforcement or the military, is sure to be a losing proposition. The best and wisest shelter in such circumstances, would to be a dependable and tolerant neighbor, an advocate for justice, and to eschew war.

—JAY McCULLOUGH

NORTH HAVEN, CONNECTICUT

FEBRUARY 2016

# **Introduction**

A shelter can protect you from the sun, insects, wind, rain, snow, hot or cold temperatures, and enemy observation. It can give you a feeling of well-being. It can help you maintain your will to survive. In some areas, your need for shelter may take precedence over your need for food and possibly even your need for water. For example, prolonged exposure to cold can cause excessive fatigue and weakness (exhaustion). An exhausted person may develop a “passive” outlook, thereby losing the will to survive. The most common error in making a shelter is to make it too large. A shelter must be large enough to protect you. It must also be small enough to contain your body heat, especially in cold climates.

## **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.

You must also remember the problems that could arise in your environment. For instance—

- 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.

## TYPES OF SHELTERS

When looking for a shelter site, keep in mind the type of shelter (protection) you need. However, you must also consider— • How much time and effort you need to build the shelter.

- If the shelter will adequately protect you from the elements (sun, wind, rain, snow).
- If you have the tools to build it. If not, can you make improvised tools?
- If you have the type and amount of materials needed to build it.

To answer these questions, you need to know how to make various types of shelters and what materials you need to make them.

### Poncho Lean-To

It takes only a short time and minimal equipment to build this lean-to ([Figure I-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.

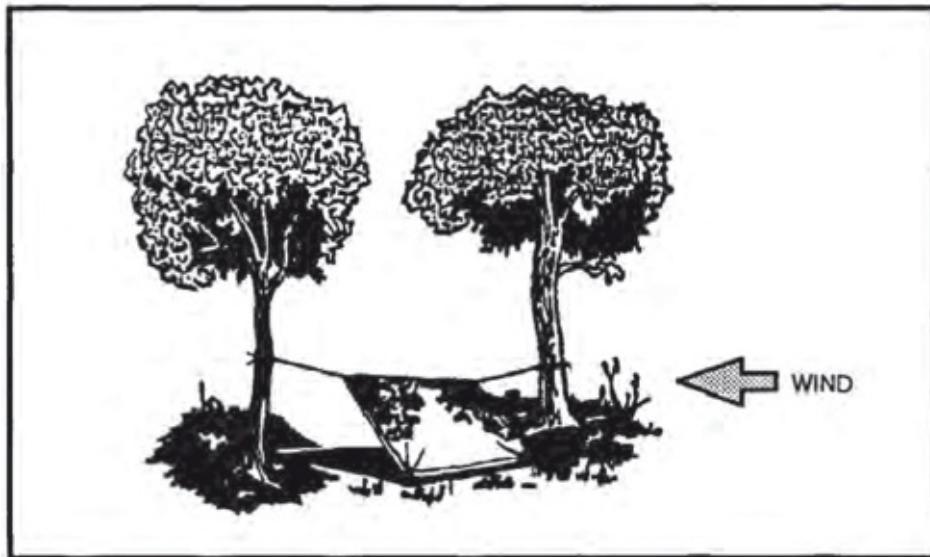


Figure I-1: Poncho lean-to

To make the lean-to—

- Tie off the hood of the poncho. Pull the drawstring tight, roll the hood long ways, 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.

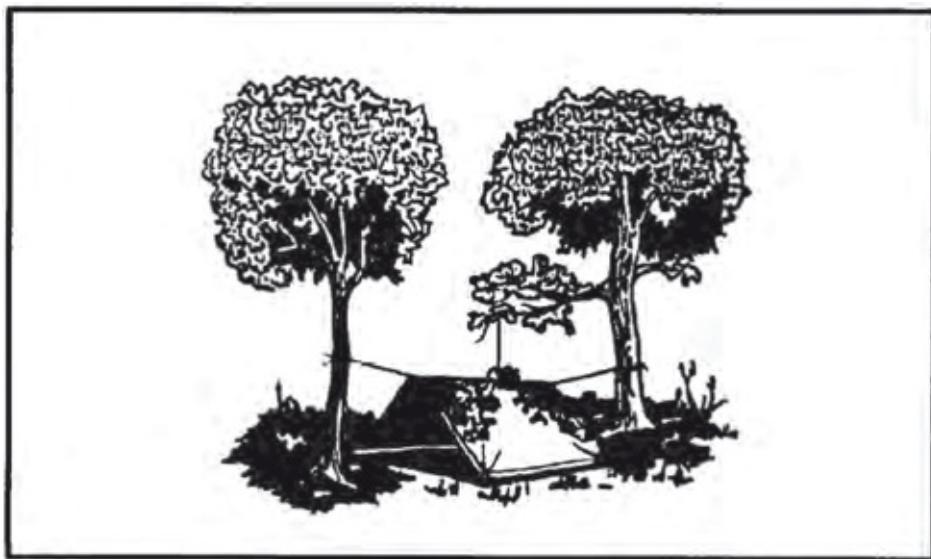
To reduce heat loss to the ground, place some type of insulating material, such as leaves or pine needles, inside your lean-to.

*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 I-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 I-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

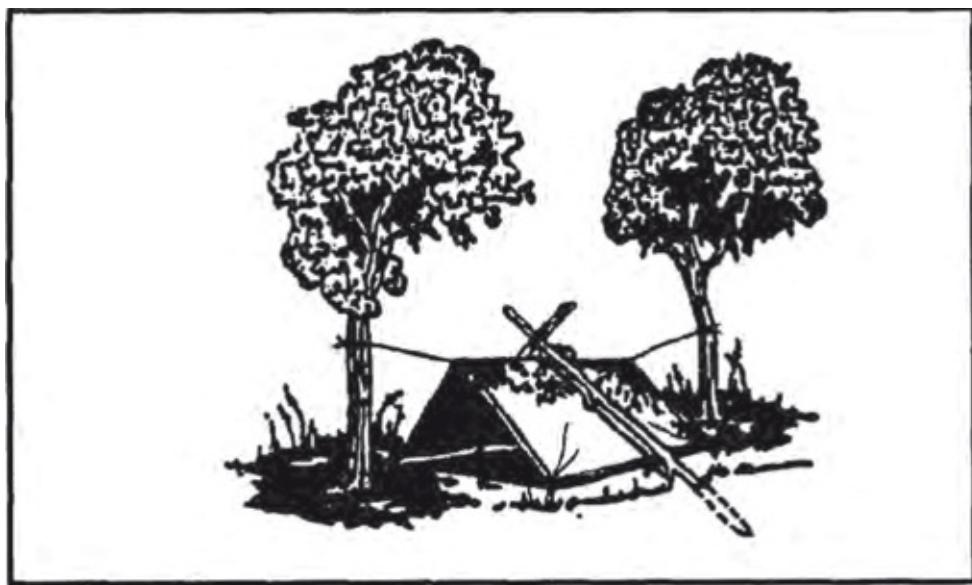
sharpened sticks through the grommets.

- 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 I-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.

### 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.



**Figure I-3. Poncho tent with A-frame**

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 I-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.

### **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.

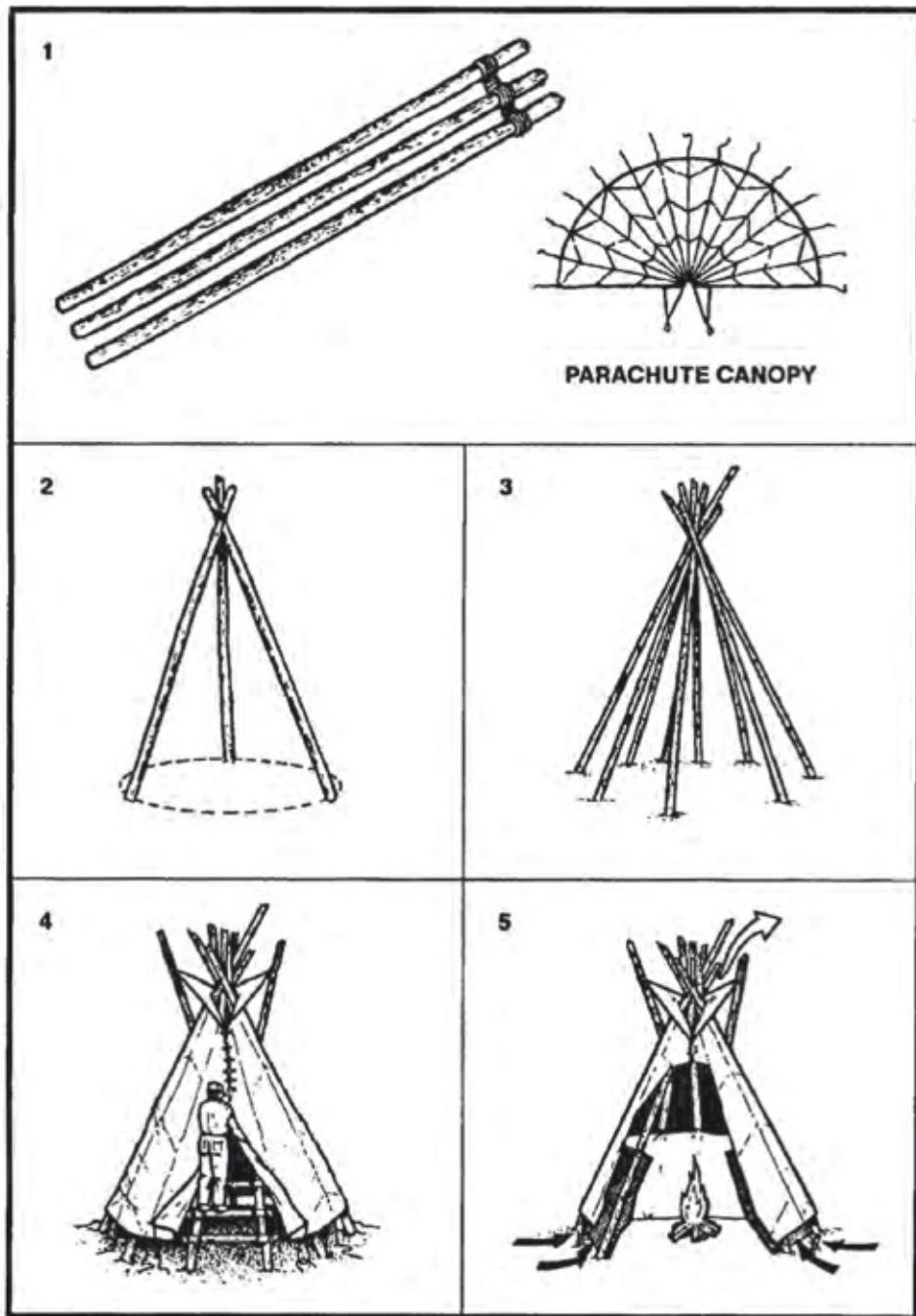
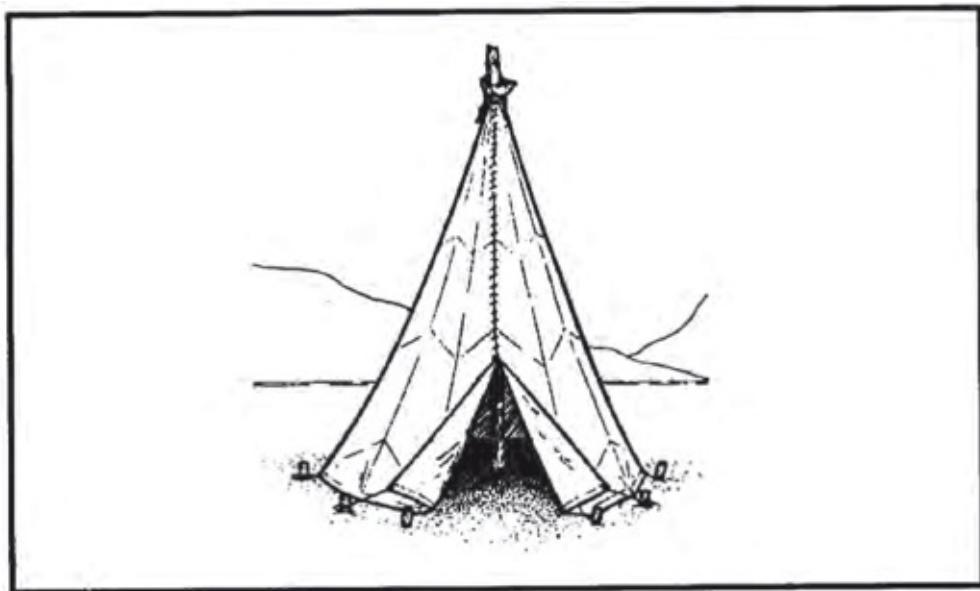


Figure I-4. Three-pole parachute tepee

To make this tepee ([Figure I-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 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 I-5. One-pole parachute tepee**

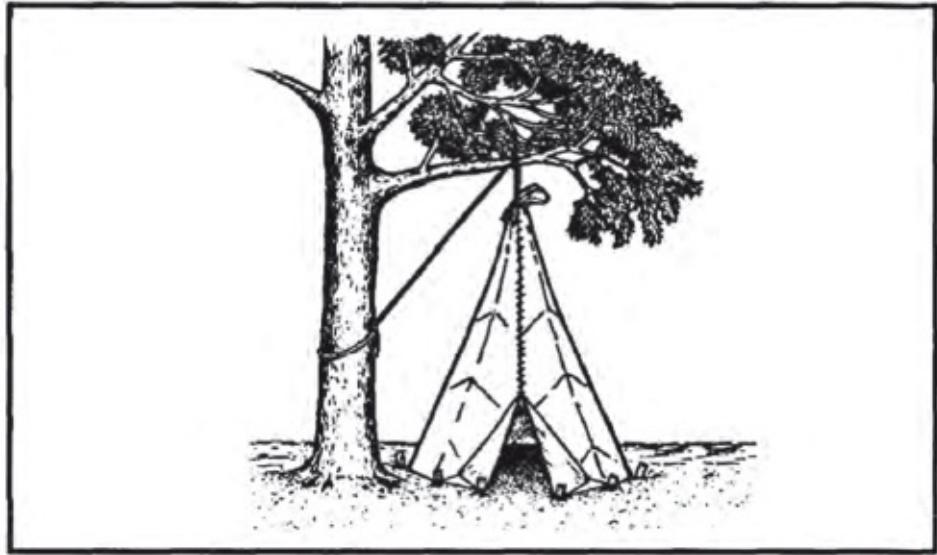


Figure I-6. No-pole parachute tepee

### 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 I-6](#))—

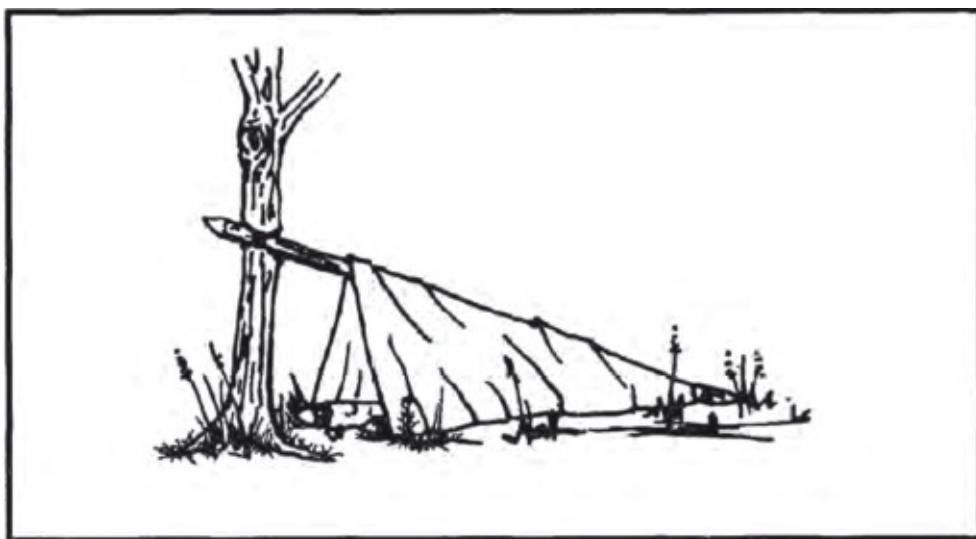
- Tie a line to the top of parachute material with a previously cut suspension line.
- Throw the line over a tree limb, and tie it to the tree trunk.
- Starting at the opposite side from the door, emplace a stake on the scribed 3.5-to 4.3-meter circle.
- Tie the first line on the lower lateral band.
- 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.

### 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 I-7](#))—

- Secure the 4.5-meter pole to the tree at about waist height.



**Figure I-7. One-man shelter**

- 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.
- 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 I-8](#)).

### **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 I-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.

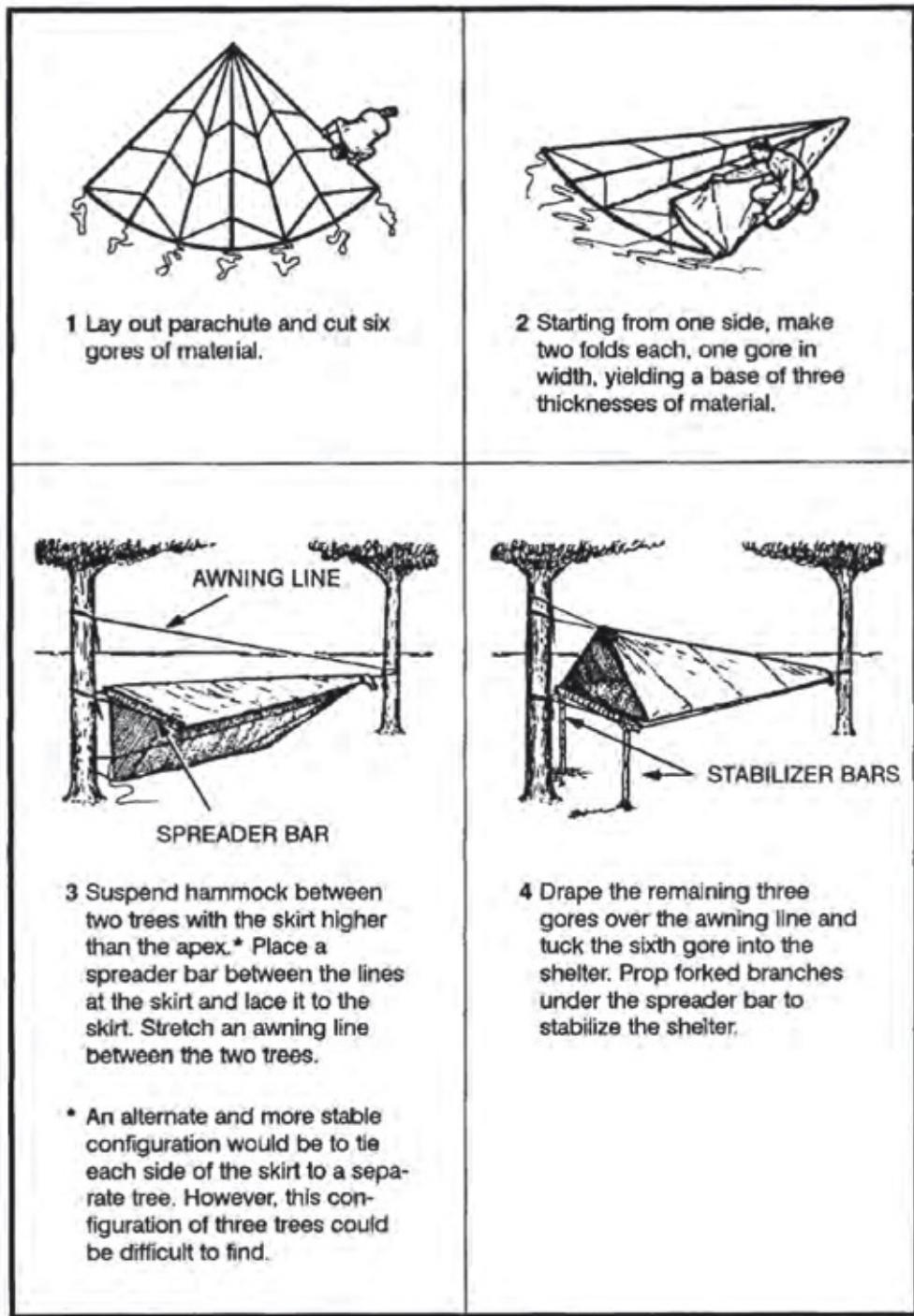


Figure I-8: Parachute hammock

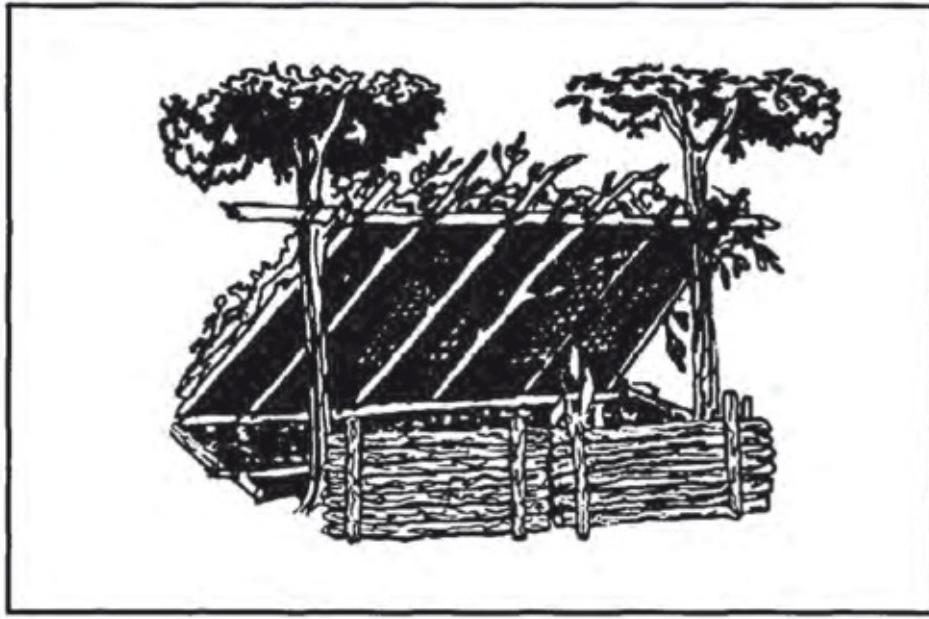
You will need two trees (or upright poles) about 2 meters apart; one pole about 2 meters long and 2.5 centimeters in diameter; five to eight poles about 3 meters long and 2.5 centimeters in diameter for beams; cord or vines for securing the horizontal support to the trees; and other poles, saplings,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

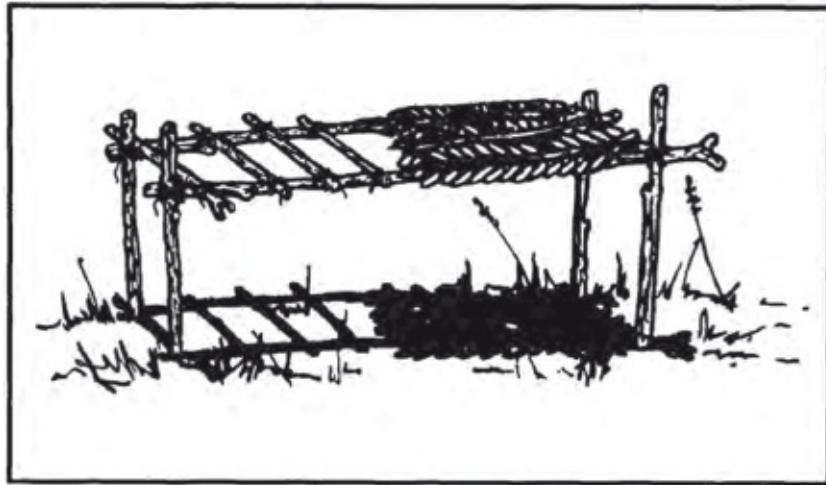


**Figure I-9. Field-expedient lean-to and fire reflector Swamp Bed**

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

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.



**Figure I-10: Swamp bed**

- Build a fire pad by laying clay, silt, or mud on one corner 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 I-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.

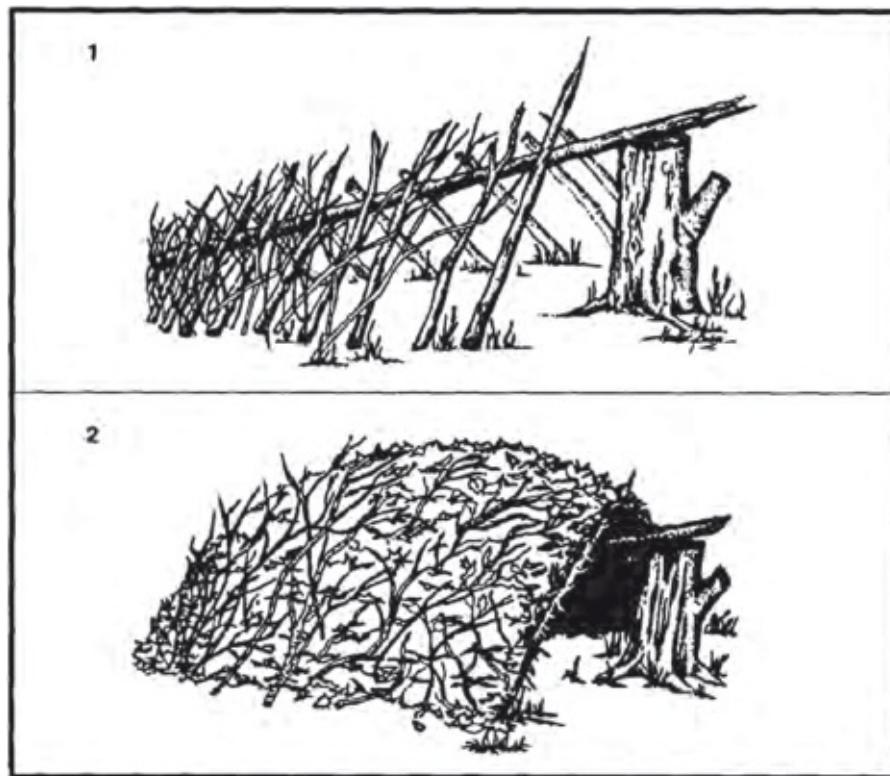


Figure I-11: Debris hut

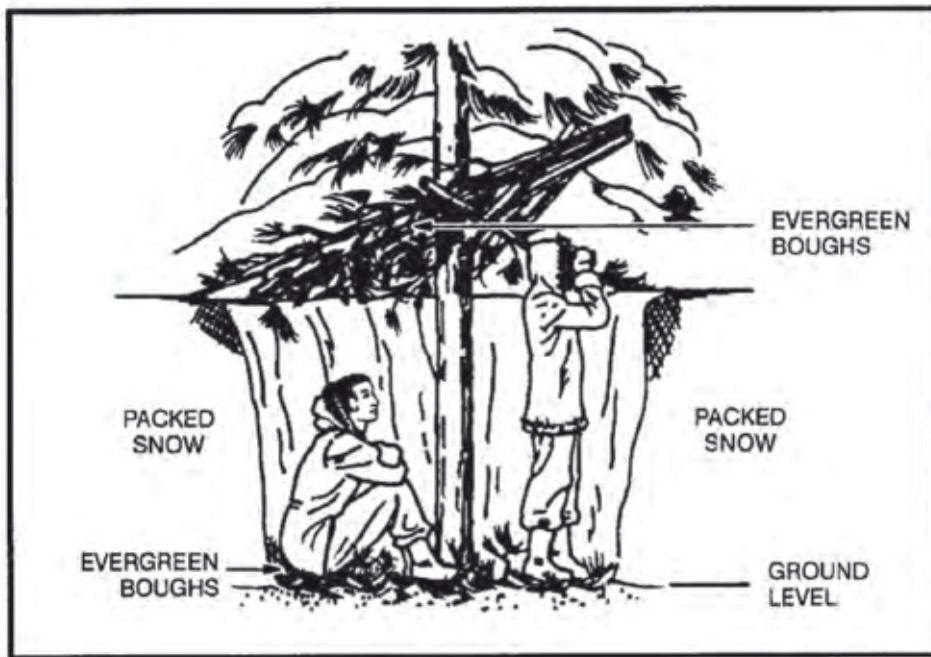
- Add light, dry, if possible, soft debris over the ribbing until the insulating material is at least 1 meter thick—the thicker the better.
- Place a 30-centimeter layer of insulating material inside the shelter.
- At the entrance, pile insulating material that you can drag to you once inside the shelter 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.

## **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 I-12](#)).

To make this shelter—

- Find a tree with bushy branches that provides overhead cover.



**Figure I-12: Tree-pit snow shelter**

- 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 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.

See [Chapter 3](#) for other arctic or cold weather shelters.

## **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 I-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.



**Figure I-13: Beach shade shelter**

- 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.

## 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.

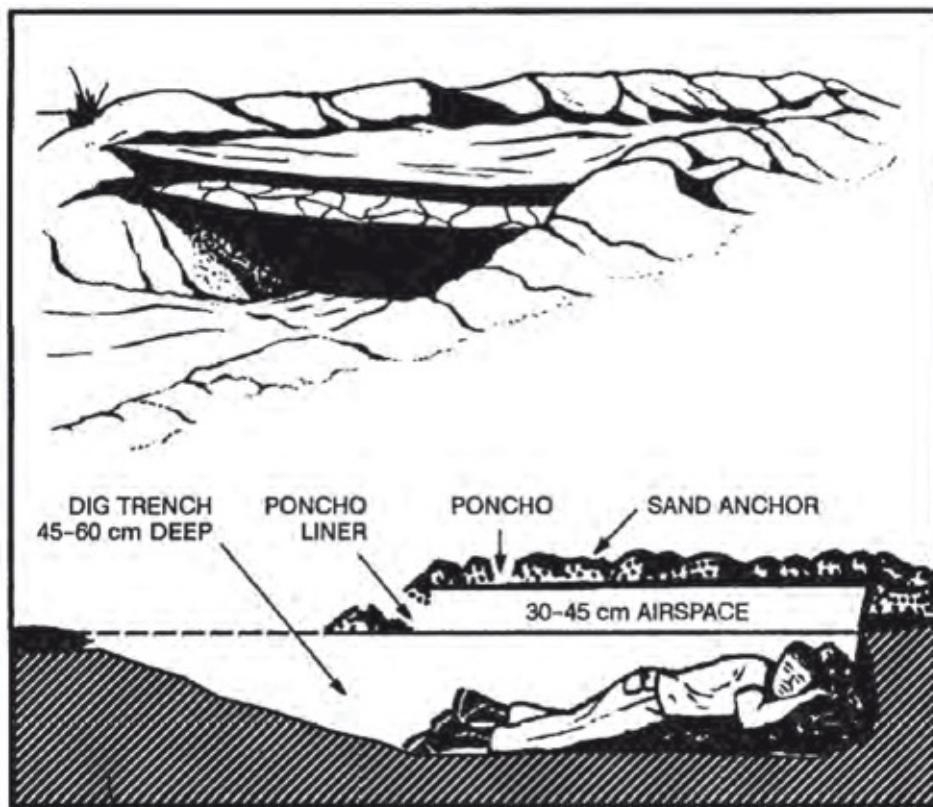
- Extend and anchor the other end of the poncho so it provides the best possible shade.

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 I-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.



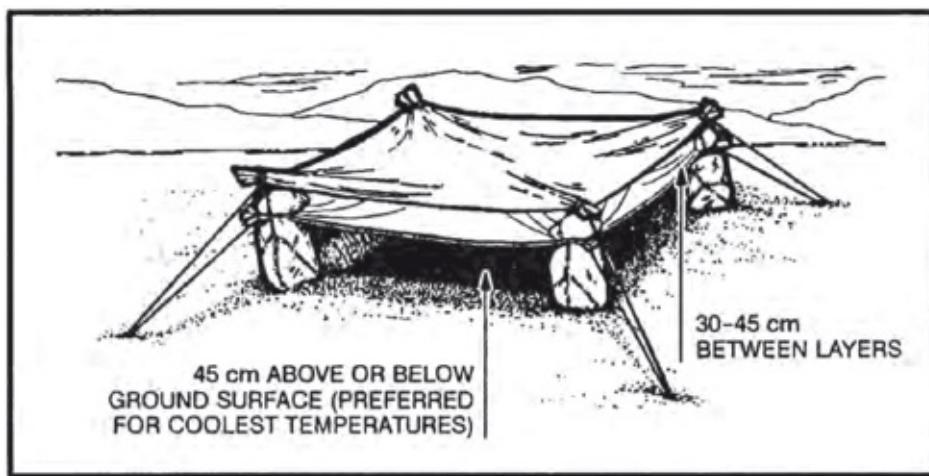
**Figure I-14: Belowground desert shelter**

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 I-15](#)). White is the best color to reflect heat; the innermost layer should be of darker material.

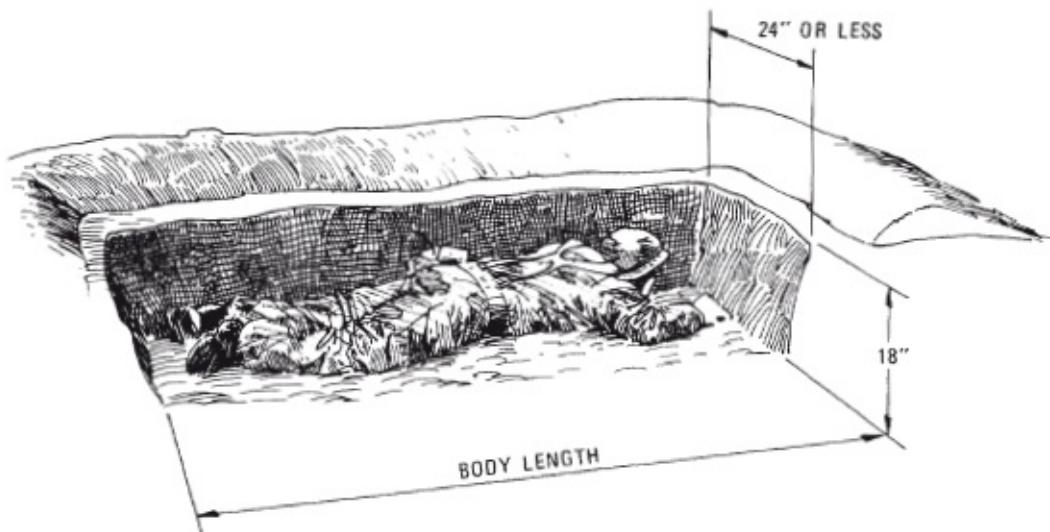
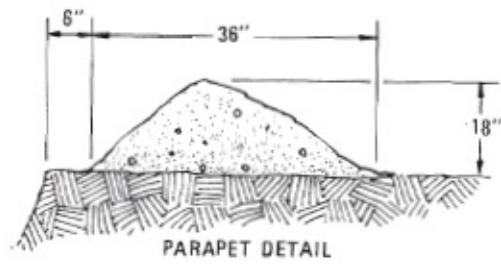


**Figure I-15: Open desert shelter**

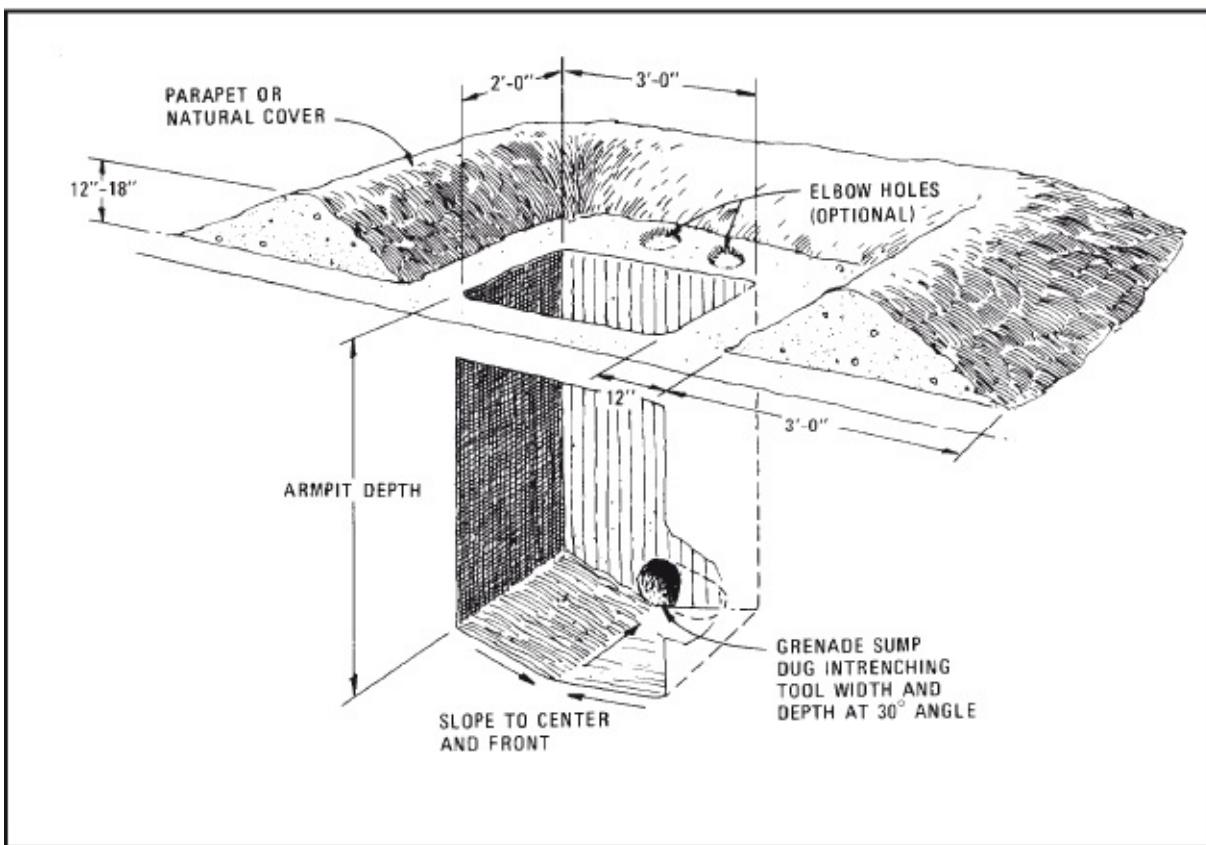
# CHAPTER 4

## Position Design Details

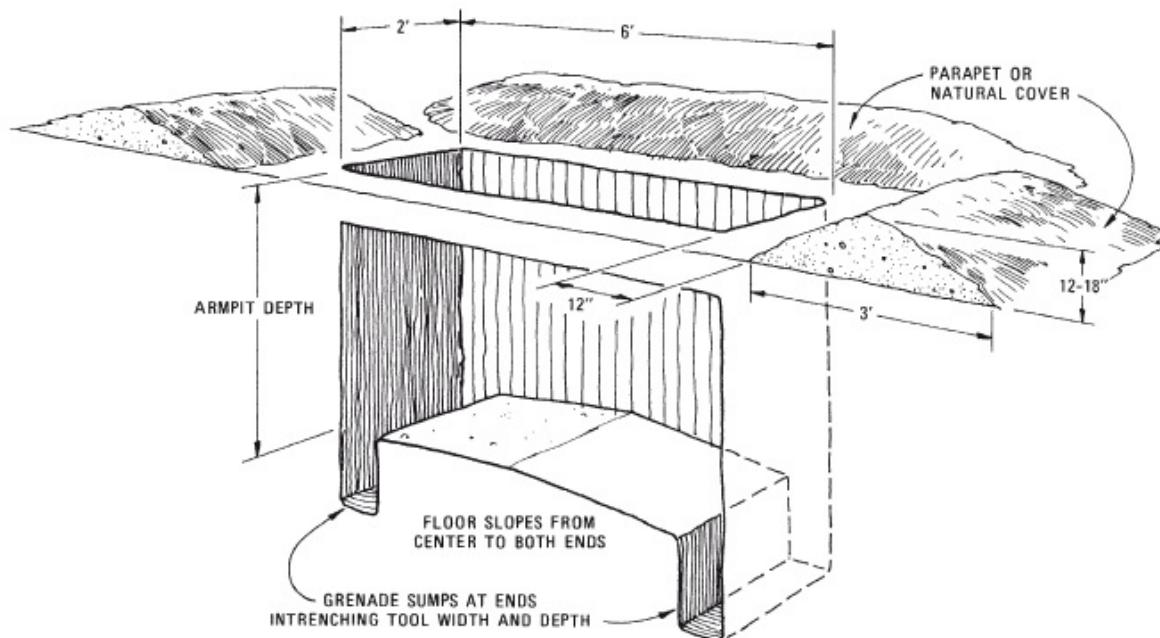
PRONE POSITION (HASTY)



## ONE-SOLDIER POSITION (DELIBERATE)



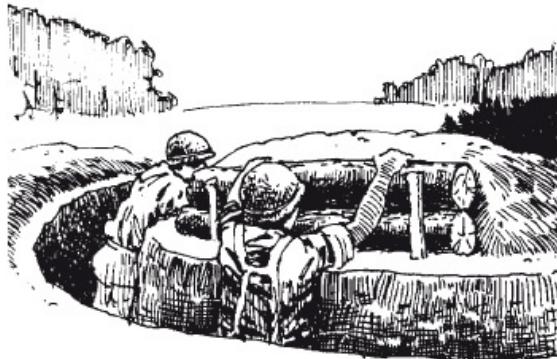
**TWO-SOLDIER POSITION (DELIBERATE)**



## ONE- OR TWO-SOLDIER POSITION WITH OVERHEAD COVER (DELIBERATE)

### FRONT SUPPORT

The front supports are high enough so men can shoot from beneath the overhead cover when it is completed.



### REAR SUPPORT



### CONSTRUCTING ROOF

The roof is made of logs 4"-6" in diameter placed side by side across the supports.



### WATERPROOFING

A water-repellant layer, such as waterproof packing material, plastic membrane, or a poncho, is then laid over the logs.

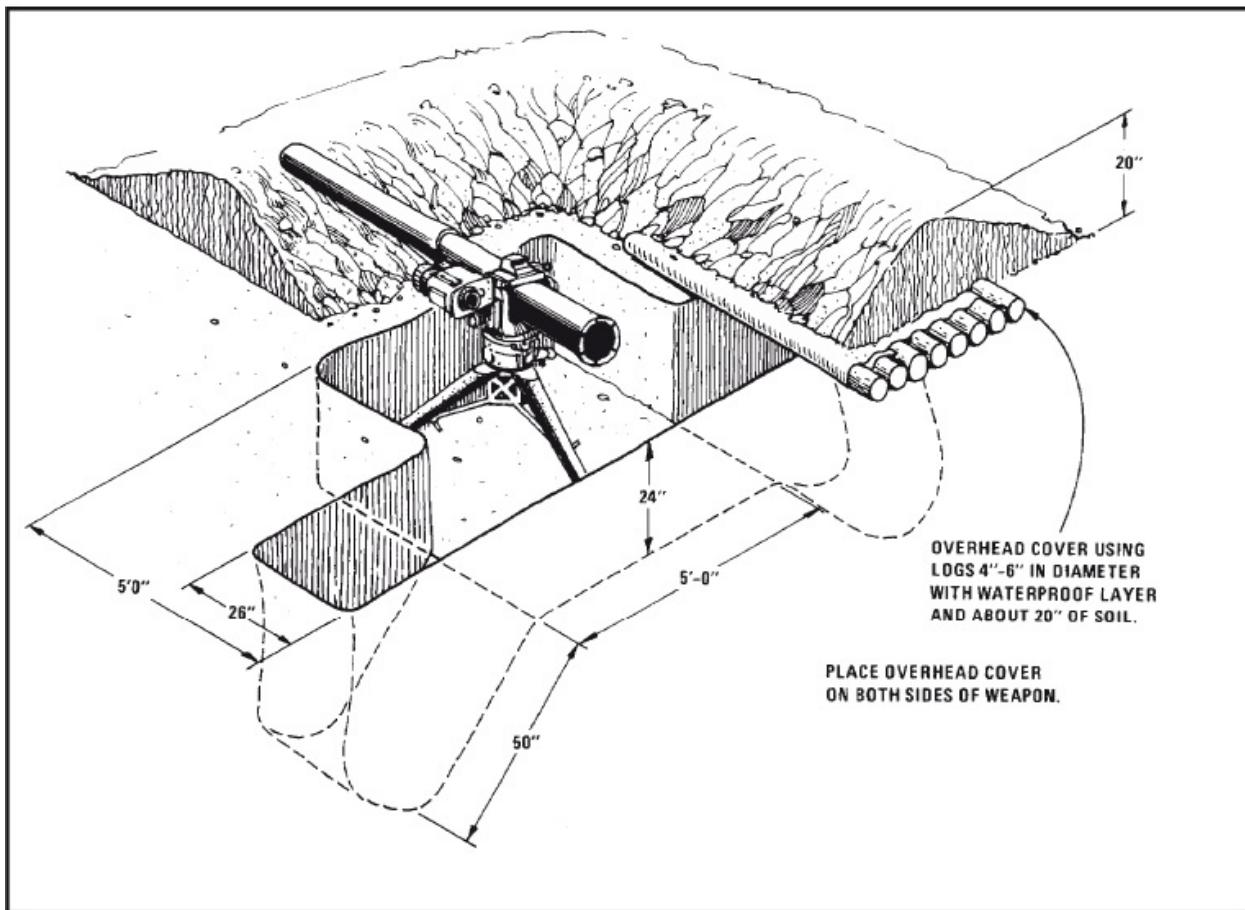


### CAMOUFLAGE OVERHEAD COVER

18"-20" of dirt is added and molded to blend with the slope of the terrain.



## DISMOUNTED TOW POSITION



## MACHINE GUN POSITION



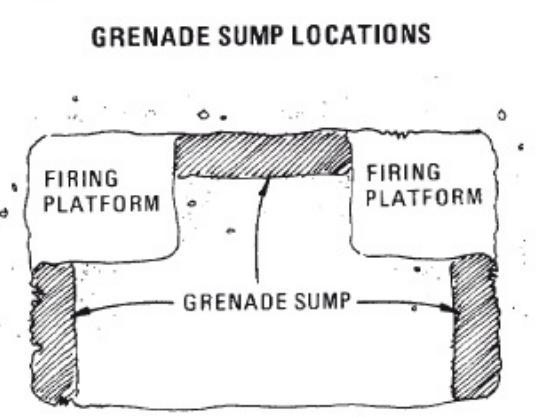
MARKING THE POSITION OF THE TRIPOD LEGS AND THE LIMITS OF THE SECTORS OF FIRE



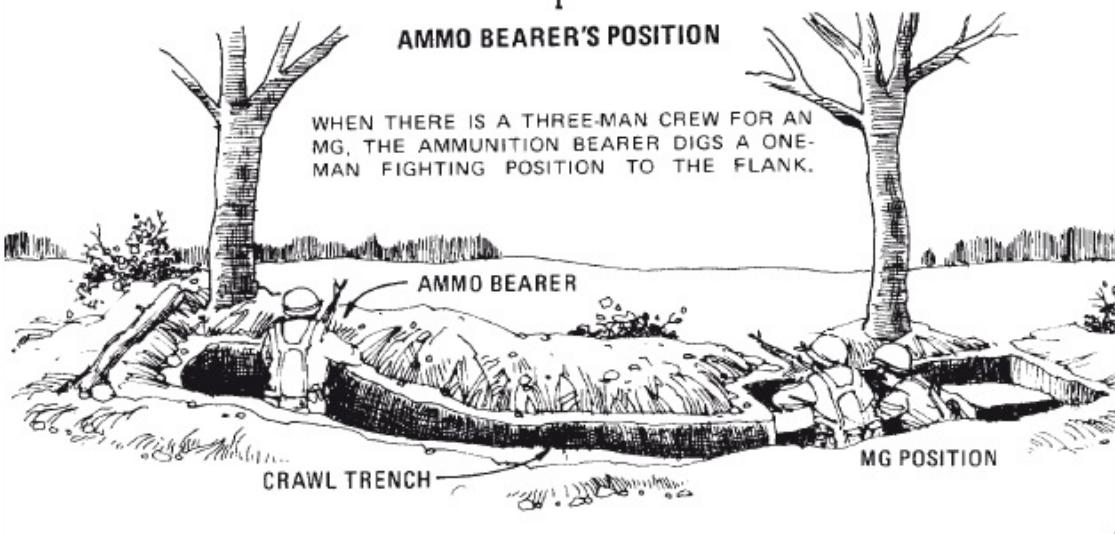
THE WEAPON IS LOWERED BY DIGGING DOWN FIRING PLATFORMS WHERE THE MG WILL BE PLACED. THE CREW THEN DIGS THE HOLE ABOUT ARMPIT DEEP. DIRT IS PLACED FIRST WHERE FRONTAL COVER IS NEEDED THEN ON THE FLANKS AND REAR.



IN SOME POSITIONS, AN MG MAY NOT HAVE A SECONDARY SECTOR OF FIRE; SO, ONLY HALF OF THE POSITION IS DUG.



TOP VIEW



WHEN THERE IS A THREE-MAN CREW FOR AN MG, THE AMMUNITION BEARER DIGS A ONE-MAN FIGHTING POSITION TO THE FLANK.

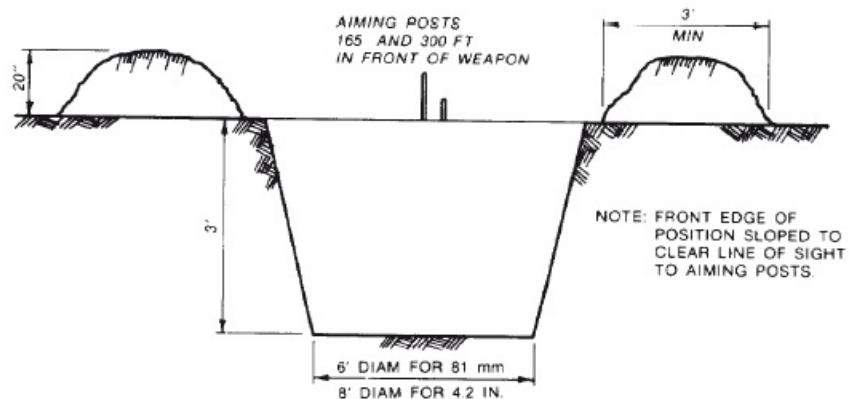
CRAWL TRENCH

MG POSITION



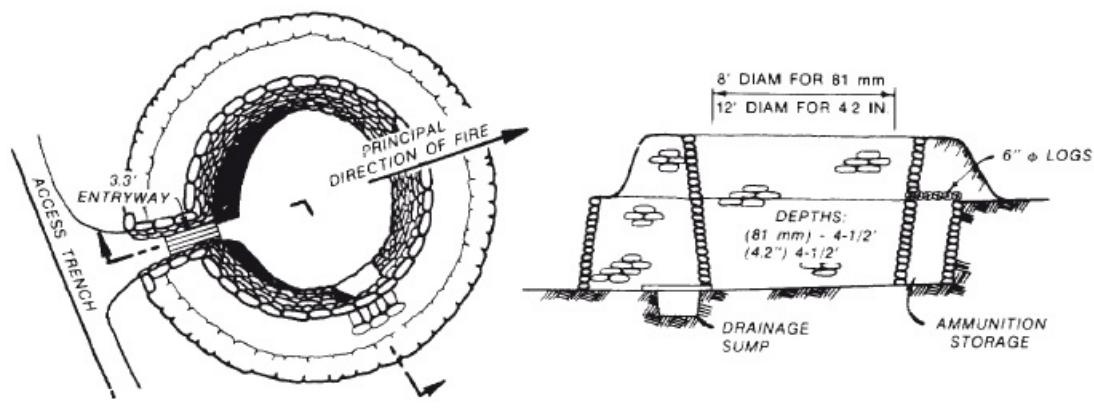
## MORTAR POSITION (81MM AND 4.2-IN MORTARS)

### HASTY POSITION



### TYPICAL SECTION

### IMPROVED POSITION

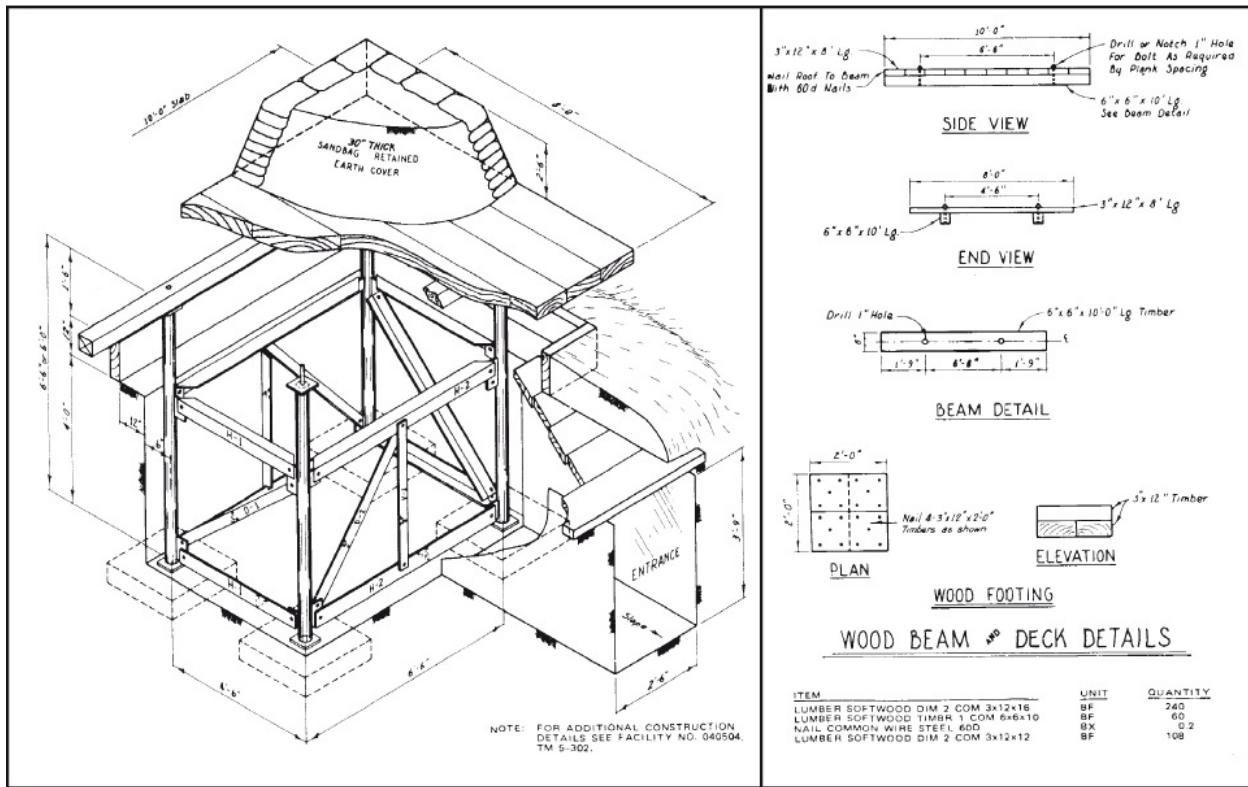


### PLAN

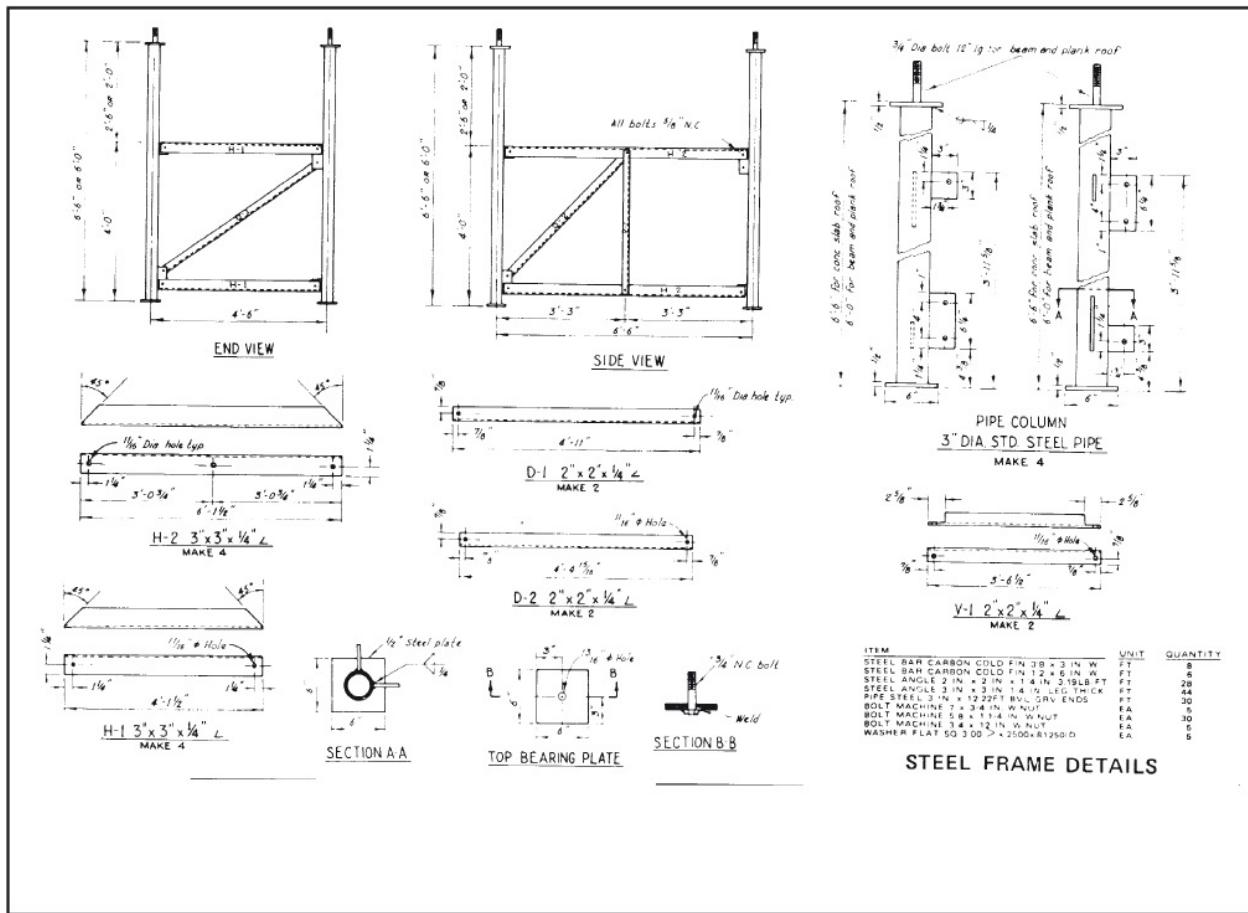
### CROSS SECTION

NOTE: TOTAL DEPTH  
INCLUDES THE PARAPET.  
SLOPE FLOOR TOWARD  
DRAINAGE SLUMP

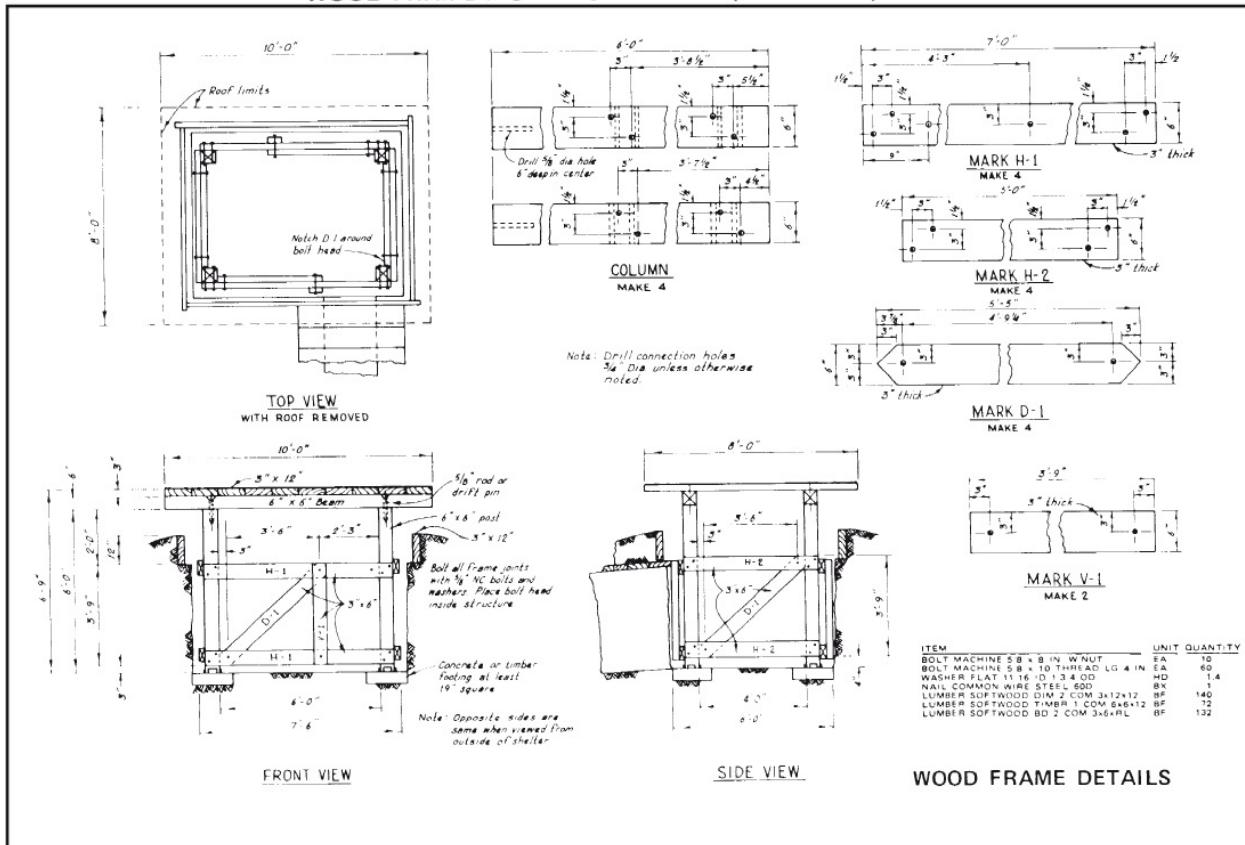
**WOOD-FRAME FIGHTING POSITION (sheet 1 of 3)**



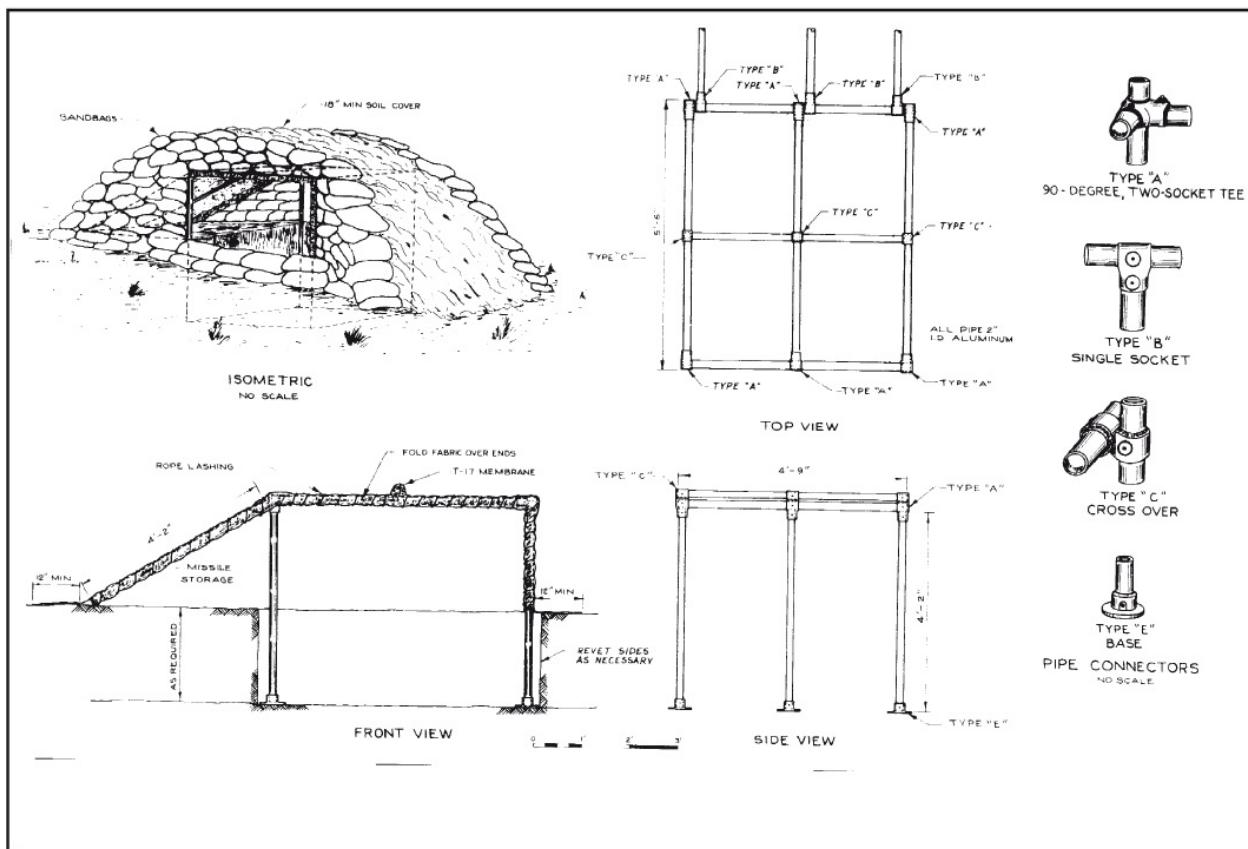
**WOOD-FRAME FIGHTING POSITION (sheet 2 of 3)**



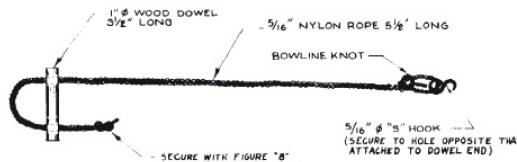
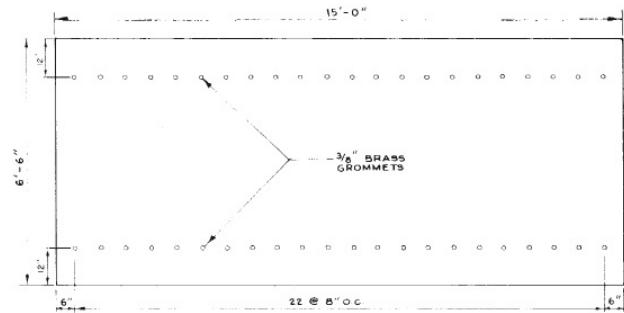
### WOOD-FRAME FIGHTING POSITION (sheet 3 of 3)



FABRIC-COVERED FRAME POSITION (sheet 1 of 2)



## FABRIC-COVERED FRAME POSITION (sheet 2 of 2)



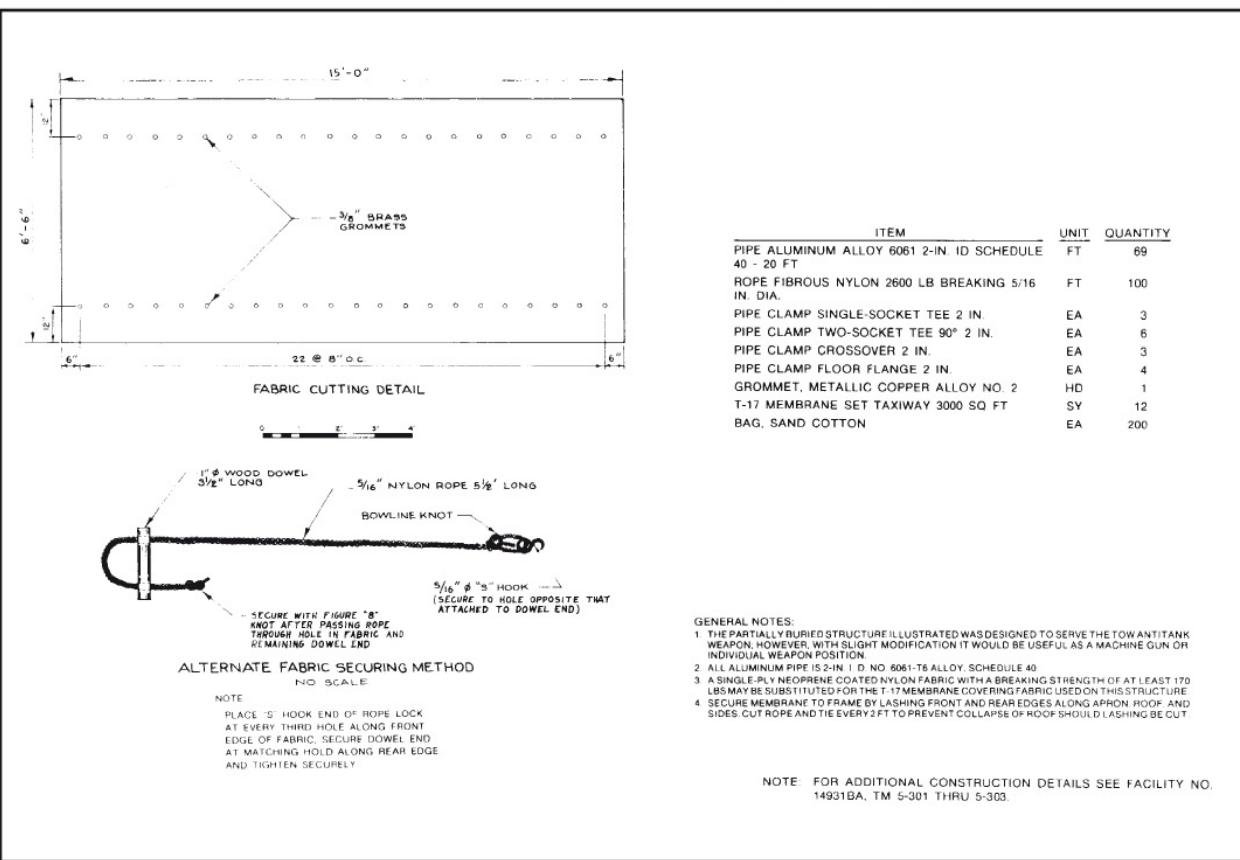
ITEM	UNIT	QUANTITY
PIPE ALUMINUM ALLOY 6061 2-IN. ID SCHEDULE 40 - 20 FT	FT	69
ROPE FIBROUS NYLON 2600 LB BREAKING 5/16 IN. DIA.	FT	100
PIPE CLAMP SINGLE-SOCKET TEE 2 IN.	EA	3
PIPE CLAMP TWO-SOCKET TEE 90° 2 IN.	EA	6
PIPE CLAMP CROSSOVER 2 IN.	EA	3
PIPE CLAMP FLOOR FLANGE 2 IN.	EA	4
GROMMET, METALLIC COPPER ALLOY NO. 2	HD	1
T-17 MEMBRANE SET TAXIWAY 3000 SQ FT	SY	12
BAG, SAND COTTON	EA	200

GENERAL NOTES:

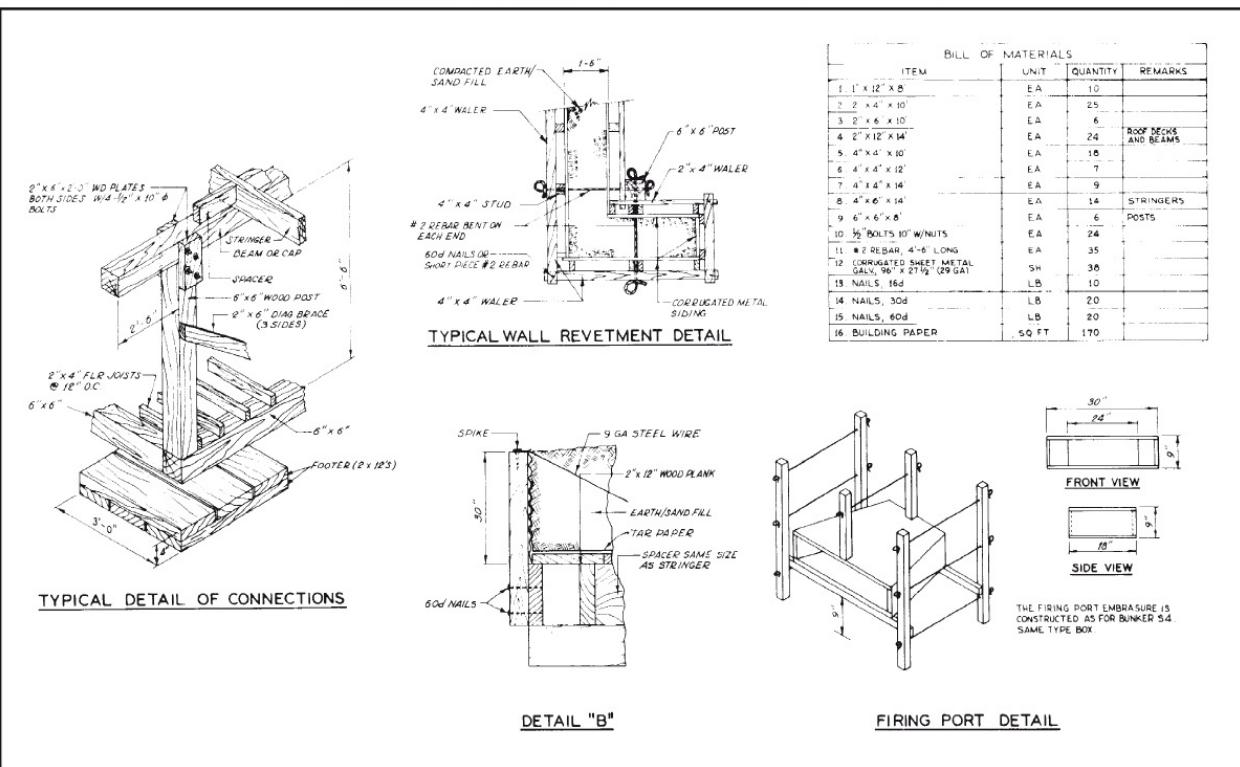
1. THE PARTIALLY BURIED STRUCTURE ILLUSTRATED WAS DESIGNED TO SERVE THE TOW ANTITANK WEAPON. HOWEVER, WITH SLIGHT MODIFICATION IT WOULD BE USEFUL AS A MACHINE GUN OR INDIVIDUAL WEAPON POSITION.
2. ALL ALUMINUM PIPE IS 2-IN. I. D. NO. 6061-T6 ALLOY, SCHEDULE 40.
3. ALL ROPE IS FIBROUS NYLON. ROPE HAS A BREAKING STRENGTH OF AT LEAST 170 LBS. MAY BE SUBSTITUTED FOR THE T-17 MEMBRANE COVERING FABRIC USED ON THIS STRUCTURE.
4. SECURE MEMBRANE TO FRAME BY LASHING FRONT AND REAR EDGES ALONG APRON, ROOF, AND SIDES. CUT ROPE AND TIE EVERY 2 FT TO PREVENT COLLAPSE OF HOOP SHOULD LASHING BE CUT.

NOTE: FOR ADDITIONAL CONSTRUCTION DETAILS SEE FACILITY NO. 14931BA, TM 5-301 THRU 5-303.

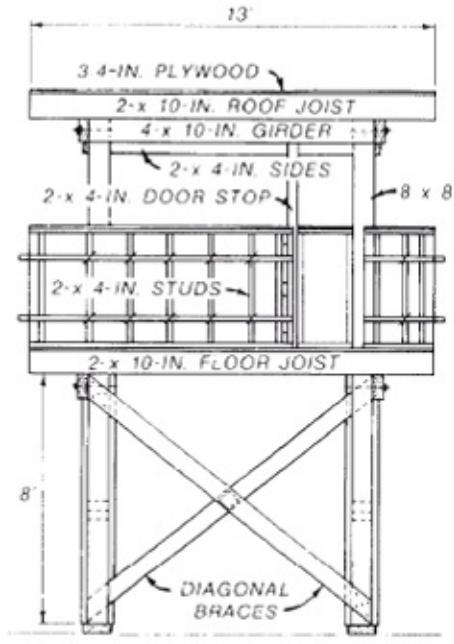
## FABRIC-COVERED FRAME POSITION (sheet 2 of 2)



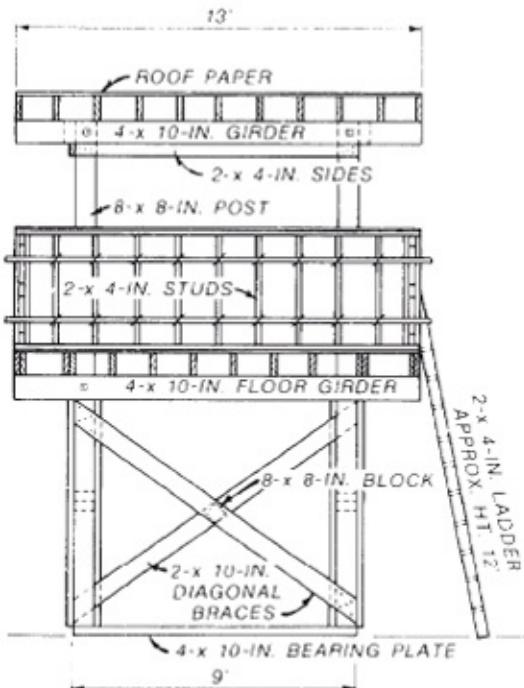
## CORRUGATED METAL FIGHTING BUNKER (sheet 2 of 2)



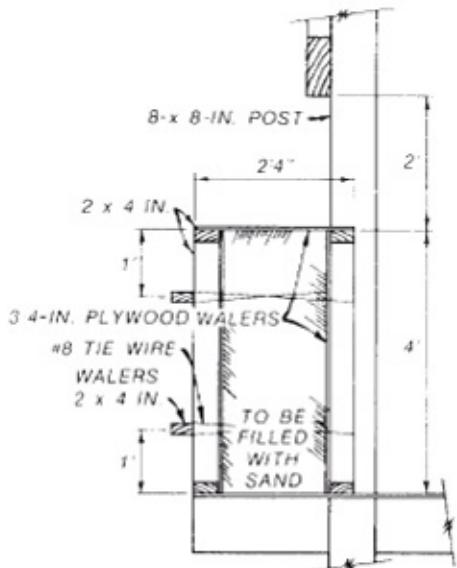
**PLYWOOD PERIMETER BUNKER**



**FRONT ELEVATION**



**TYPICAL SIDE ELEVATION**



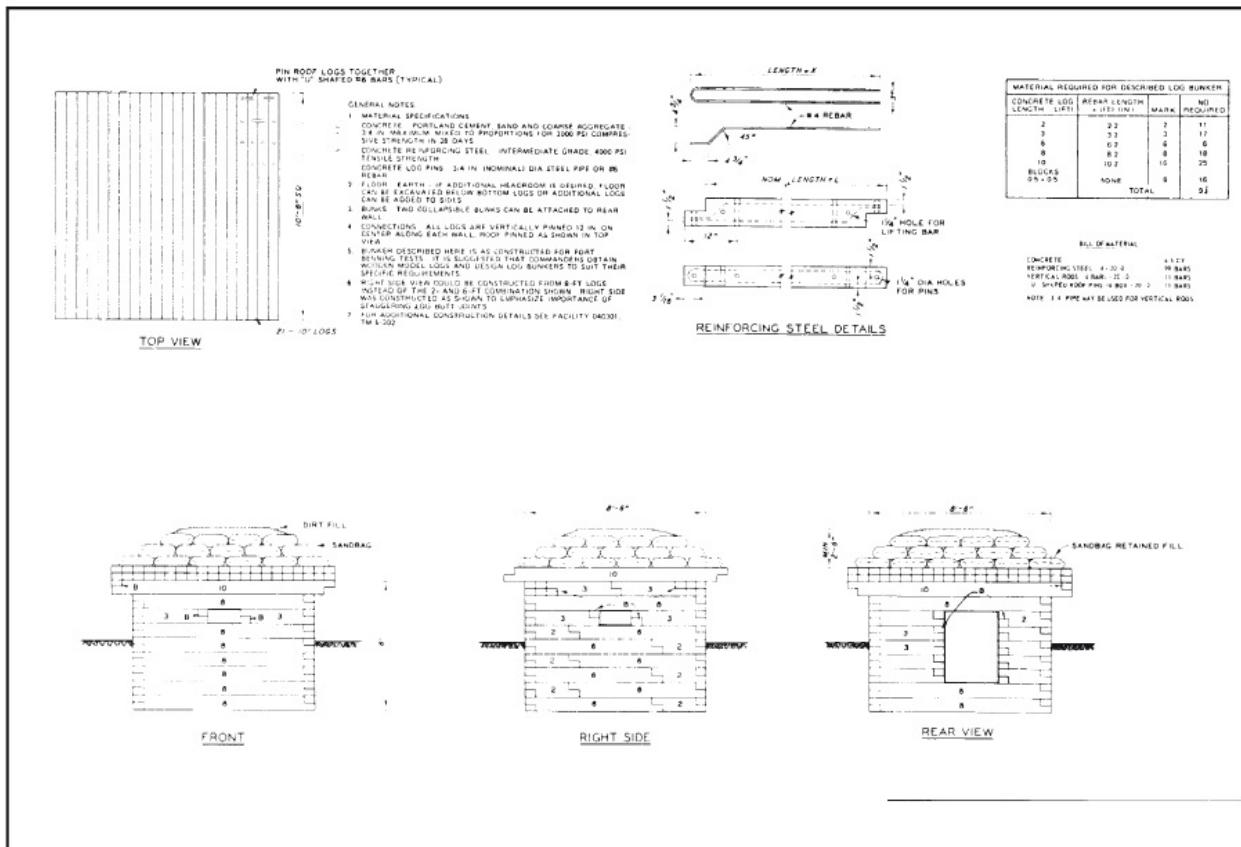
**TYPICAL WALL SECTION**

**BILL OF MATERIALS**

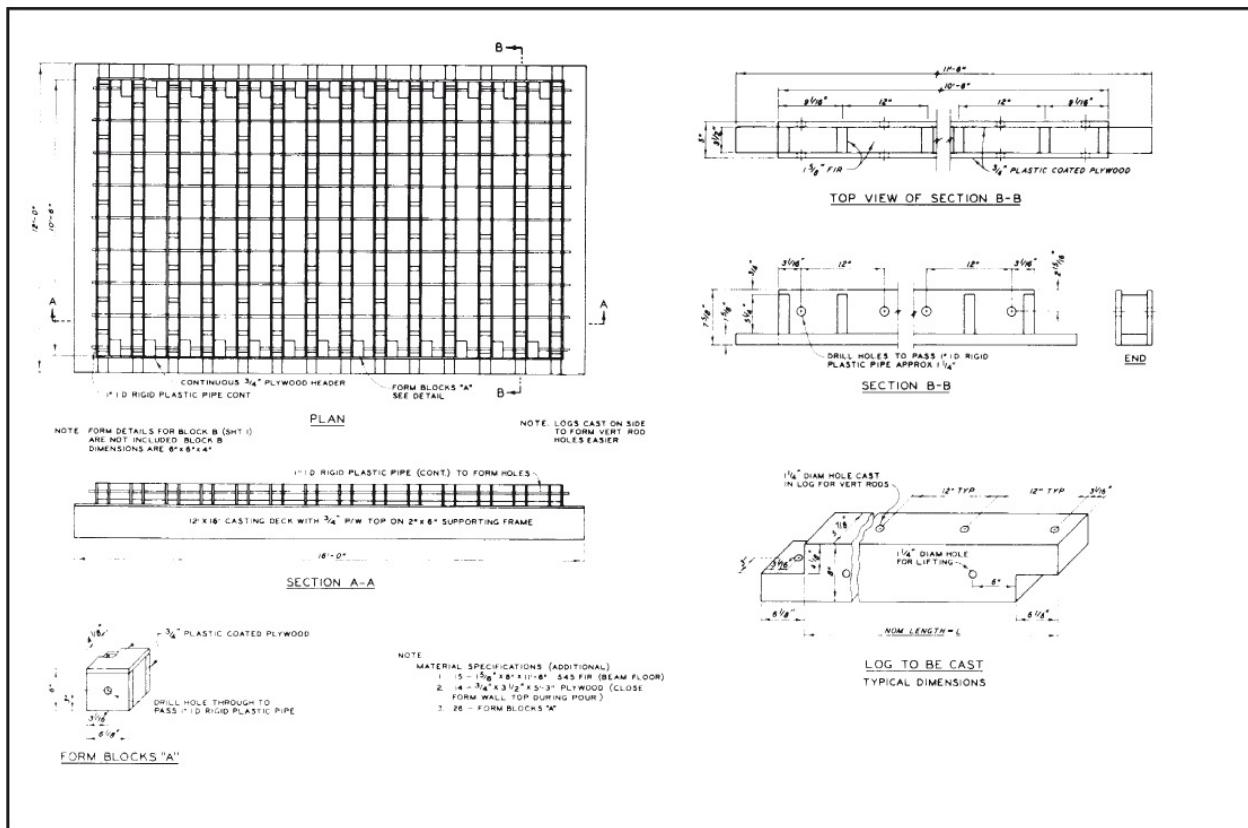
ITEM	UNIT	QUANTITY
2"x4"x12"	EA	120
2"x4"x14"	EA	30
2"x10"x14"	EA	40
4"x10"x14"	EA	17
8"x8"x16"	EA	4
4"x8"x3/4" PLWD	EA	32
NAILS, 20d	LB	50
NAILS, 60d	LB	25
BOLTS, 3/4"x14"	EA	8
ROOF PAPER	SF	200

NOTE: THIS BUNKER CAN BE ELEVATED AS SHOWN OR BUILT DIRECTLY ON THE GROUND.

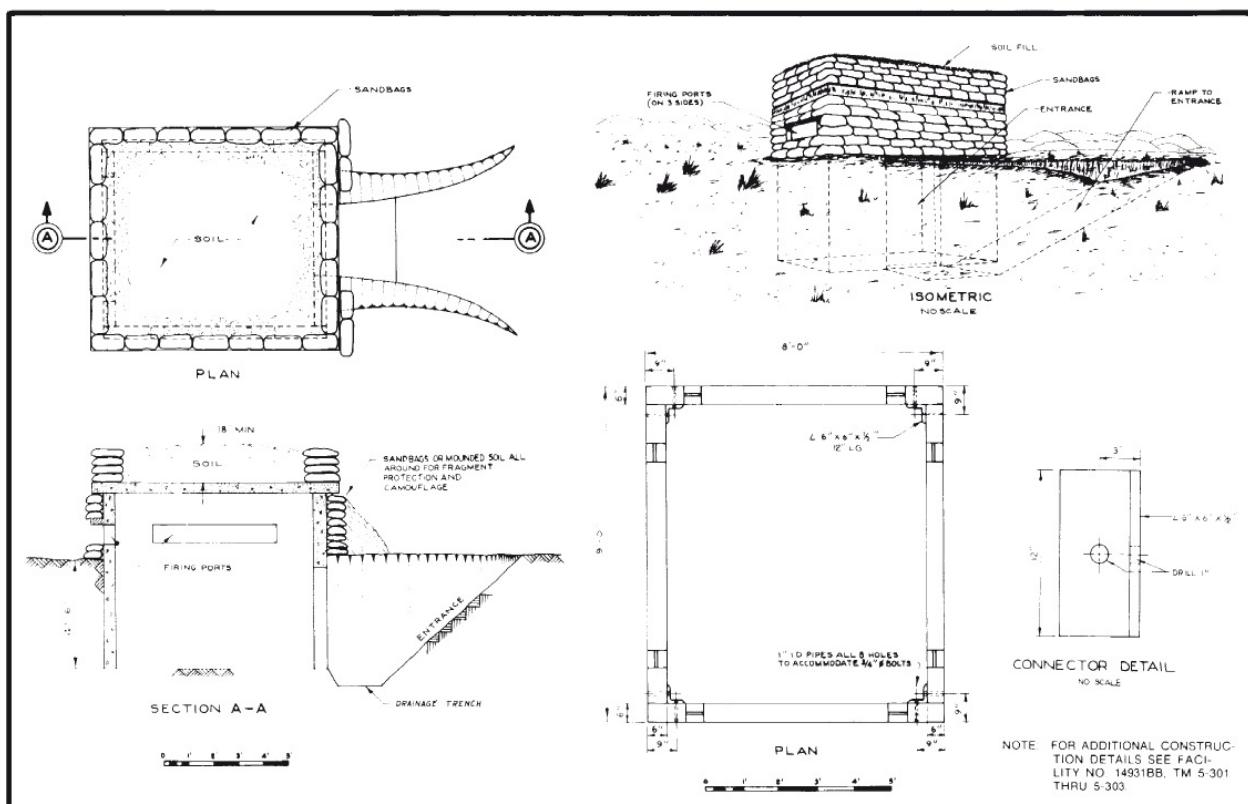
**CONCRETE LOG BUNKER (sheet 1 of 2)**



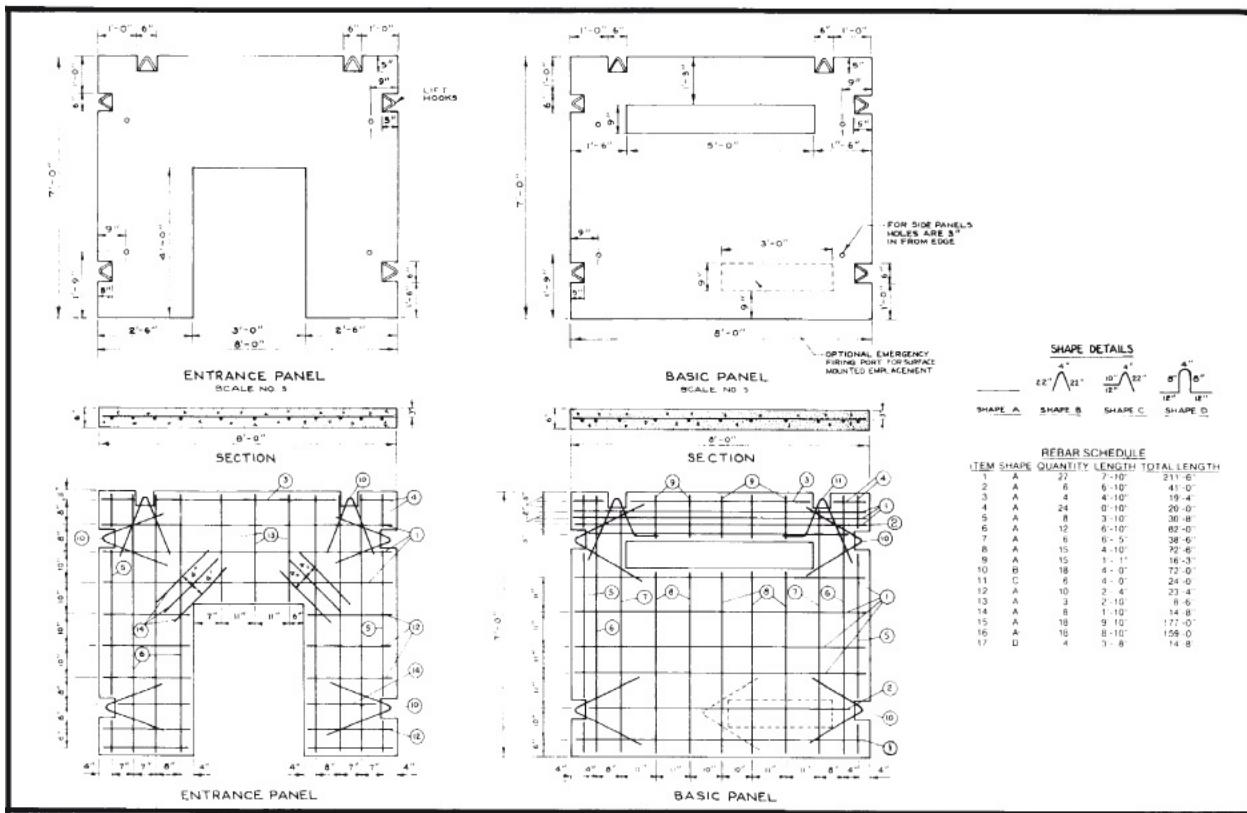
## CONCRETE LOG BUNKER (sheet 2 of 2)



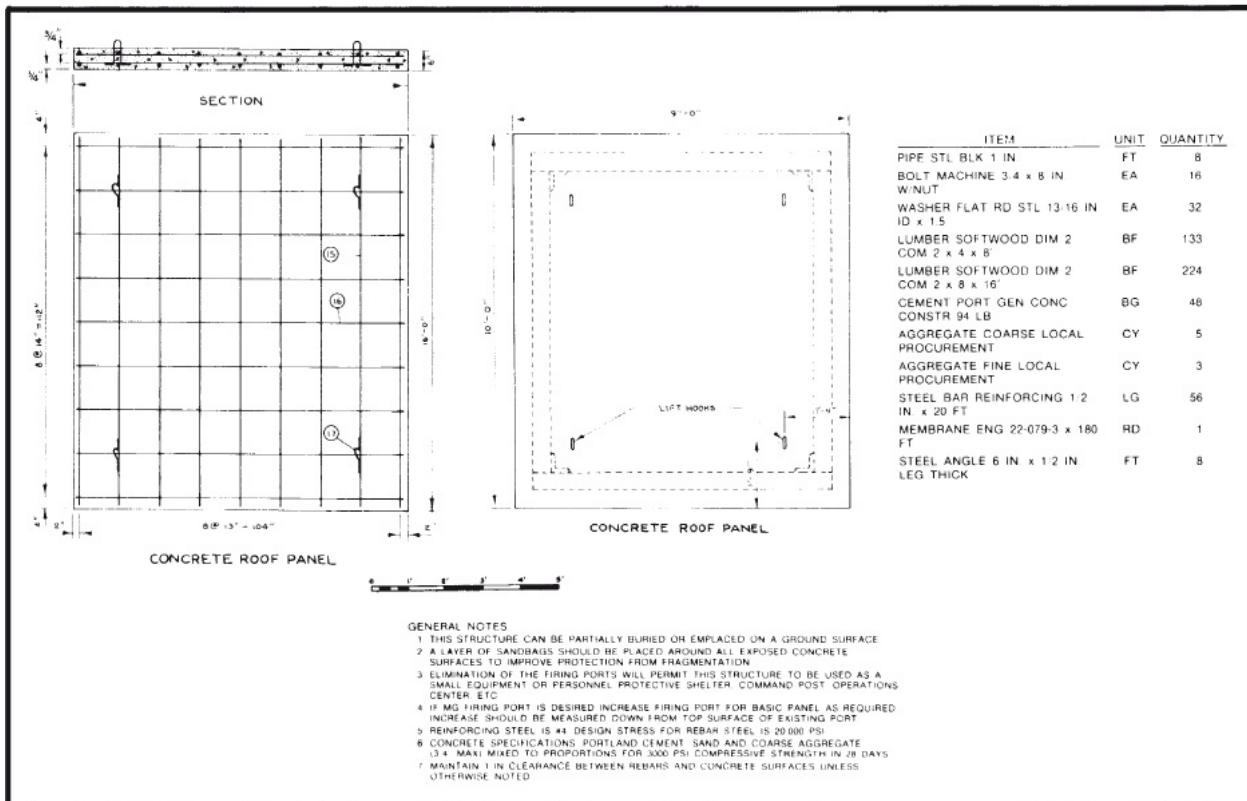
## PRECAST CONCRETE SLAB BUNKER (sheet 1 of 3)



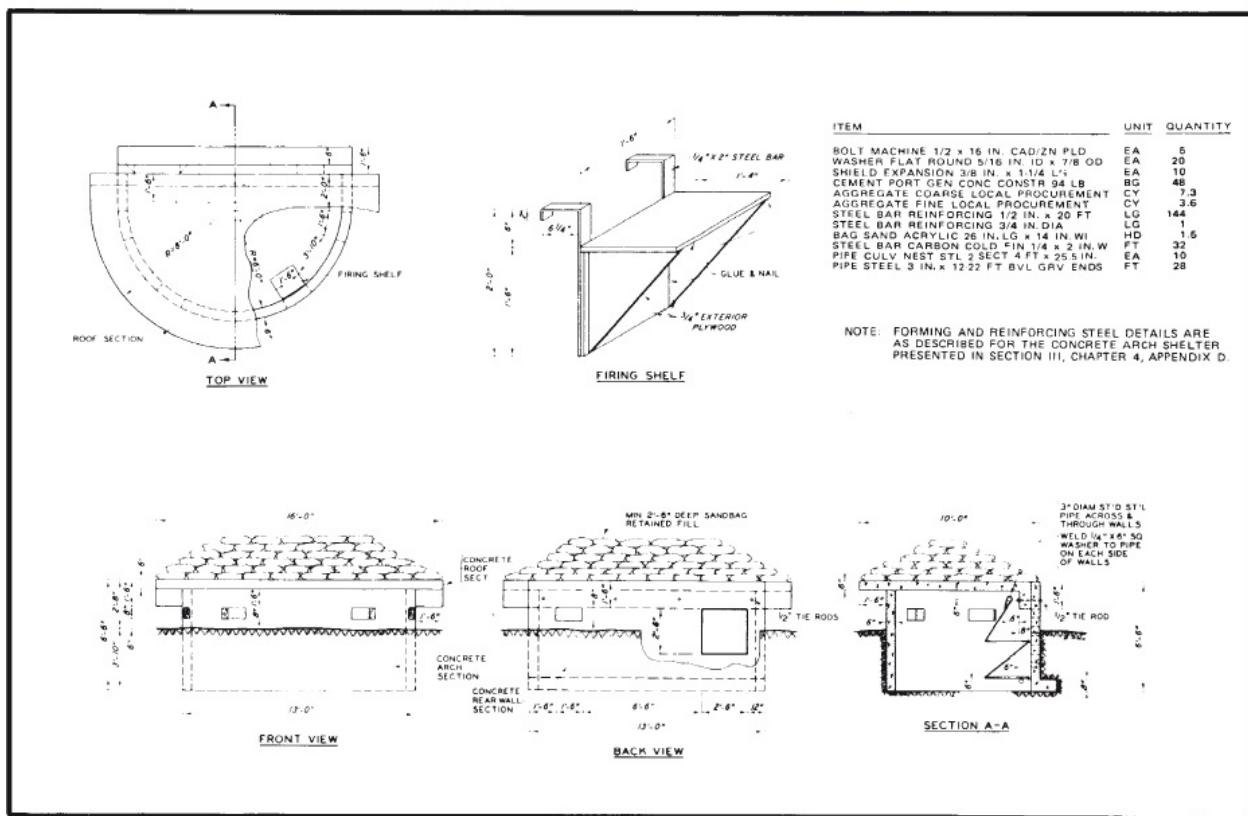
## PRECAST CONCRETE SLAB BUNKER (sheet 2 of 3)



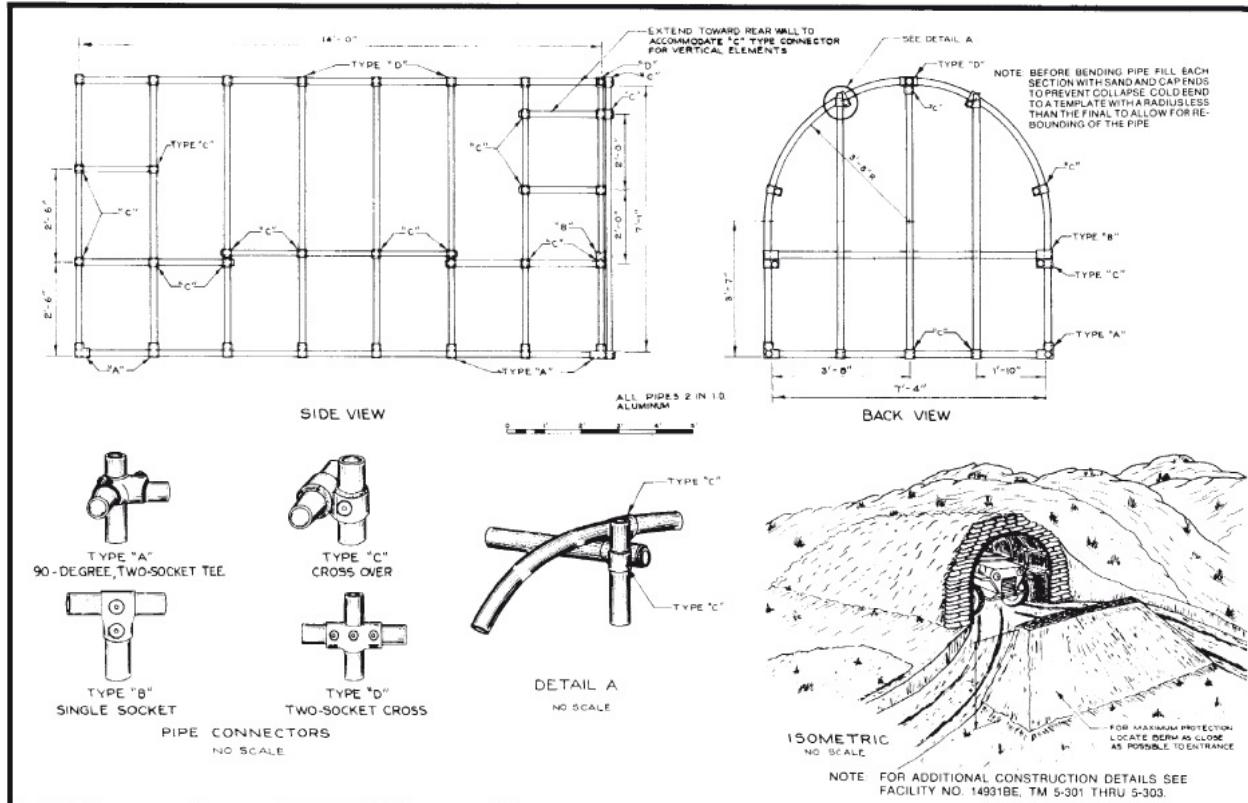
## PRECAST CONCRETE SLAB BUNKER (sheet 3 of 3)



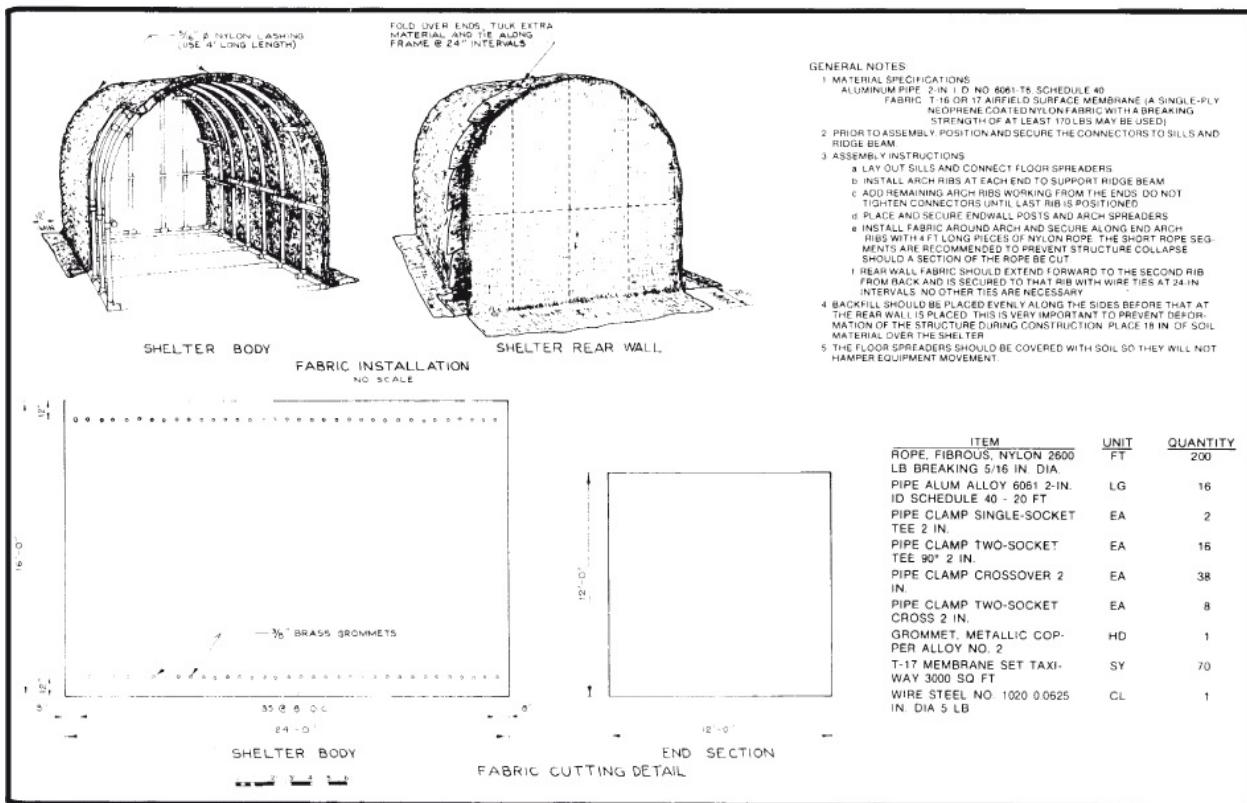
## CONCRETE ARCH BUNKER



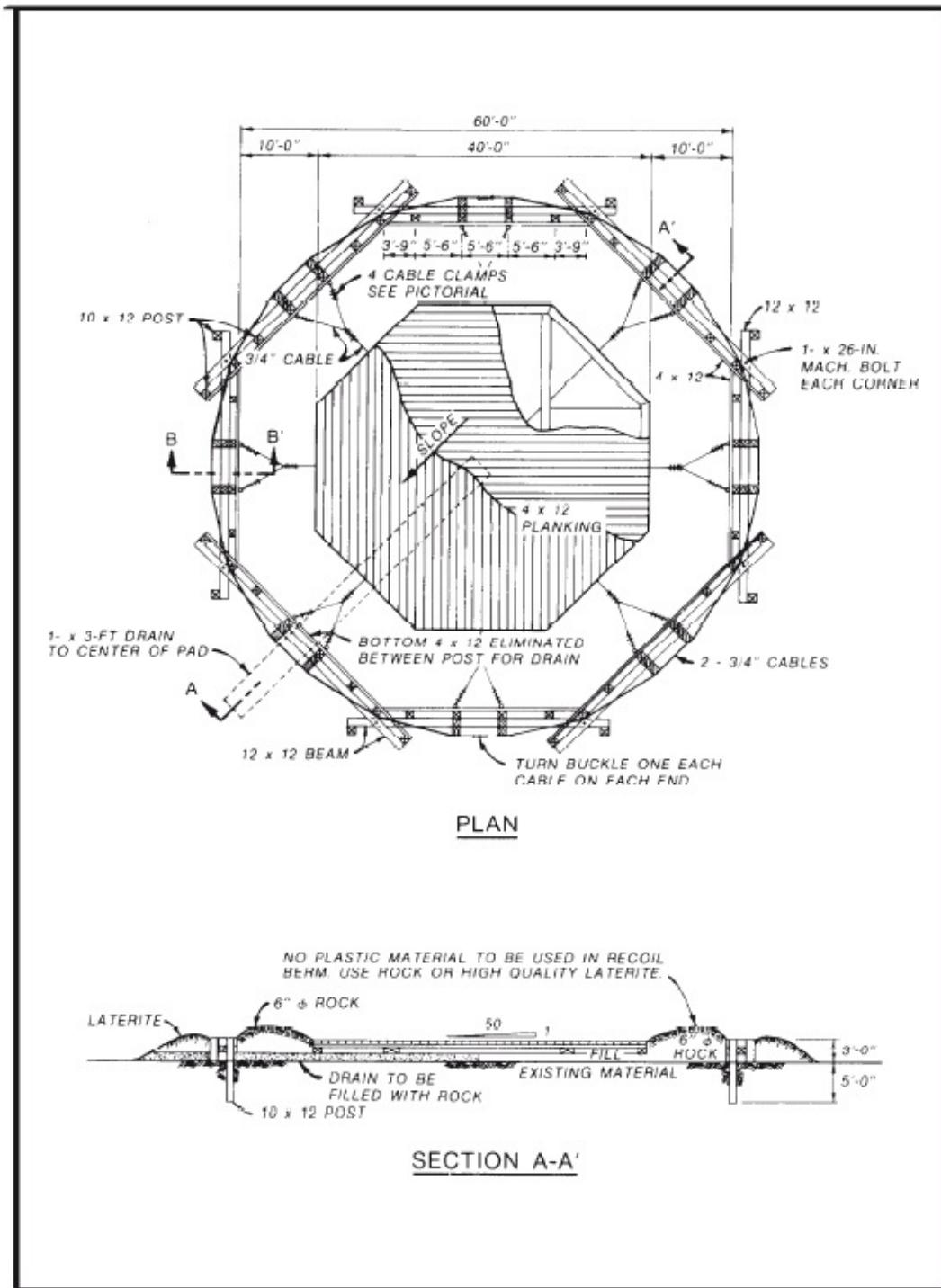
## COVERED DEEP-CUT POSITION (sheet 1 of 2)



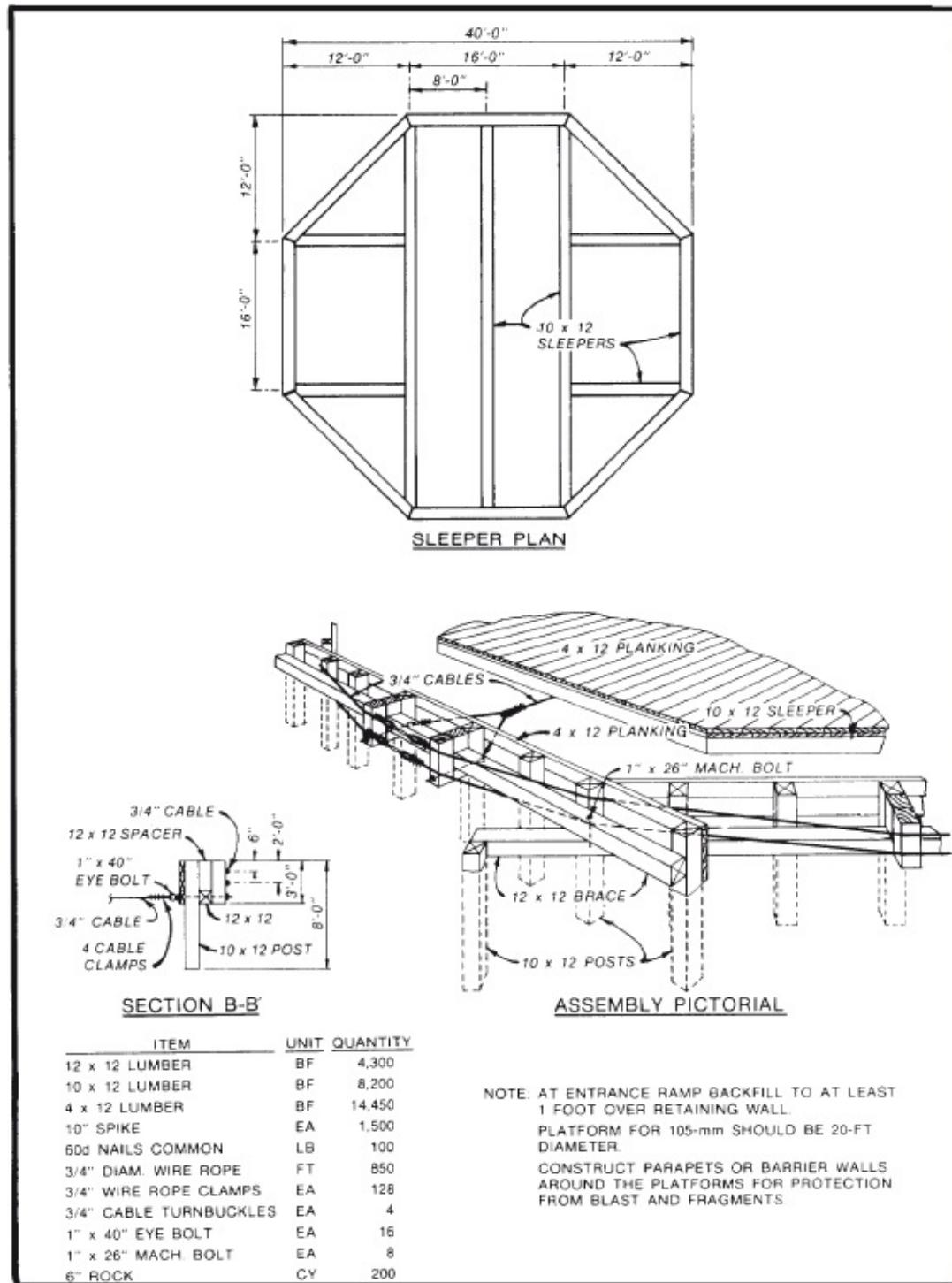
## COVERED DEEP-CUT POSITION (sheet 2 of 2)



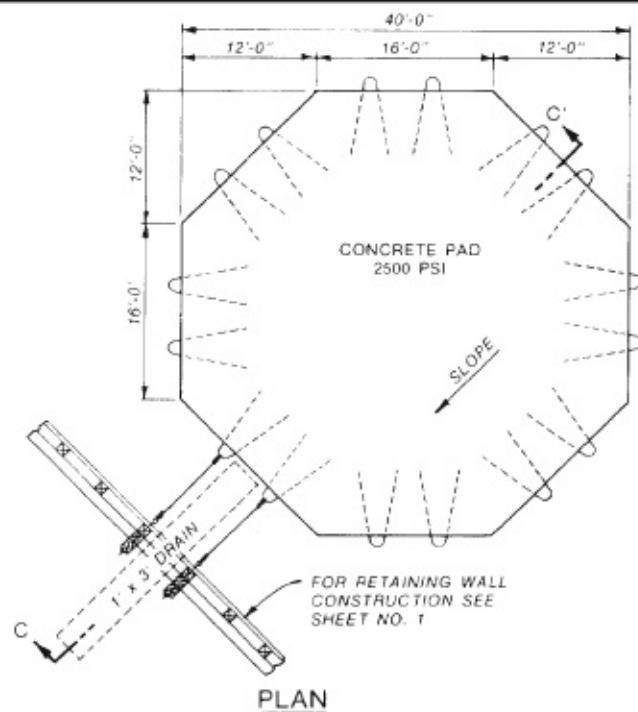
**ARTILLERY FIRING PLATFORM (155MM, 175MM, AND 8-IN ARTILLERY) (sheet 1 of 3)**



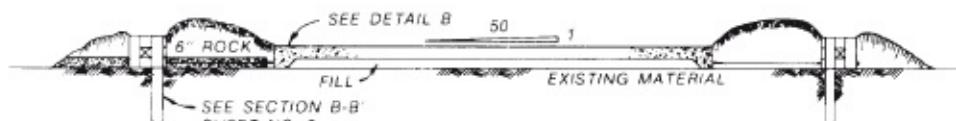
**ARTILLERY FIRING PLATFORM (155MM, 175MM, AND 8-IN ARTILLERY) (sheet 2 of 3)**



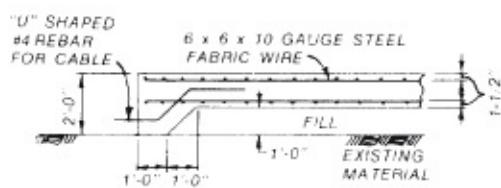
**ARTILLERY FIRING PLATFORM (155MM, 175MM, AND 8-IN ARTILLERY) (sheet 3 of 3)**



PLAN



SECTION C-C'



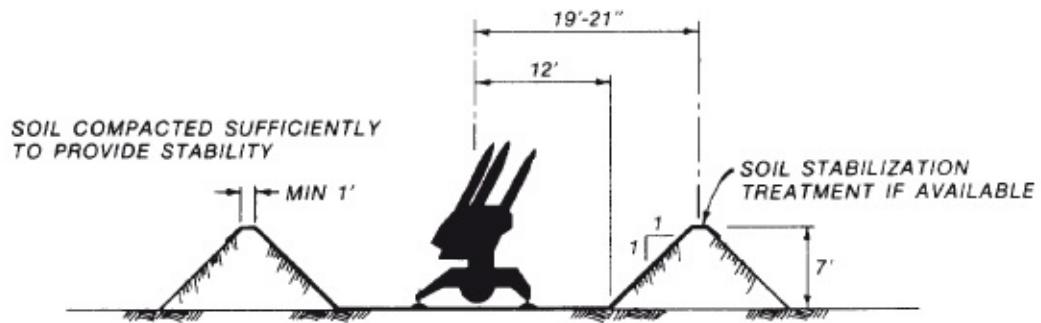
DETAIL B

NOTE: NO FORMING MATERIAL SUPPLIED  
PLATFORM FOR 105 mm SHOULD BE  
20-FT DIAMETER.

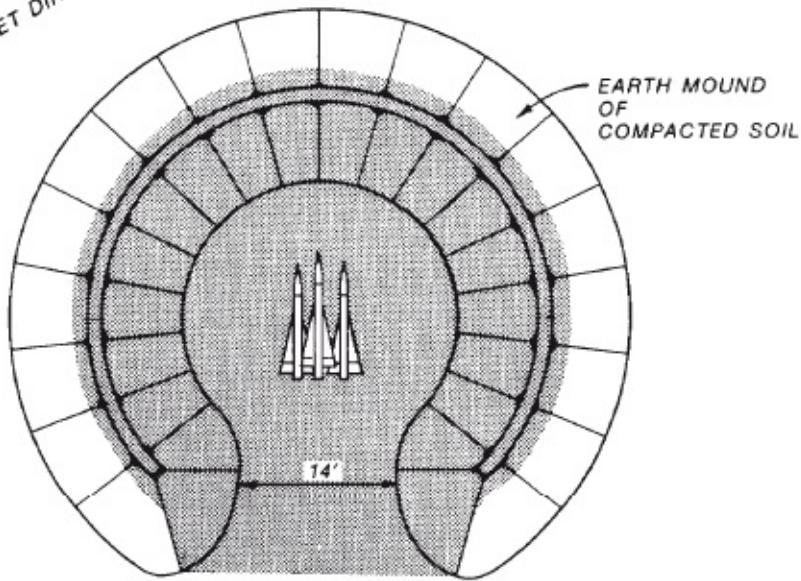
CONSTRUCT PARAPETS OR BARRIER  
WALLS AROUND THE PLATFORMS FOR  
PROTECTION FROM BLAST AND  
FRAGMENTS

ITEM	UNIT	QUANTITY
#4 REBAR	LF	160
CONCRETE 2500 PSI	CU YD	106
6 x 6 x 10 GAUGE STEEL		
FABRIC WIRE	SQ FT	2650
12 x 12 LUMBER	BF	4300
10 x 12 LUMBER	BF	4480
4 x 12 LUMBER	BF	2880
60d NAILS COMMON	LB	100
3/4" Ø WIRE ROPE	FT	610
3/4" WIRE CLAMPS	EA	160
3/4" CABLE TURNBUCKLES	EA	4
1" x 40" EYE BOLT	EA	16
1" x 26" MACH. BOLT	EA	8
6" ROCK	CY	200

## PARAPET POSITION FOR ADA



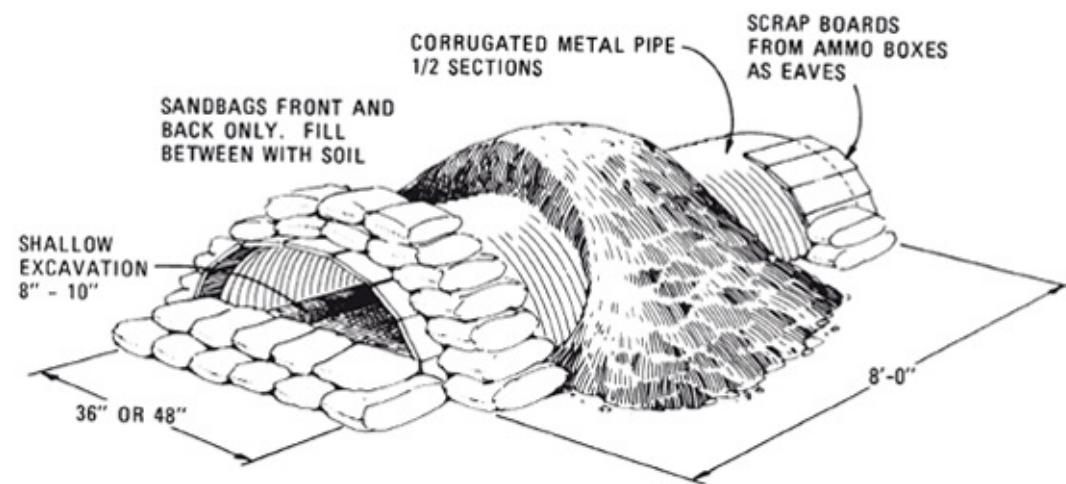
SECTION VIEW



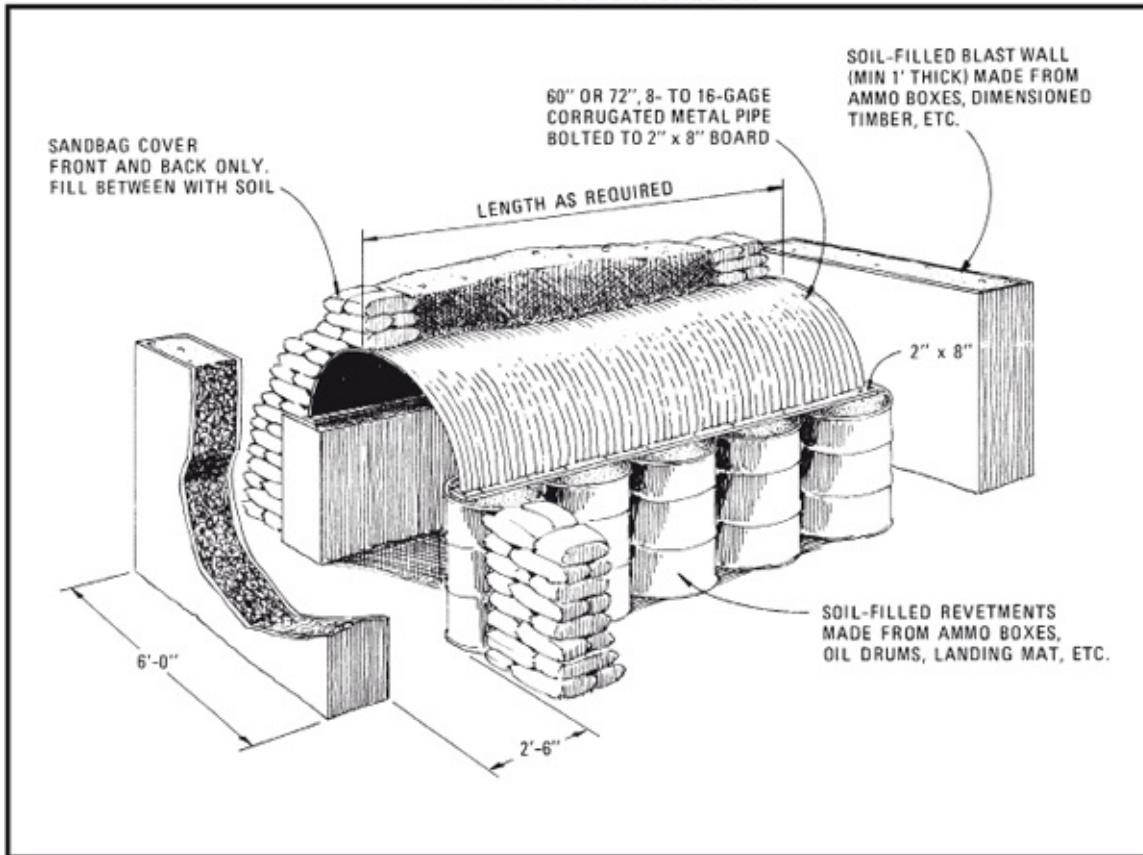
TOP VIEW

NOTES: 1. EMPLACEMENT SHOWN IS FOR IMPROVED HAWK LAUNCHER.  
2. PROVIDE FOR ADEQUATE DRAINAGE OF SITE.

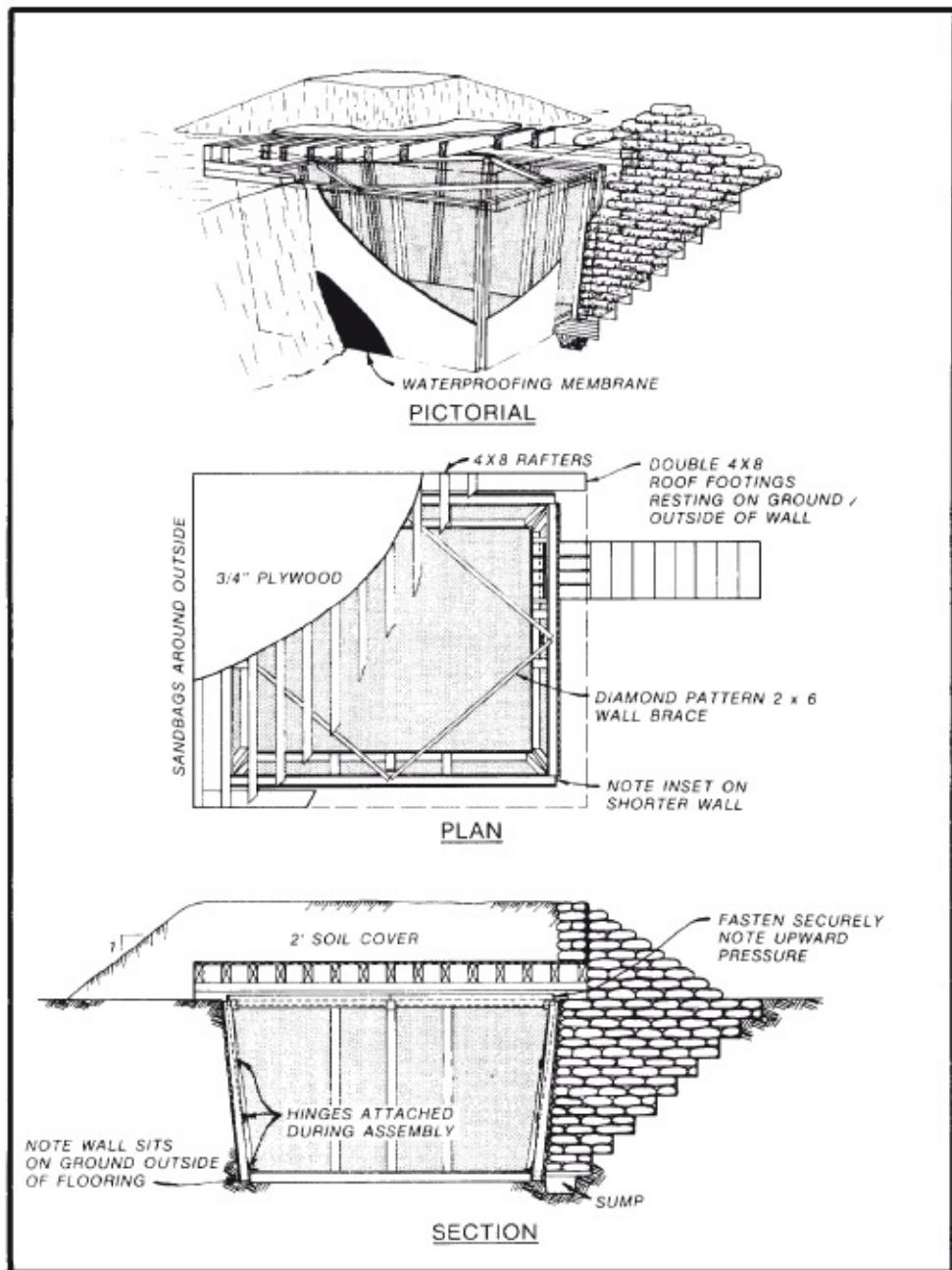
### TWO-SOLDIER SLEEPING SHELTER



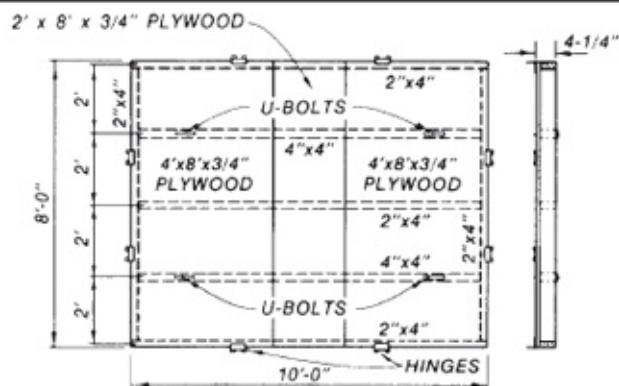
### METAL CULVERT SHELTER



**AIRTRANSPORTABLE ASSAULT SHELTER (sheet 1 of 3)**

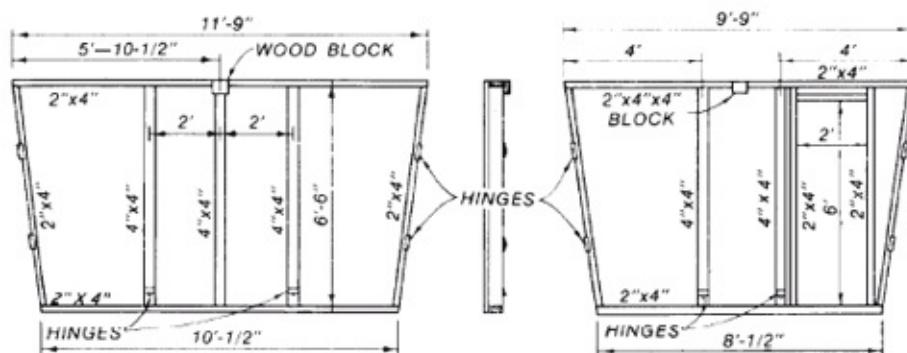


## AIRTRANSPORTABLE ASSAULT SHELTER (sheet 2 of 3)



### FLOOR DETAIL

1 NEEDED

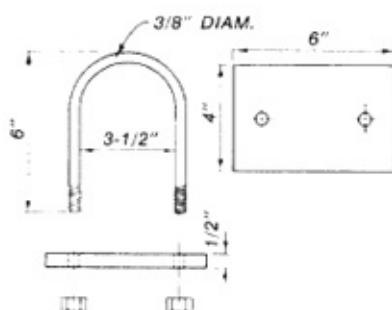
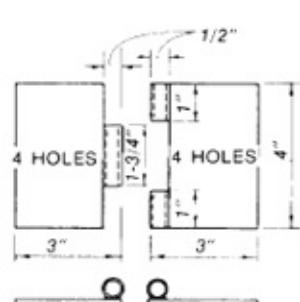


### SIDE WALL DETAIL

2 NEEDED

### END WALL DETAIL

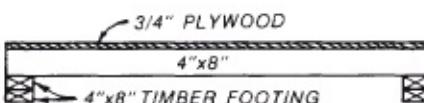
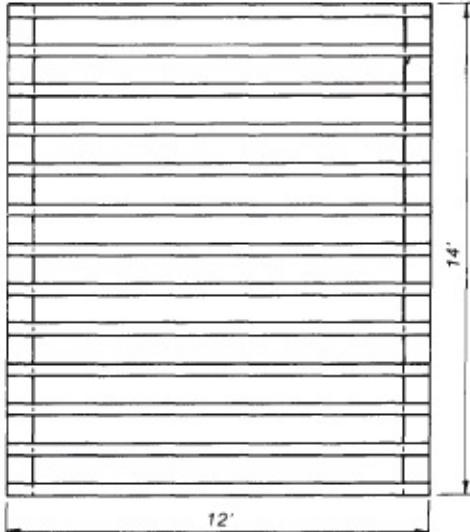
2 NEEDED, 1 W/O DOOR



16 NEEDED

4 NEEDED

## AIRTRANSPORTABLE ASSAULT SHELTER (sheet 3 of 3)



### ROOF DETAIL

#### NOTES:

- (1) Abut longer side walls against shorter end walls because the longer walls must sustain the greatest load. The shorter walls then act as a support. Install hinges during assembly.
- (2) Provide wall bracing (2" x 6") at the top of the shelter. Brace from the center of each wall to the center of each adjacent wall (diamond pattern).
- (3) Attach a sheet of plastic or other thin waterproof covering around the outside before backfilling to minimize friction between earth and the walls and increase moisture resistance.
- (4) Make the shelter no larger than necessary. It should be no more than 6-1/2 feet high and the floor area should be less than 100 ft<sup>2</sup> unless special effort is made to provide adequate structural members in addition to those specified.

#### BILL OF MATERIALS (WALLS AND FLOOR)

ITEM	UNITS	QUANTITY
4'x8'x3/4"	EA	14
PLYWOOD		
4"x4"x8'	EA	10
4"x4"x10'	EA	2
2"x4"x12'	EA	4
2"x4"x10'	EA	9
2"x4"x8'	EA	10
2"x6"x10'	EA	4
TRIM (METAL EDGING)	FT	190
OPTIONAL		
BOLTS (FOR HINGES)	EA	128
WOOD SCREWS (OR #8 NAILS)	LB	5
PAINT	GAL	1
HINGES	EA	16
U-BOLTS W/ BEARING PLATES	EA	4

#### BILL OF MATERIALS (ROOF)

ITEM	UNIT	QUANTITY
4"x8"x12'	EA	13
4"x8"x14'	EA	4
4'x8'x3/4"	EA	6
PLYWOOD		

(5) Backfilling should be accomplished by hand labor, maintaining a uniform load around the perimeter as backfilling progresses.

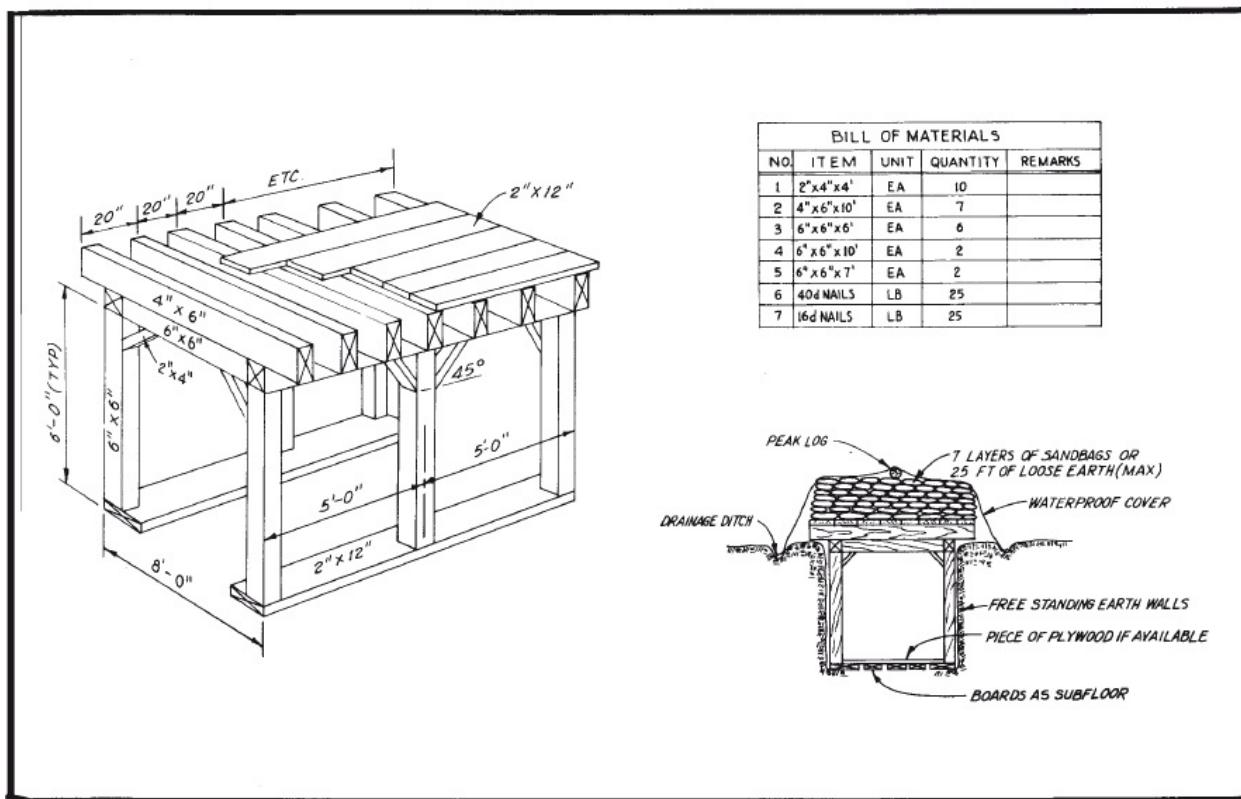
(6) Make the bottom of the excavation 2 feet longer and 2 feet wider than the length and width of the structure floor to increase working room during erection and provide adequate clearance for the walls.

(7) Use explosives as extensively as practical during excavation to minimize required hand digging.

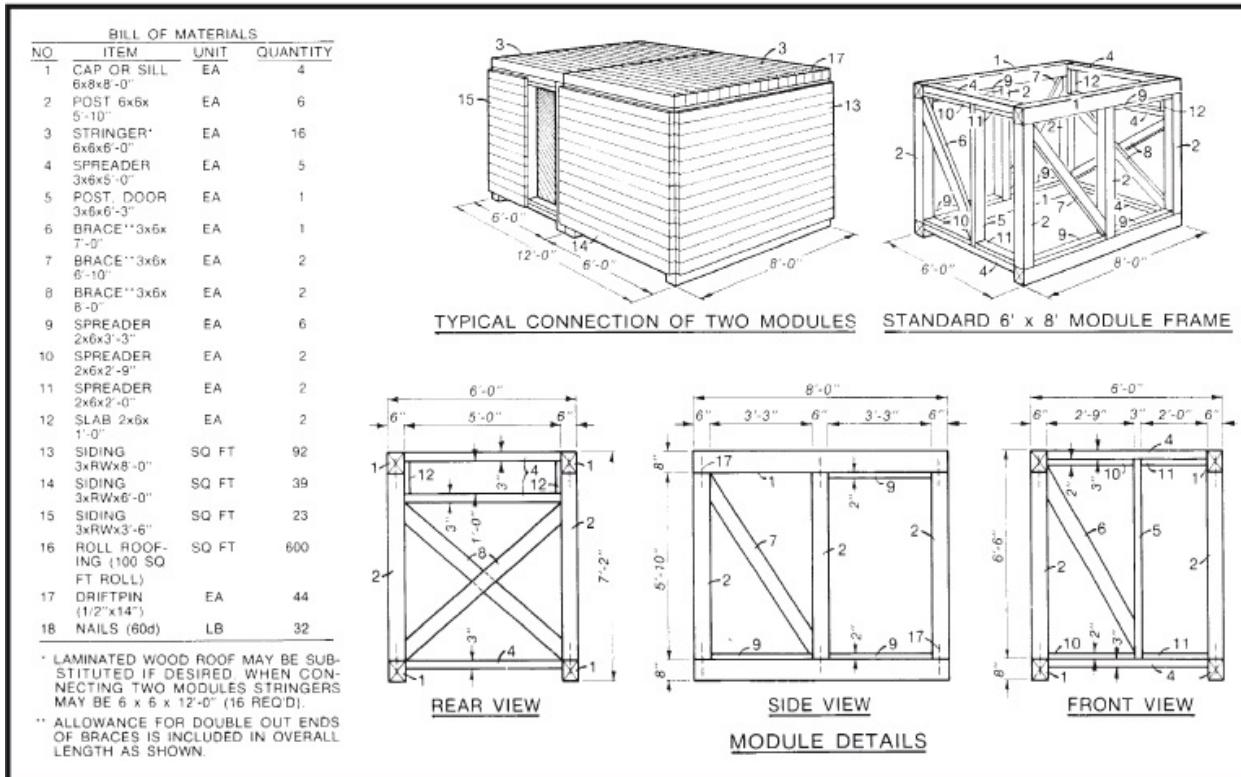
(8) To complete the structure provide a suitable entryway. Drainage ditches should be provided around the shelter to carry away runoff, and a waterproof cover placed over the overhead cover to prevent saturation of the soil material and eliminate seepage into the interior.

(9) Prior to lifting the structure from the installed position, remove some of the backfill with hand tools to reduce effects of wall friction.

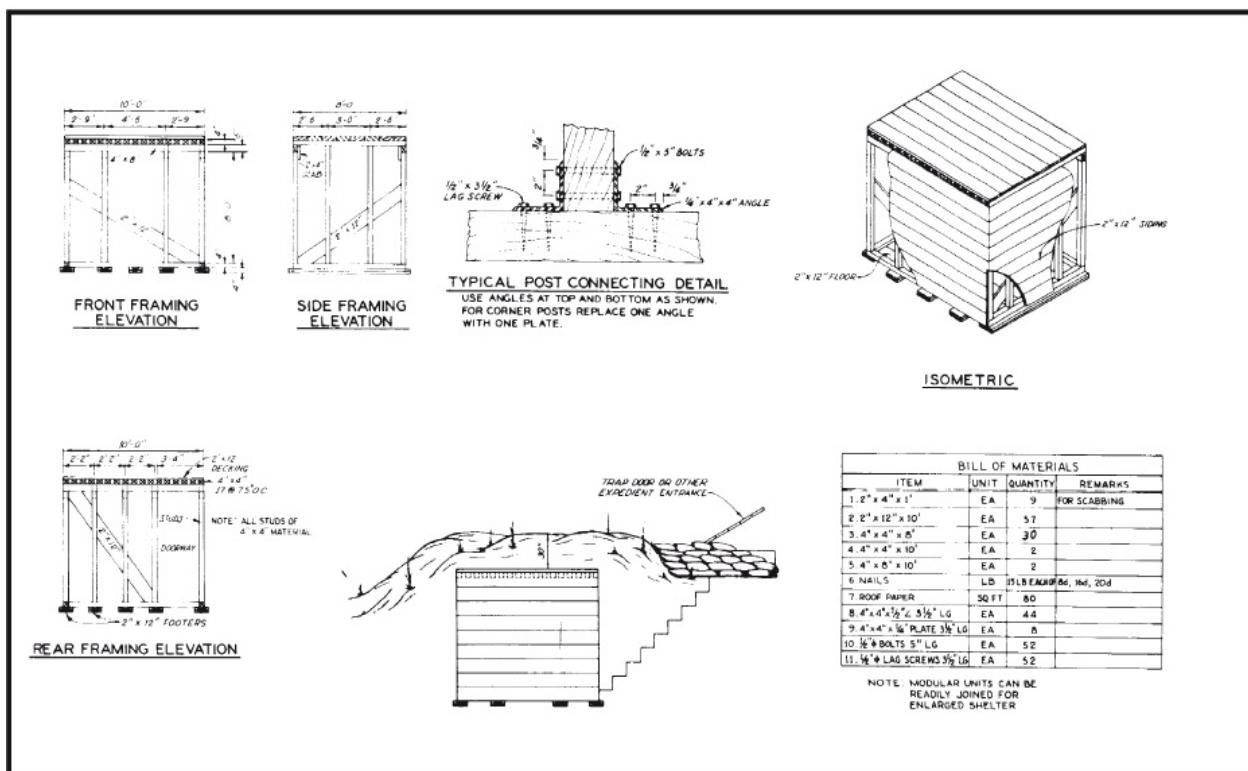
## TIMBER POST BURIED SHELTER



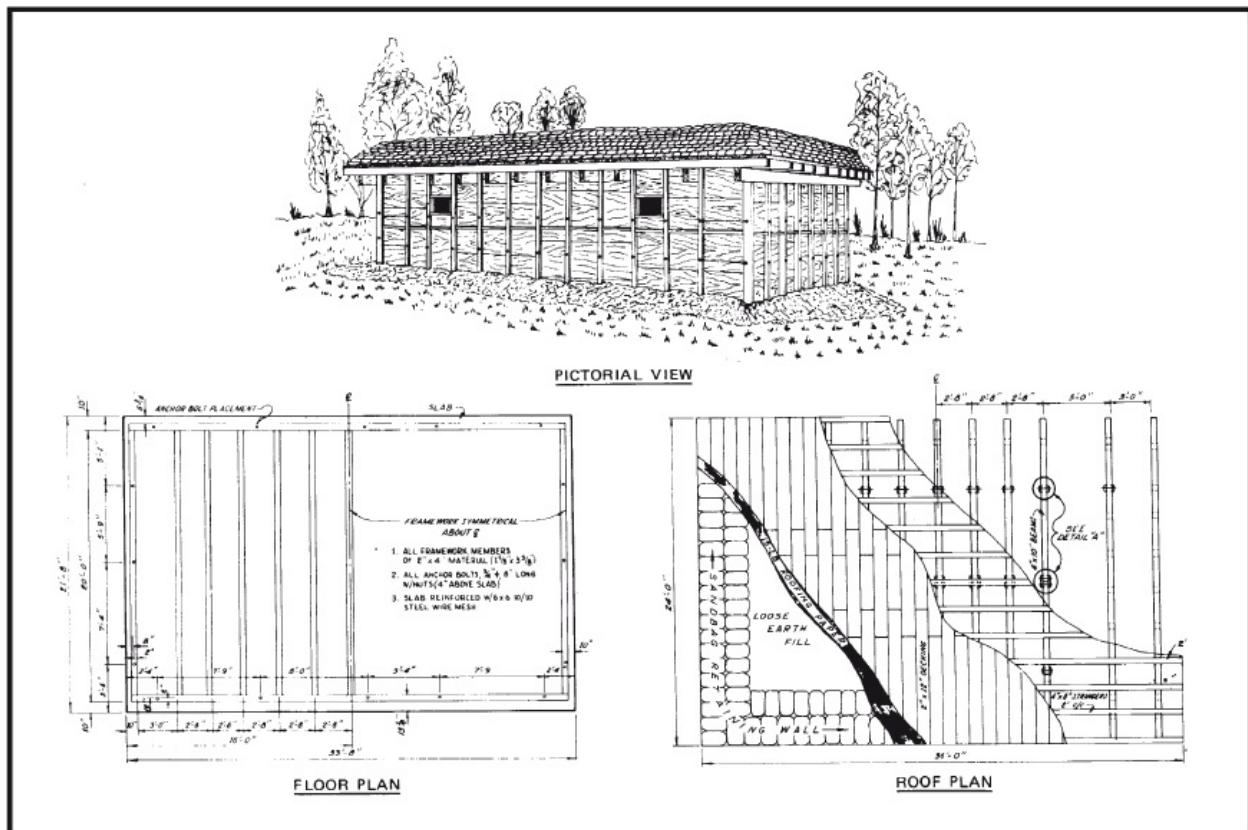
## MODULAR TIMBER FRAME SHELTER



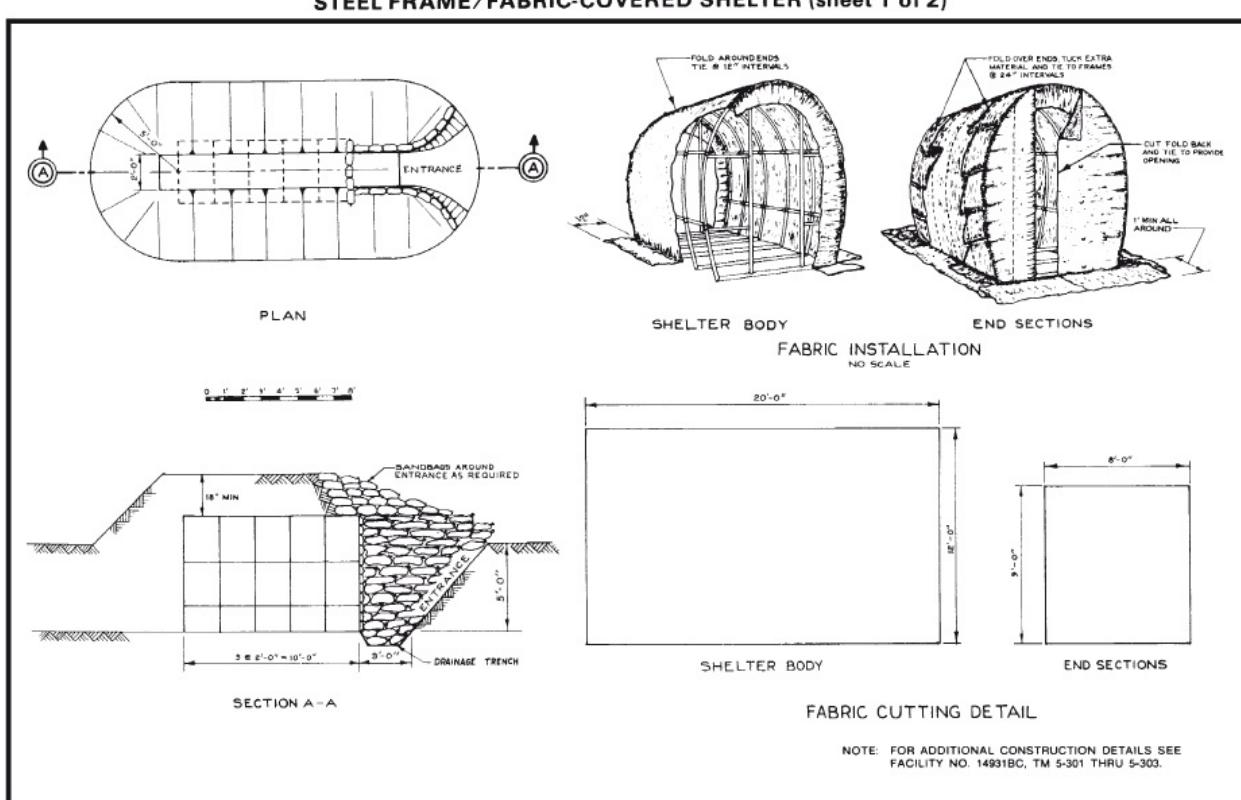
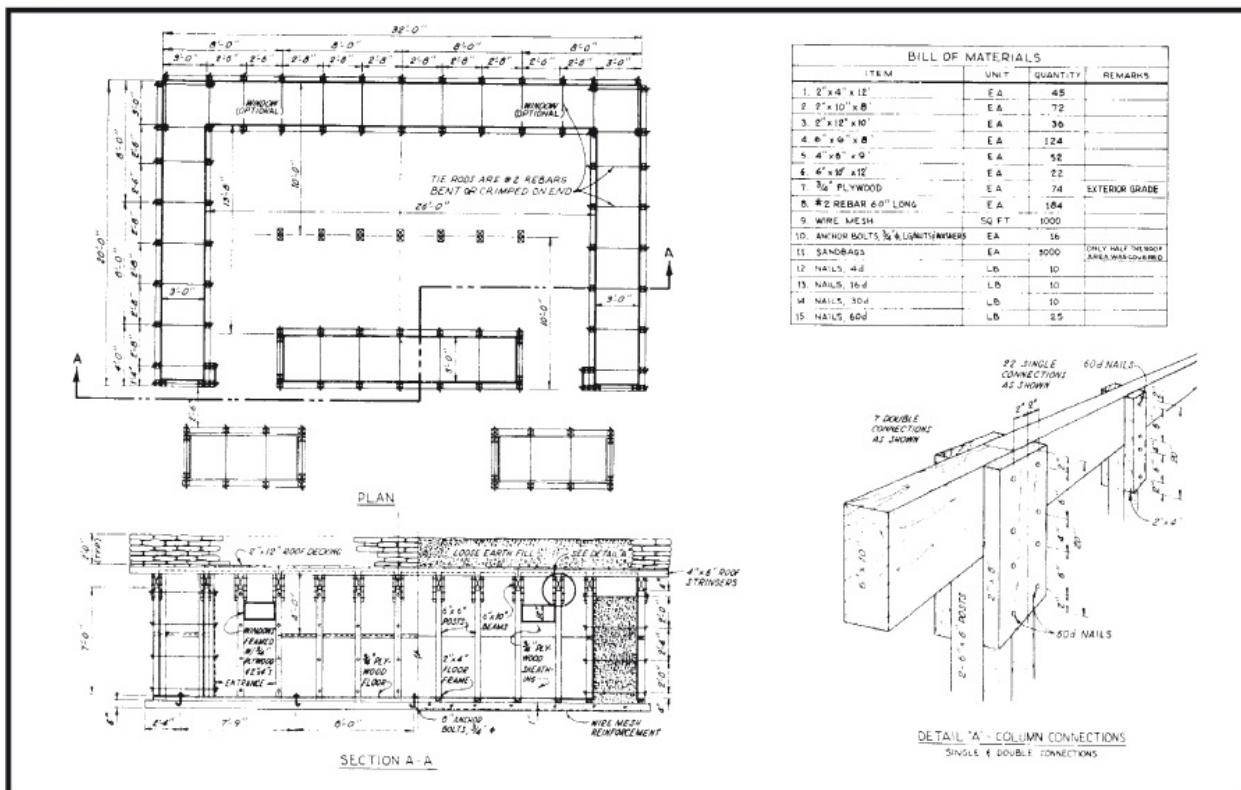
## TIMBER FRAME BURIED SHELTER



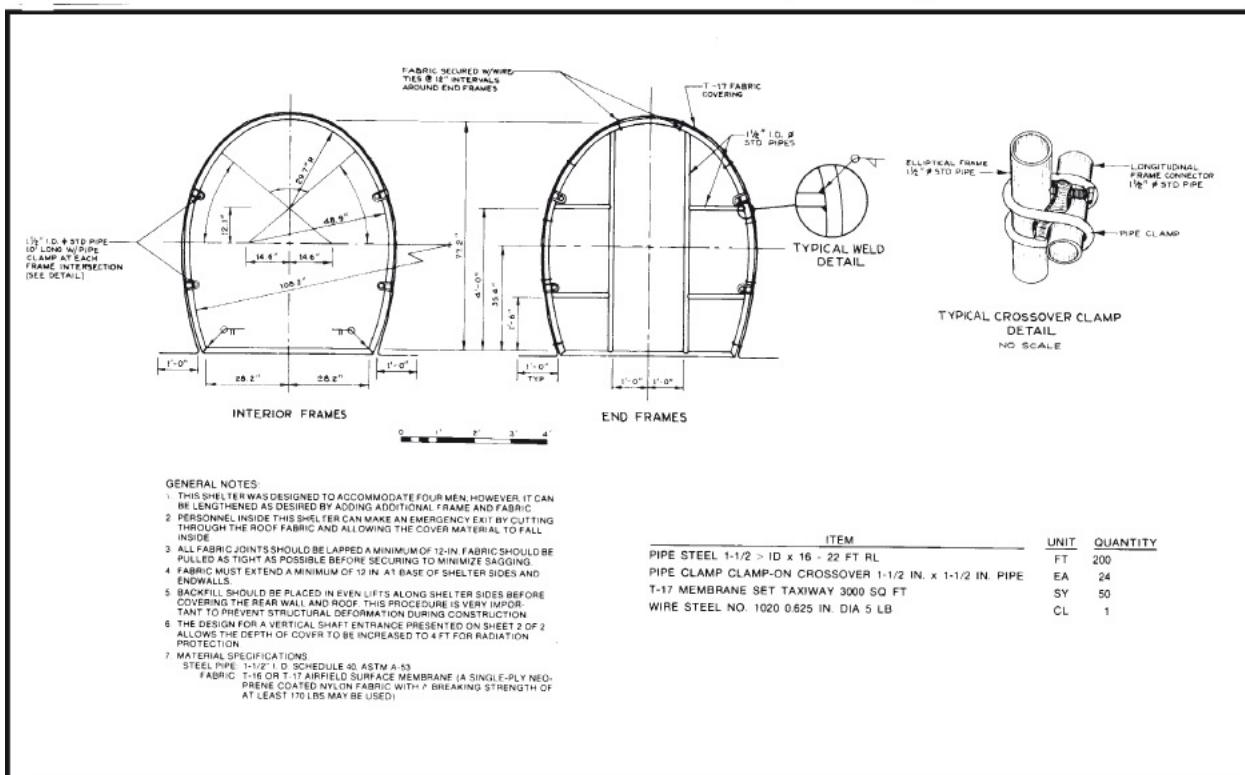
ABOVEGROUND CAVITY WALL SHELTER (sheet 1 of 2)



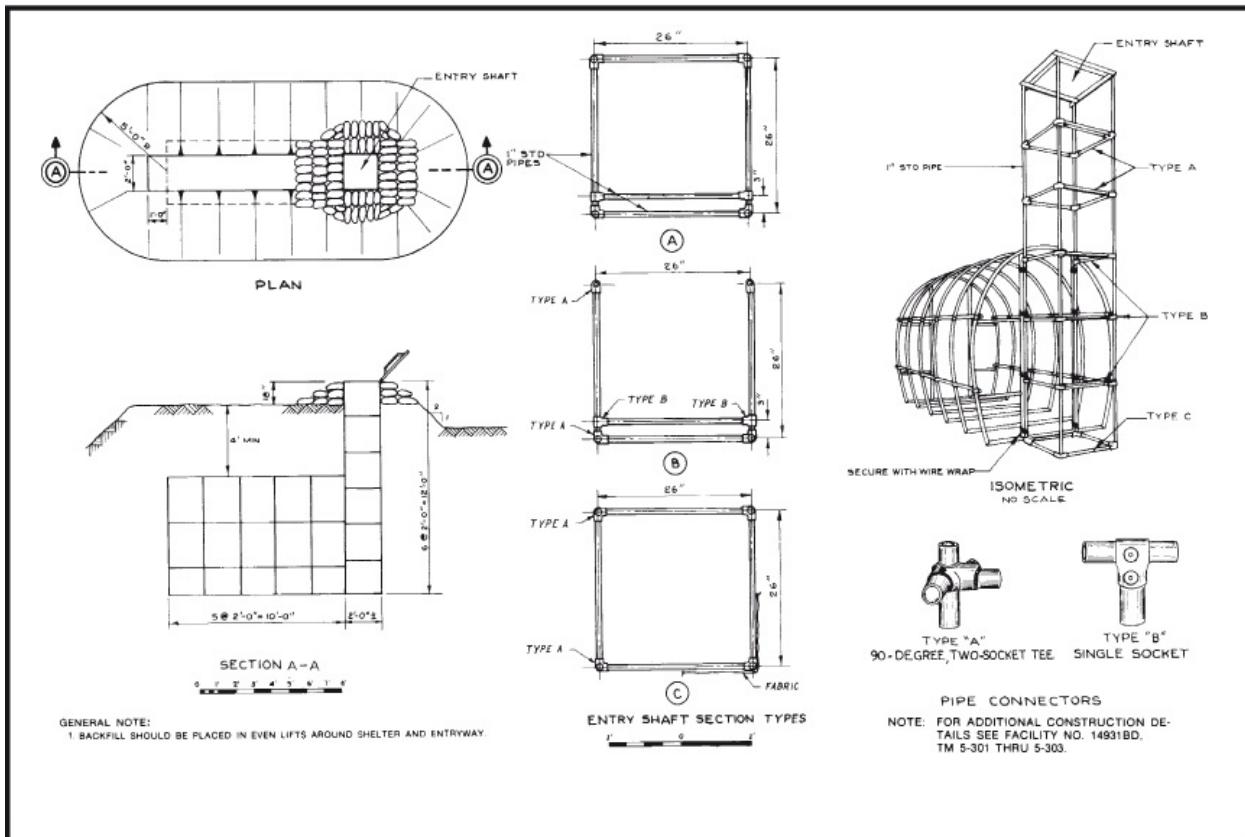
## ABOVEGROUND CAVITY WALL SHELTER (sheet 2 of 2)



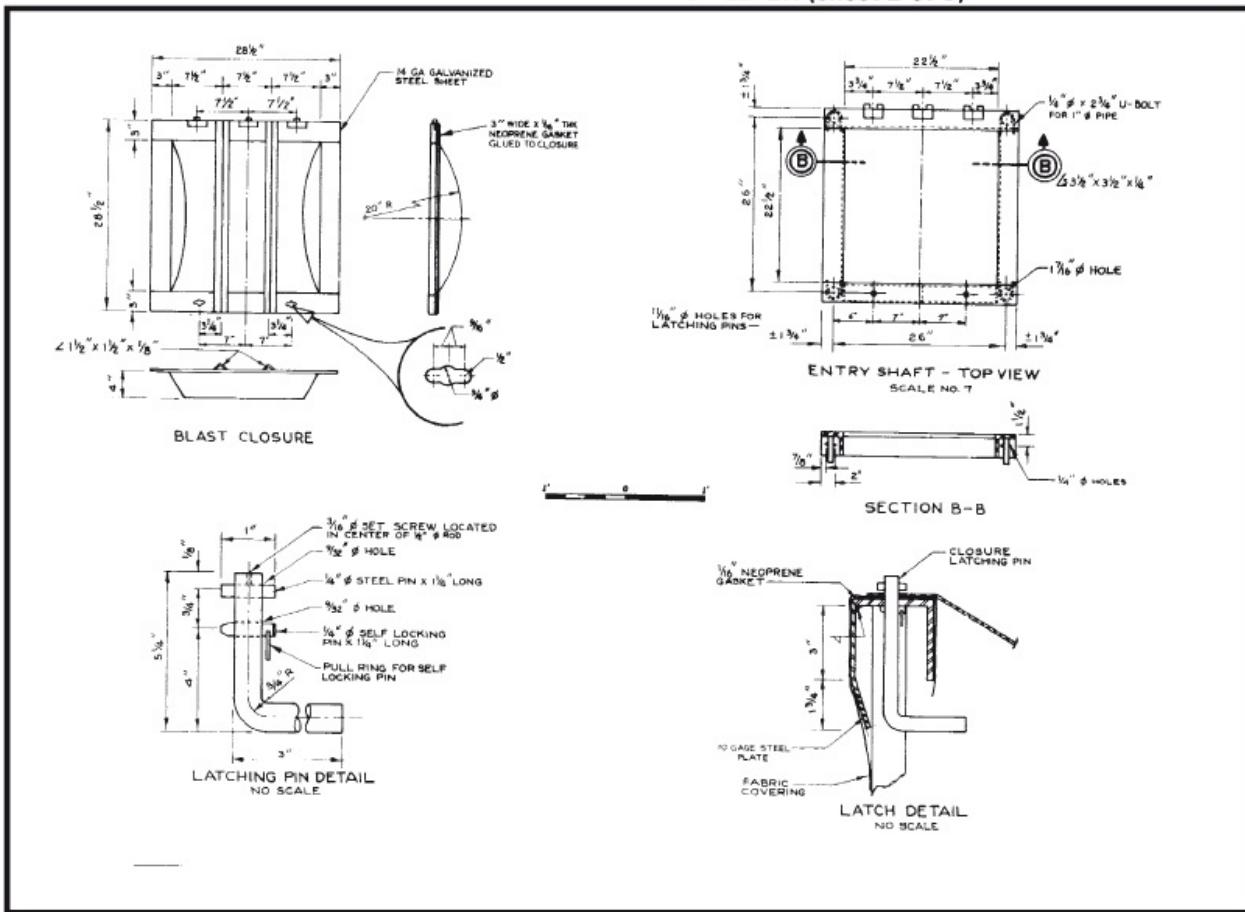
## STEEL FRAME/FABRIC-COVERED SHELTER (sheet 2 of 2)



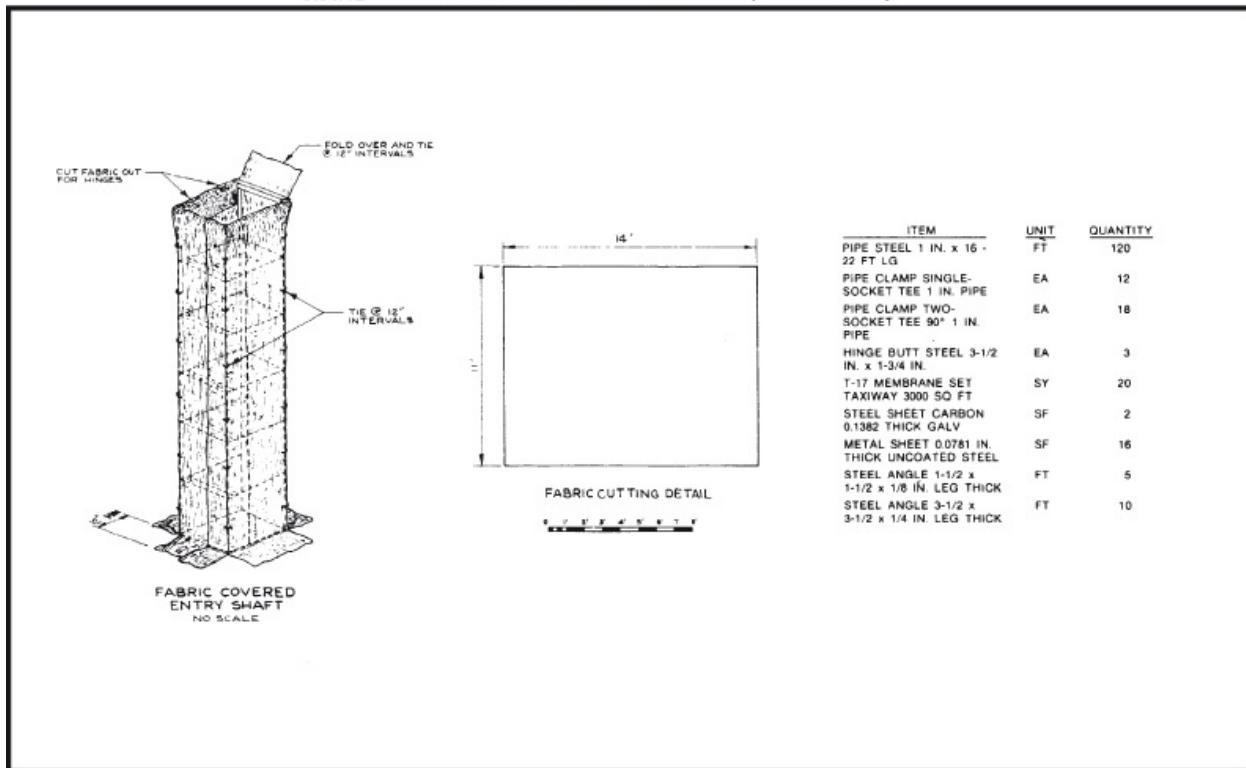
## HARDENED FRAME/FABRIC SHELTER (sheet 1 of 3)



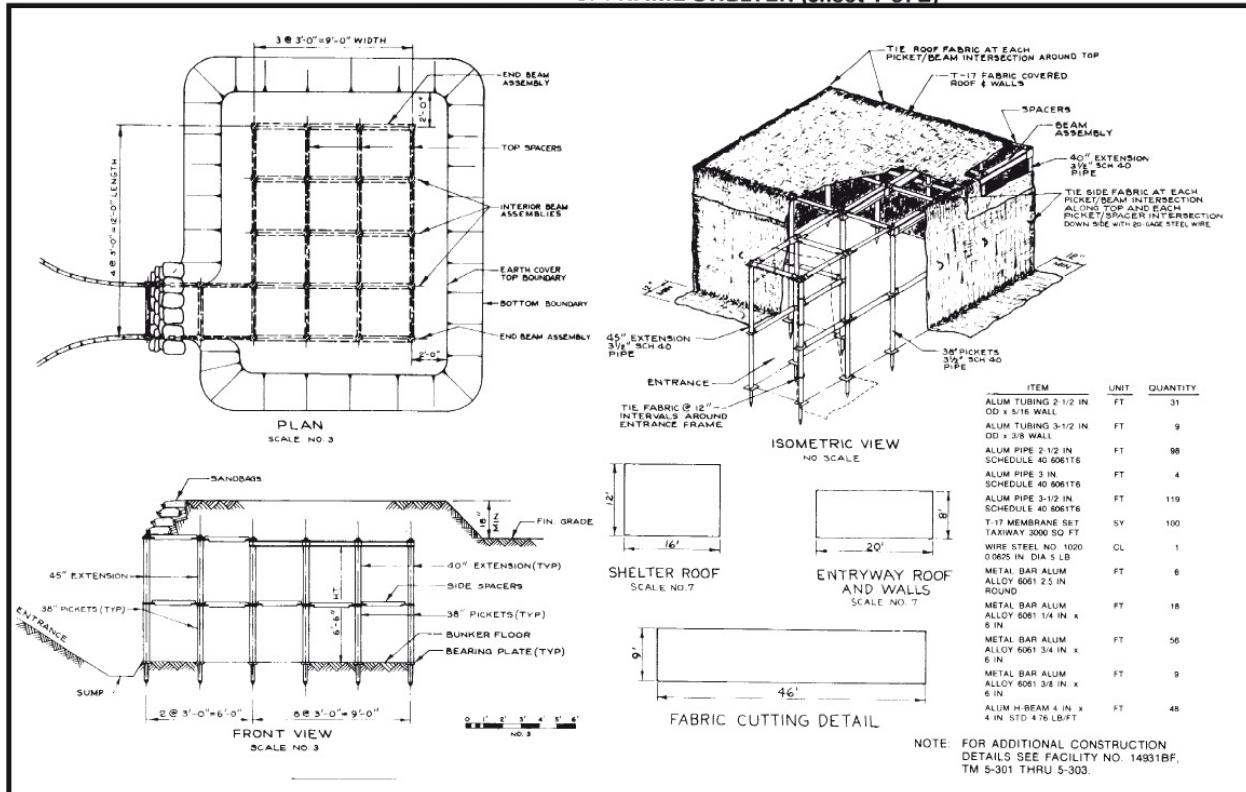
**HARDENED FRAME/FABRIC SHELTER (sheet 2 of 3)**



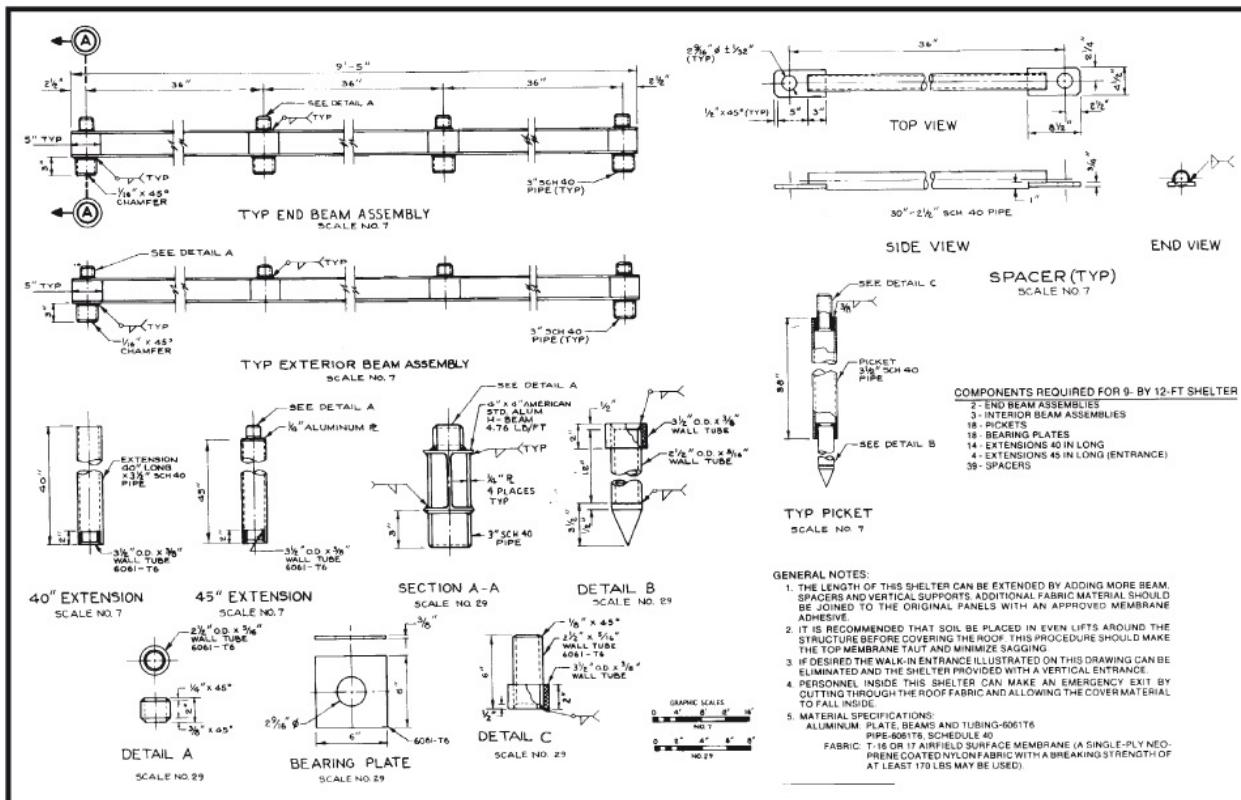
### HARDENED FRAME/FABRIC SHELTER (sheet 3 of 3)



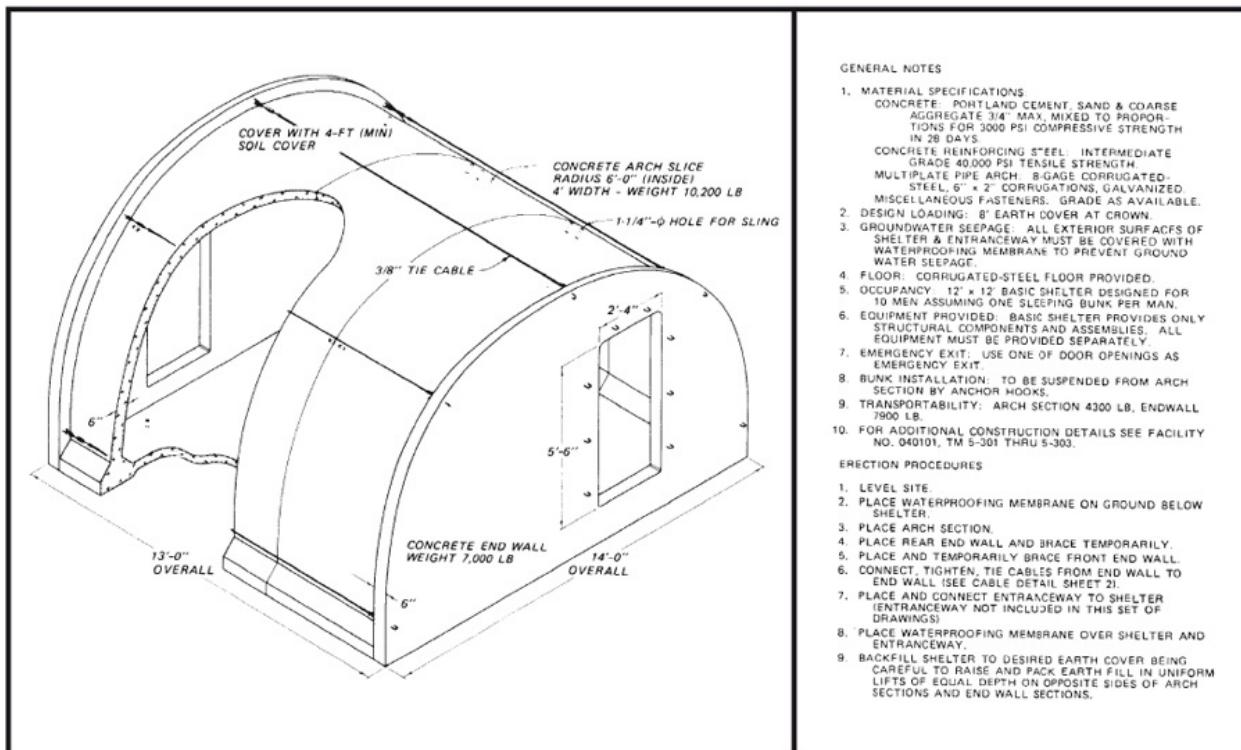
### RECTANGULAR FABRIC/FRAME SHELTER (sheet 1 of 2)



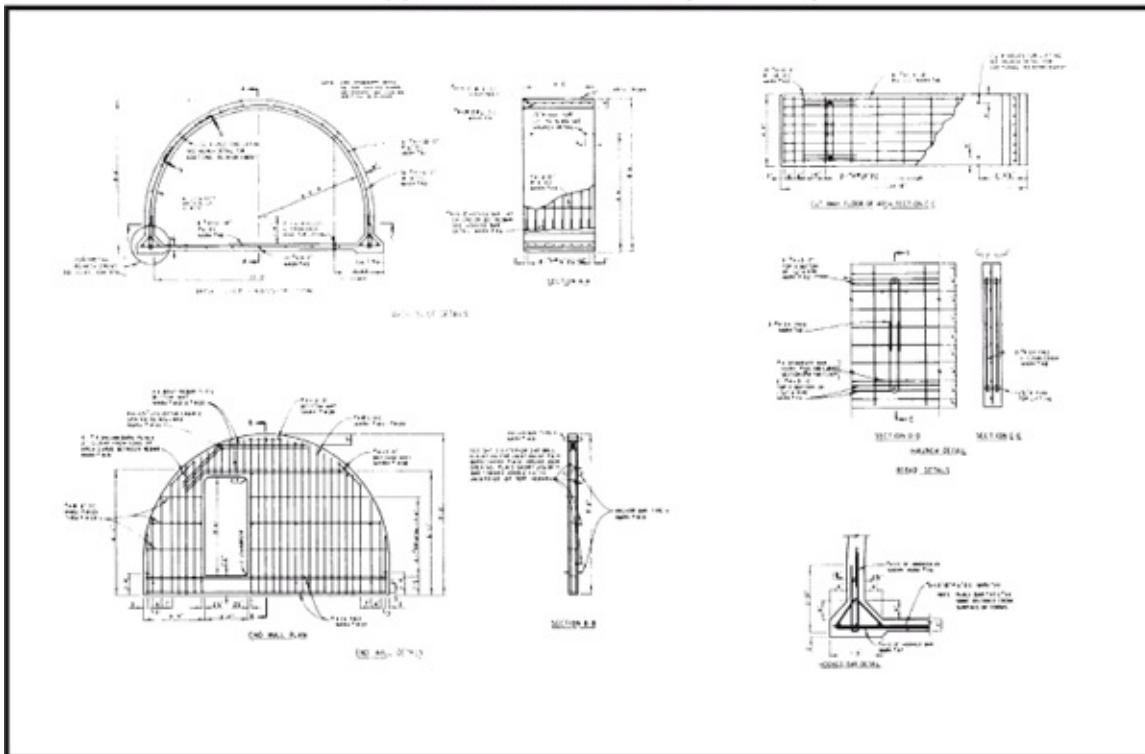
## RECTANGULAR FABRIC/FRAME SHELTER (sheet 2 of 2)



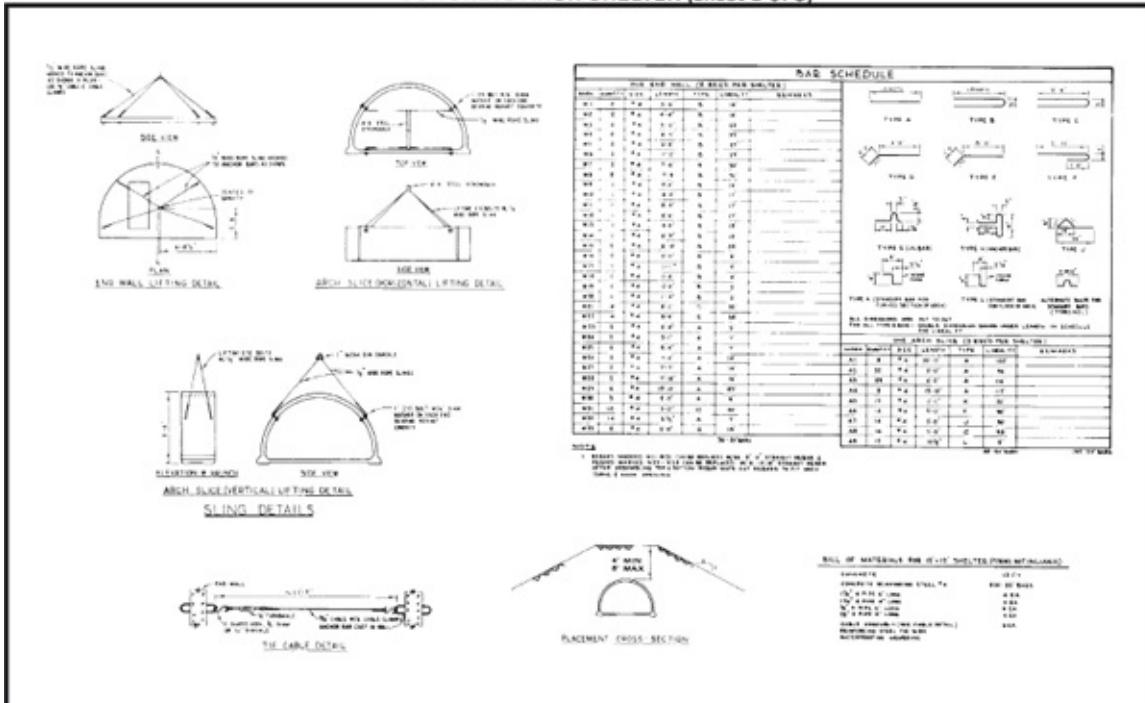
## CONCRETE ARCH SHELTER (sheet 1 of 3)



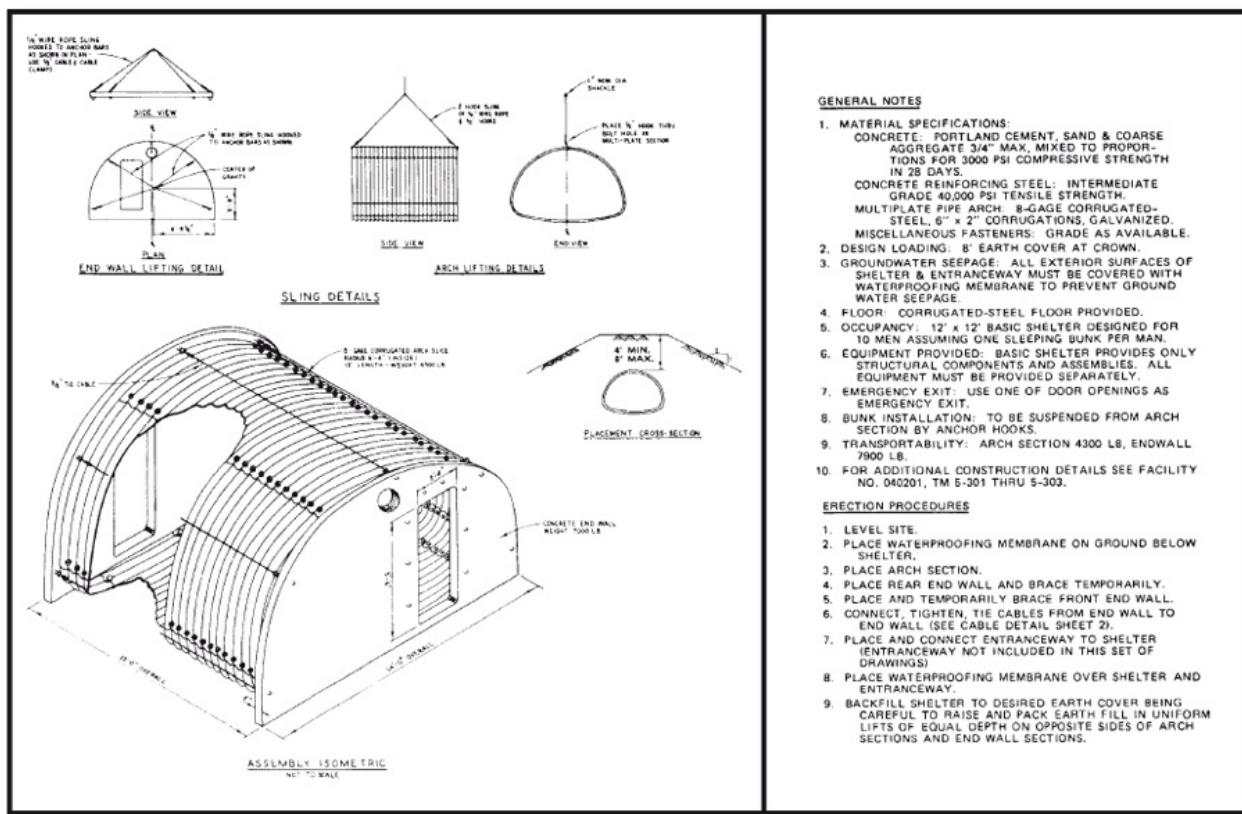
**CONCRETE ARCH SHELTER (sheet 2 of 3)**



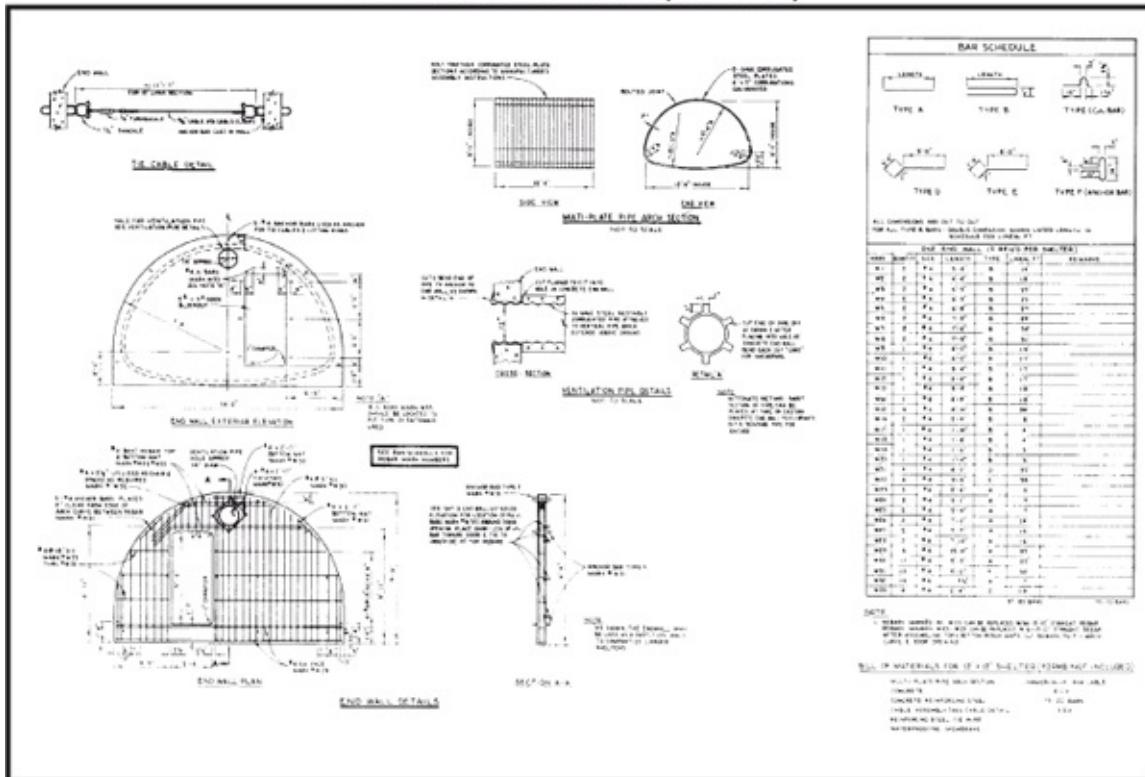
**CONCRETE ARCH SHELTER** (sheet 3 of 3)



**METAL PIPE ARCH SHELTER (sheet 1 of 2)**



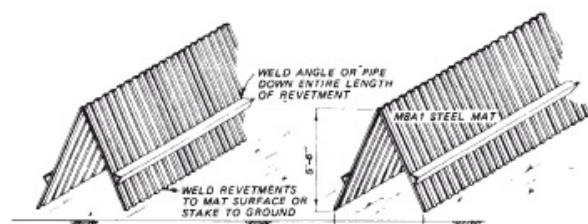
**METAL PIPE ARCH SHELTER (sheet 2 of 2)**



### STEEL LANDING MAT WALL

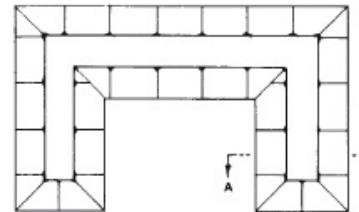
REMOVE END OF CONNECTOR PINS  
CUT THROUGH SMALL CORRUGATION TO ALLOW FOLDING OF MAT ALONG CENTERLINE

ELEVATIONS

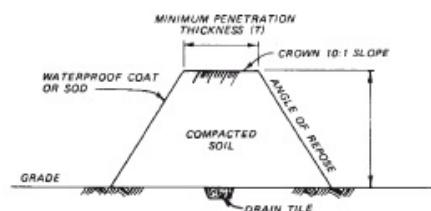


PICTORIAL VIEW

### EARTH WALLS



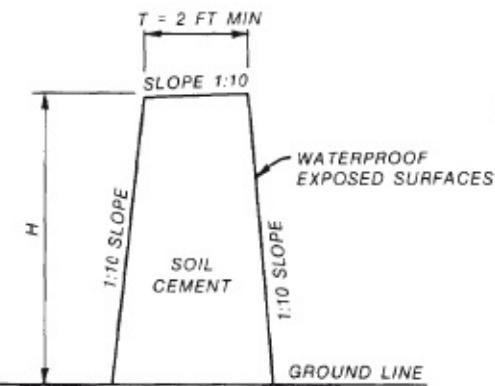
PLAN



SECTION A-A

NOTE: WATERPROOFING MAY BE ASPHALT CUTBACK OR CEMENT SURFACE. TRAFFIC ON THE REVETMENT MUST BE PROHIBITED IN ORDER TO PRESERVE THE WATERPROOF COATING.

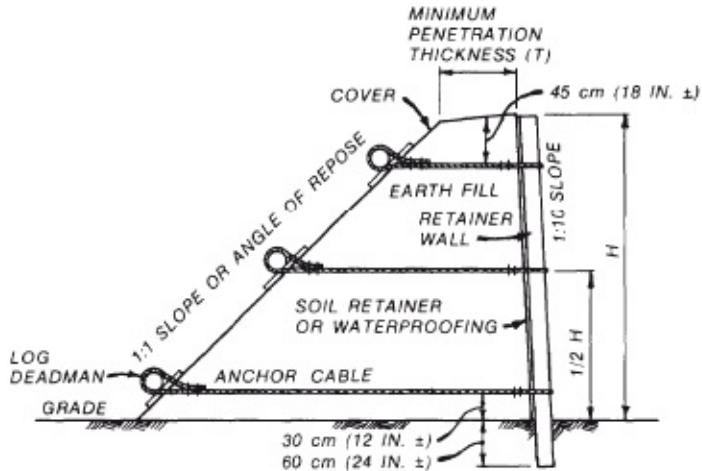
### SOIL-CEMENT WALL



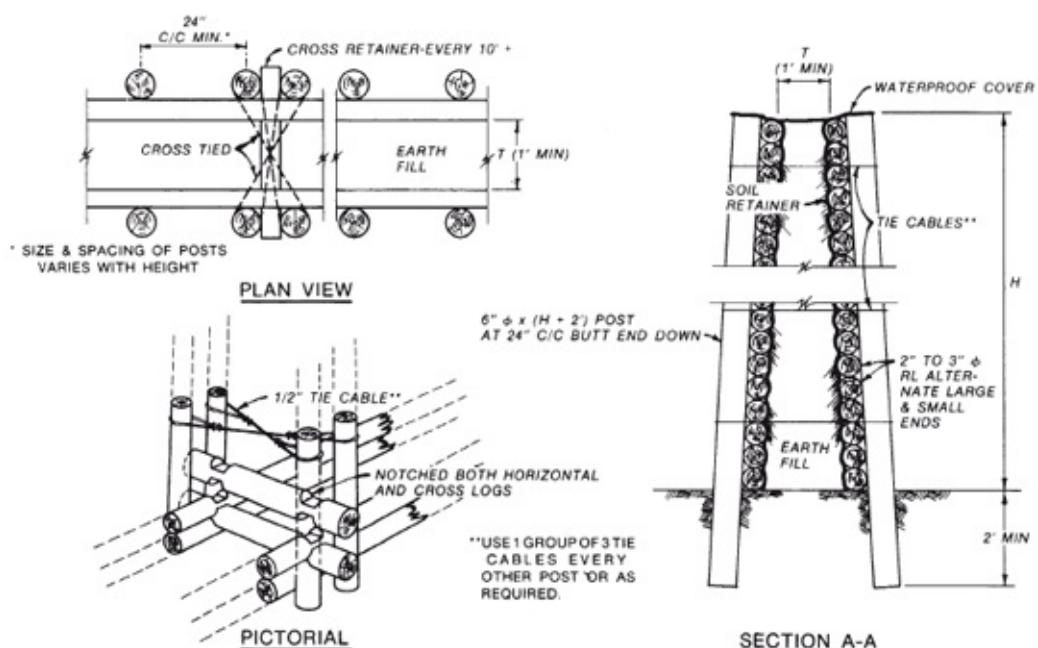
NOTE: SOIL-CEMENT MIXTURE CONSIST OF ONE (1) PART PORTLAND CEMENT TO TEN (10) PARTS SOIL. PROPORTIONS ARE MIXED BY WEIGHT.

FOOTER MAY BE NECESSARY IN LOW BEARING SOILS AND/OR LARGE VALUE OF H.

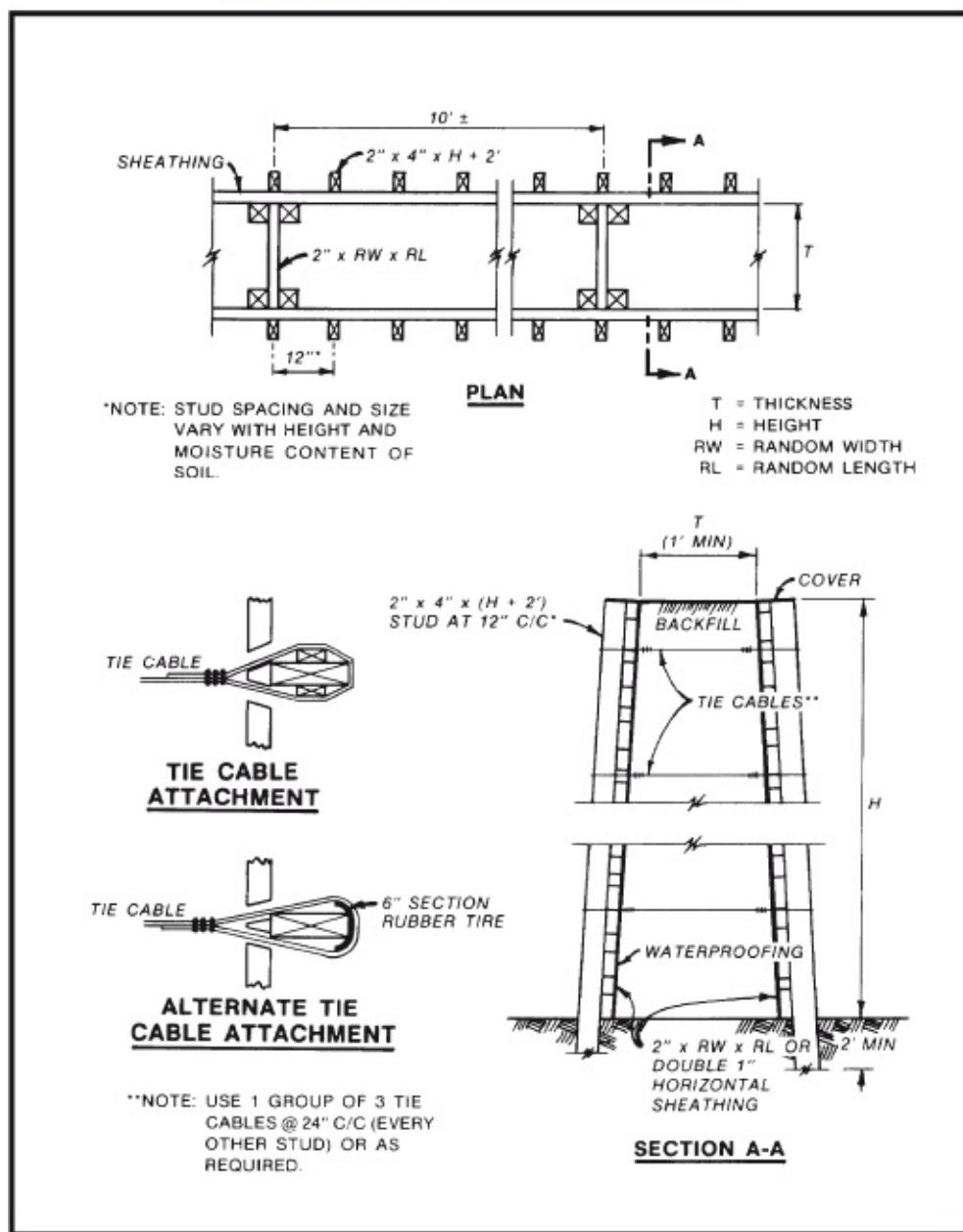
## EARTH WALL WITH REVETMENT



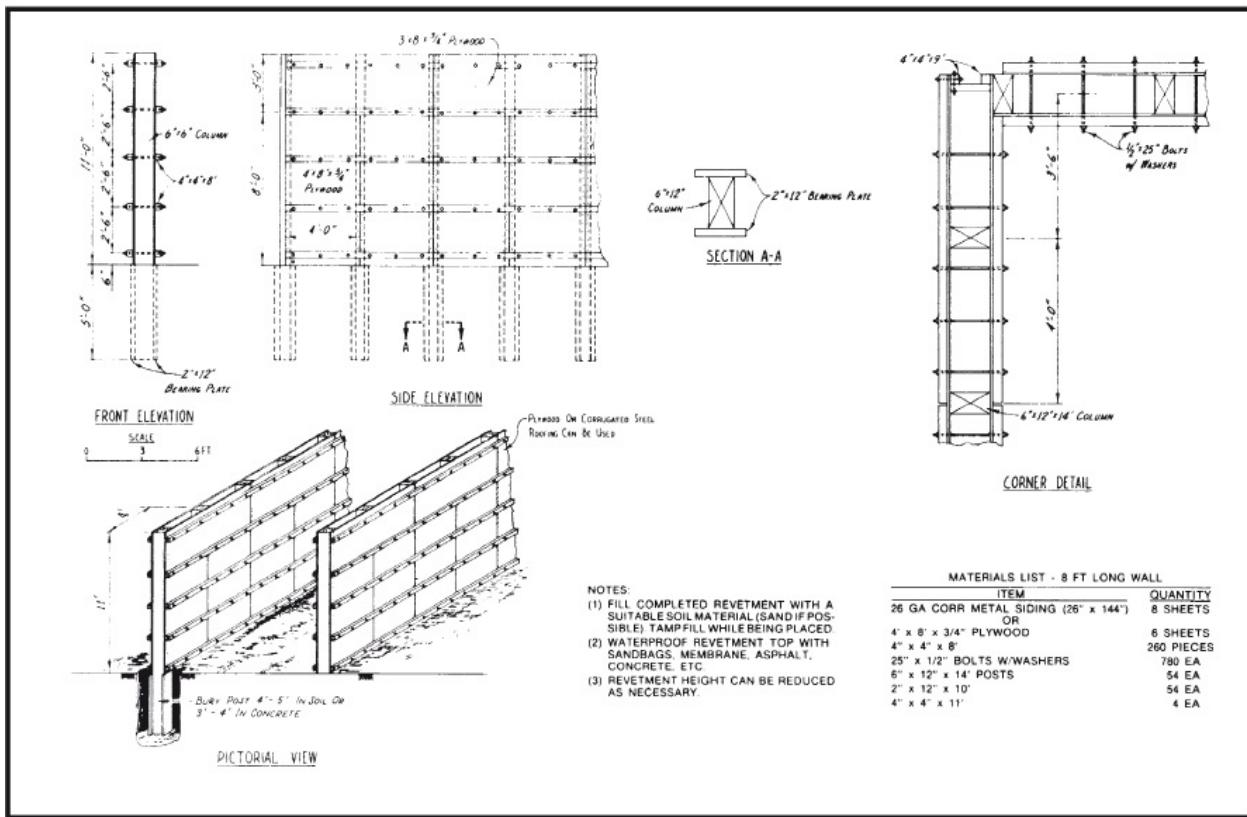
## SOIL BIN WALL WITH LOG REVETMENT



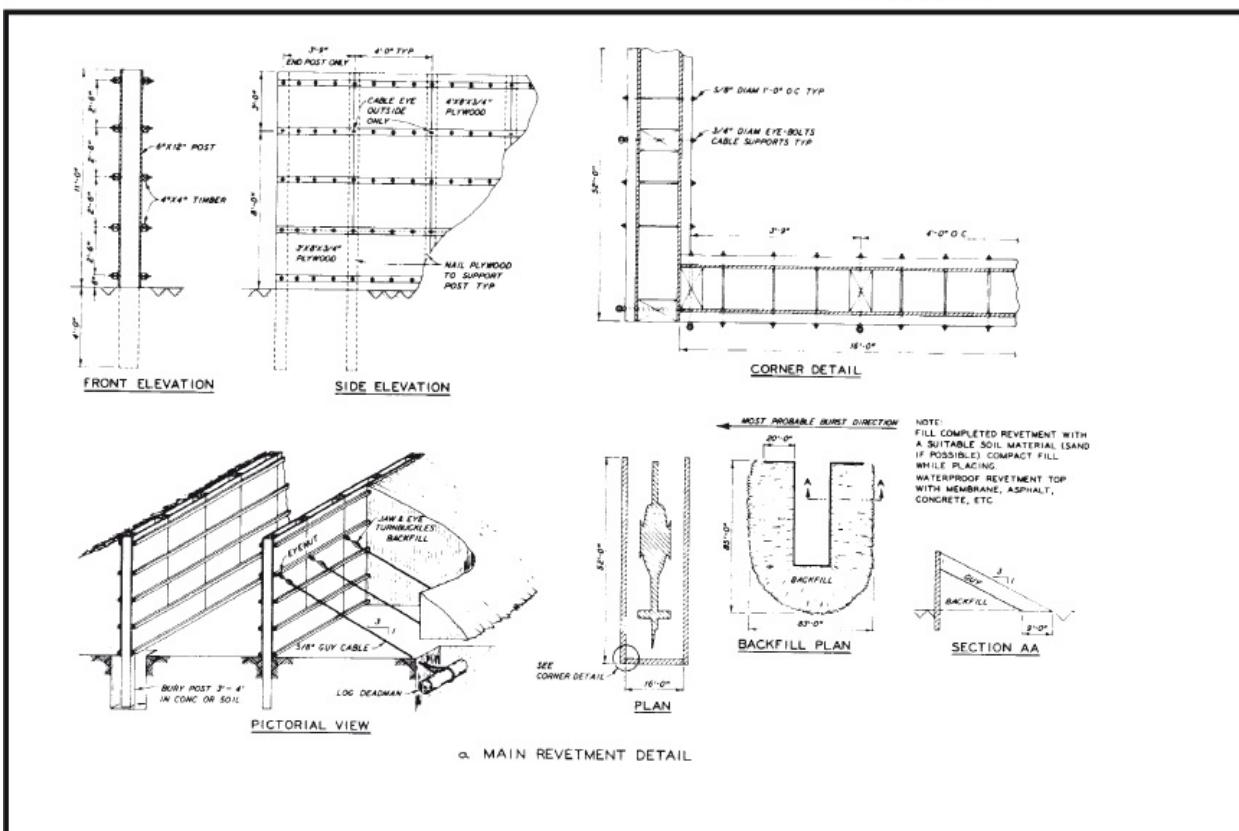
## SOIL BIN WALL WITH TIMBER REVETMENT



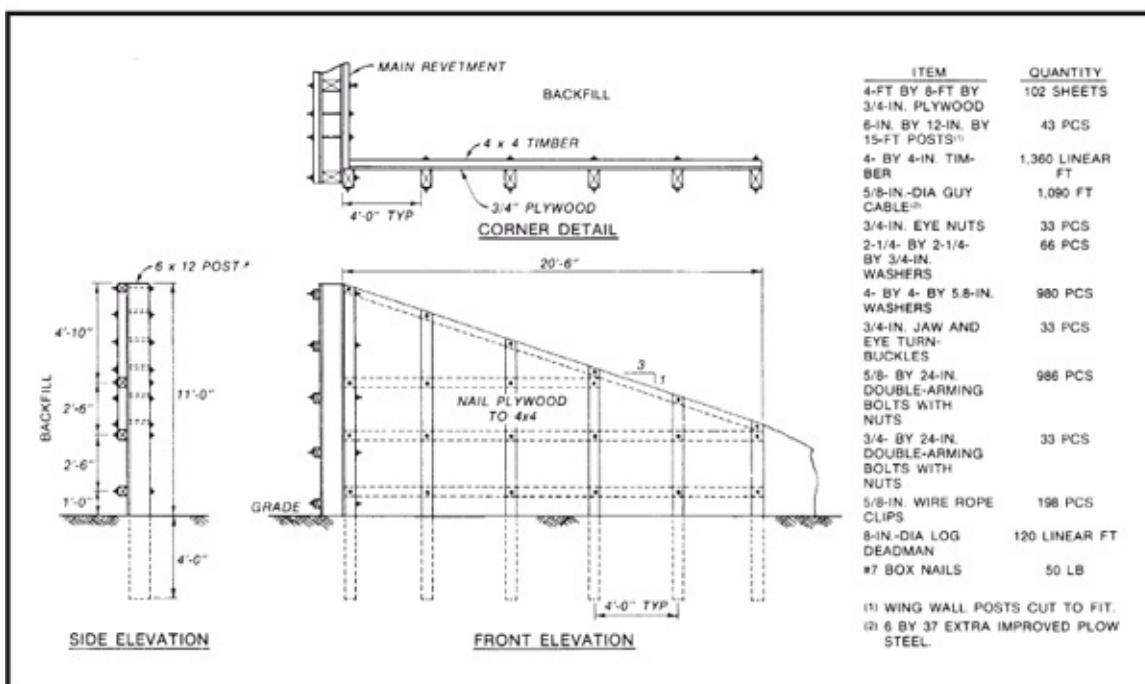
## **SOIL BIN WALL WITH PLYWOOD REVETMENT**



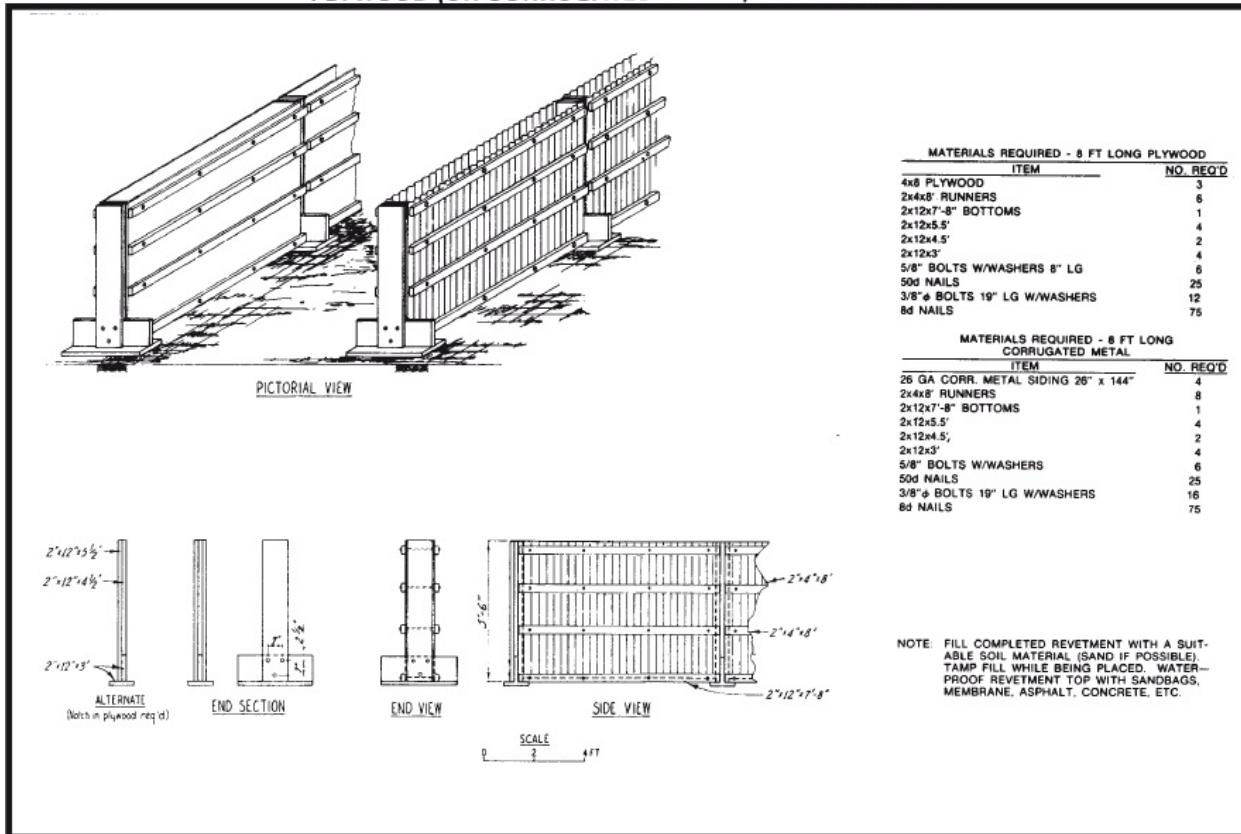
## HARDENED SOIL BIN WALL WITH PLYWOOD REVETMENT (sheet 1 of 2)



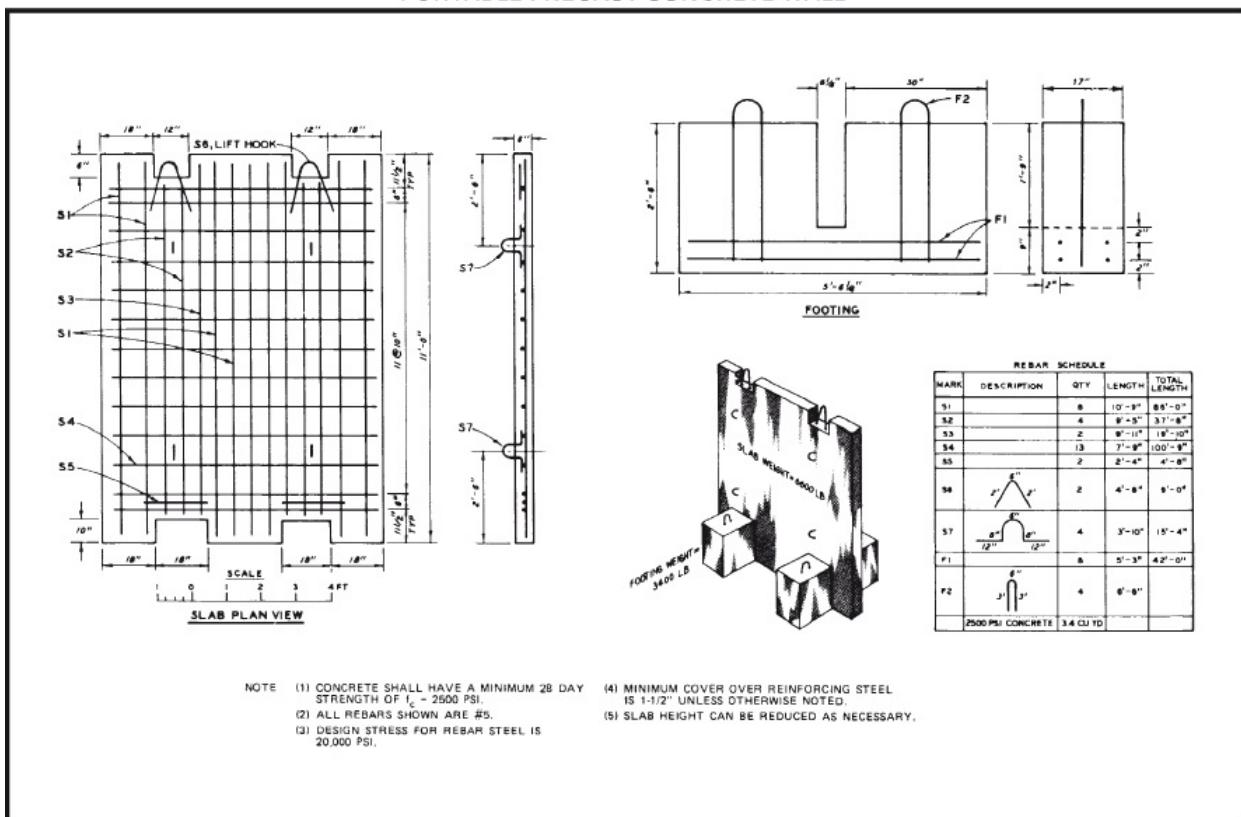
## HARDENED SOIL BIN WALL WITH PLYWOOD REVETMENT (sheet 2 of 2)



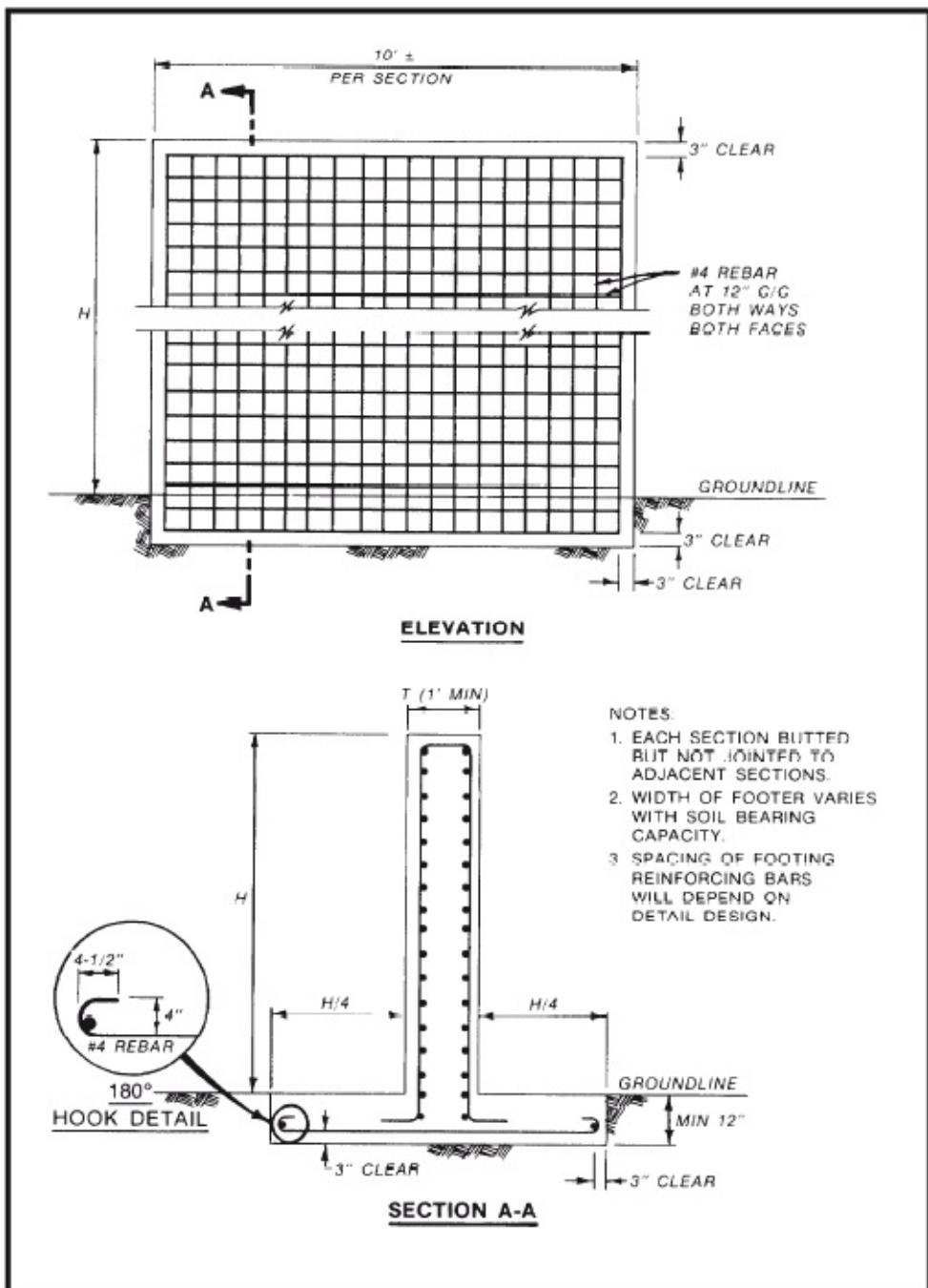
## PLYWOOD (OR CORRUGATED METAL) PORTABLE WALL



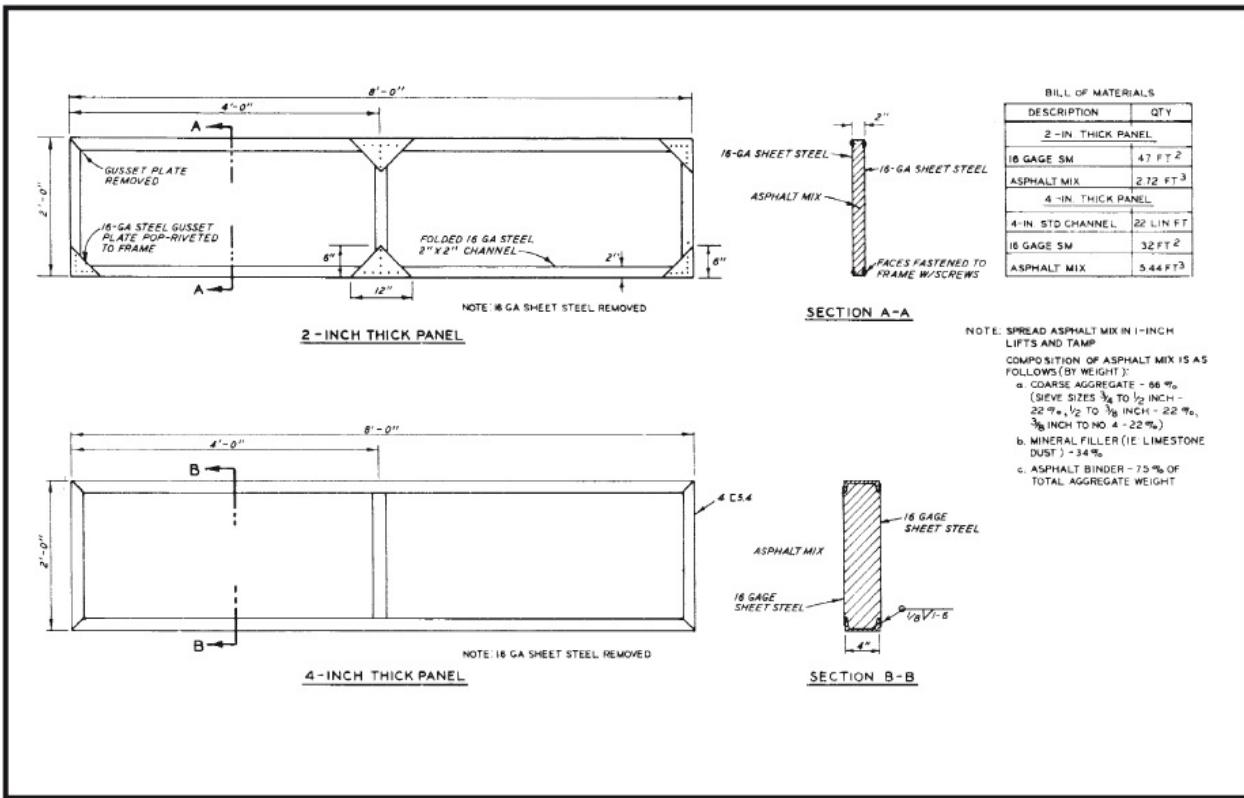
## PORTABLE PRECAST CONCRETE WALL



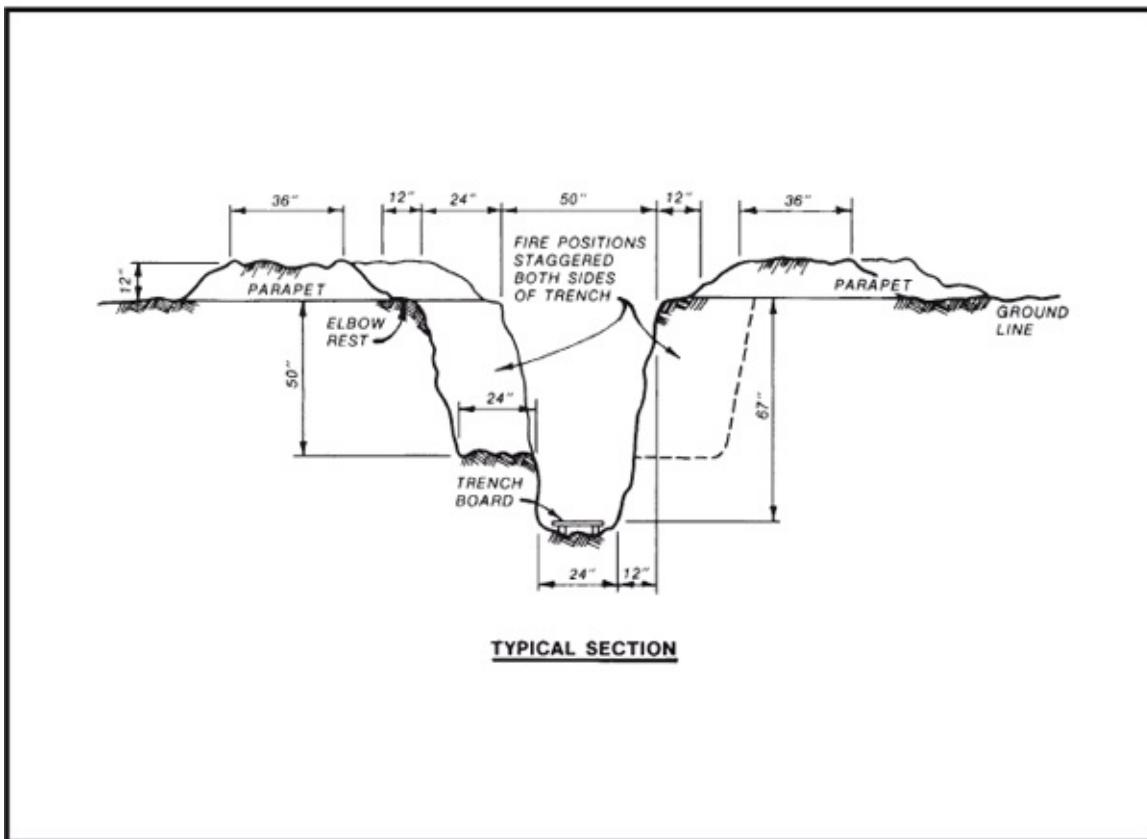
## CAST-IN-PLACE CONCRETE WALL



## **PORTABLE ASPHALT ARMOR PANELS**



## **STANDARD FIGHTING TRENCH**



### VEHICLE FIGHTING POSITIONS (DELIBERATE)

Vehicle Type DELIBERATE <sup>1</sup>	Position Dimension, ft <sup>2</sup>			Turret Depth (D) <sup>5</sup>	Weapon System Deflection	Evaluation	Volume of Earth Moved (cy)			Equipment Hours <sup>4</sup>		
	Length (A)	Width (B)	Hull Depth (C) <sup>5</sup>				Hull	Turret <sup>6</sup>	Total <sup>7</sup>	Hull	D7 Dozer/M9 ACE Turret <sup>6</sup>	Total <sup>7</sup>
M113 series carrier <sup>3</sup>	22	14	6	7 <sup>1/2</sup>	—	—	69	124	193	0.6	1.0	1.6
M901 improved TOW vehicle	22	14	7	9	-10°	+30°	80	148	228	0.6	1.1	1.7
M2 and M3 fighting vehicle	26	16	7	10	-10° gun -10° TOW	+60° +30°	108	218	326	0.8	1.7	2.5
M1 main battle tank	32	18	5 <sup>1/2</sup>	9	-10°	+20°	118	268	386	0.9	2.0	2.9
M60 series main battle tank	30	18	6	10	-10°	+20°	120	278	398	0.9	2.1	3.0
M48 series battle tank	30	18	6	10	-10°	+20°	120	278	398	0.9	2.1	3.0

**Notes:**

1. Hasty positions for tanks, IFVs, and ITVs not recommended.
2. Position dimensions provide an approximate 3-foot clearance around vehicle for movement and maintenance and do not include access ramp(s).
3. Includes M132 flamethrower and M103 Vulcan.
4. Production rate of 100 bank cubic yards per .75 hour. Divide construction time by 0.85 for rocky or hard soil, night conditions, or closed hatch operations (M9). Ripper needed if ground is frozen. Use of natural terrain features will reduce construction time.
5. All depths are approximate and will need adjustment for surrounding terrain and fields of fire.
6. Turret volume (c) plus approach volume (b). Path length (E) is approximately  $\frac{1}{2}(A)$ .
7. Hull volume (a) plus approach volume (b) plus turret volume (c).

**Side views**

