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Construction Manual for 3500 gal. Ferrocement
Water Tank

by: E. H. Robinson

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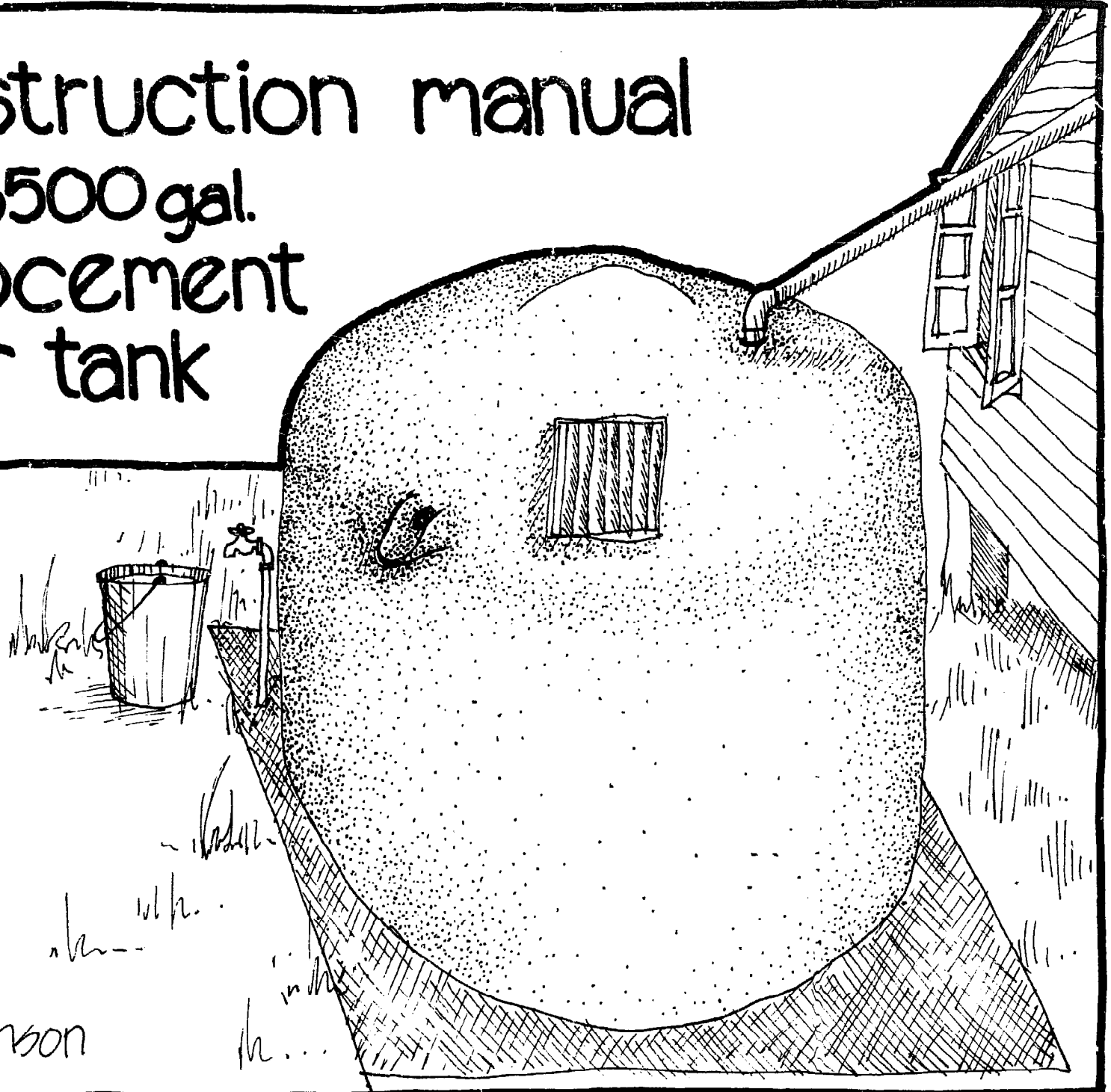
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construction manual for 3500 gal. ferrocement water tank



by E. H. Robinson

equipment:

shovels
pickaxe
hammer
woodsaw
hacksaw
string line

water containers
wire snips
trowel
spirit level
tape measure
wheel barrow

materials list: formwork

3' x 3' galvanized sheeting
16 sheets - 6' x 30" corrugated galvanized
2 - 2x4x10
2 - 2x4x12
16 - 2x2x12
2 - 1x2x12
2lbs - 2" and 2 1/2" nails

#

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note: the formwork is reusable and for projects involving more than one tank, the cost of the formwork can be shared.

materials list: the tank

#

water tap (1/2") 3-90° elbows; 7'-1/2" galv. pipe; 1-tap
4 rolls soft tie wire
32 sacks cement
56 lengths - 20' x 1/4" steel
3 lengths - 20' x 1/2" steel
35 yds of 4' wide, 1" hex mesh wire (galvanized)
1 - 2x2x10' (hatch cover)
1 - 2'x2' galvanized sheeting (hatch cover)
1 - 1'x2' fine screen mesh (insect protection)
waterproofing agent for cement mortar

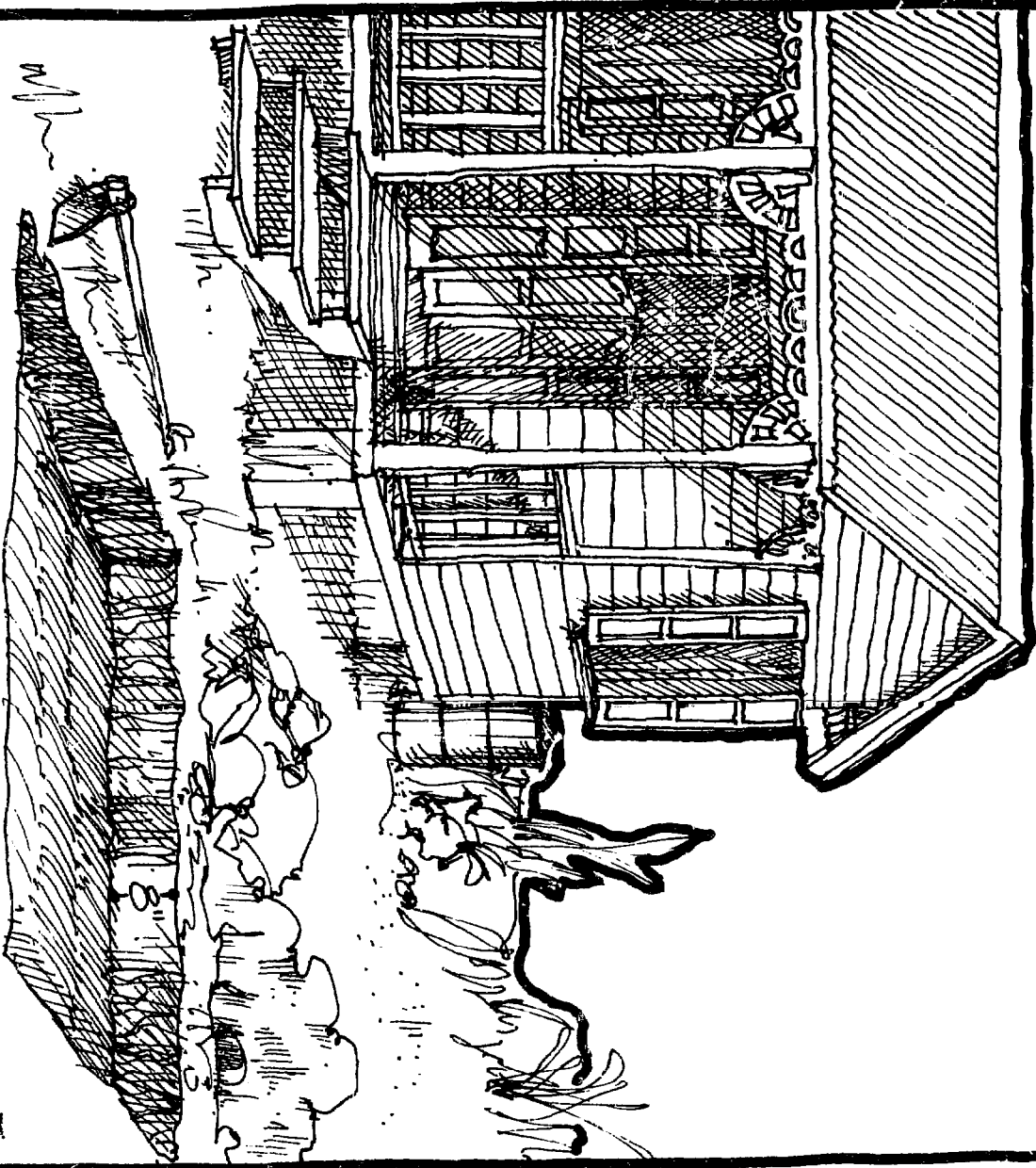
60 cu. ft. of 4" stone
60 cu. ft. of 2" stone
38 cu. ft. of sand
14 cu. ft. of gravel

tank dimensions: 10' diameter
6' wall height
7'-6" to roof top

A pit is dug for the foundation of the tank.

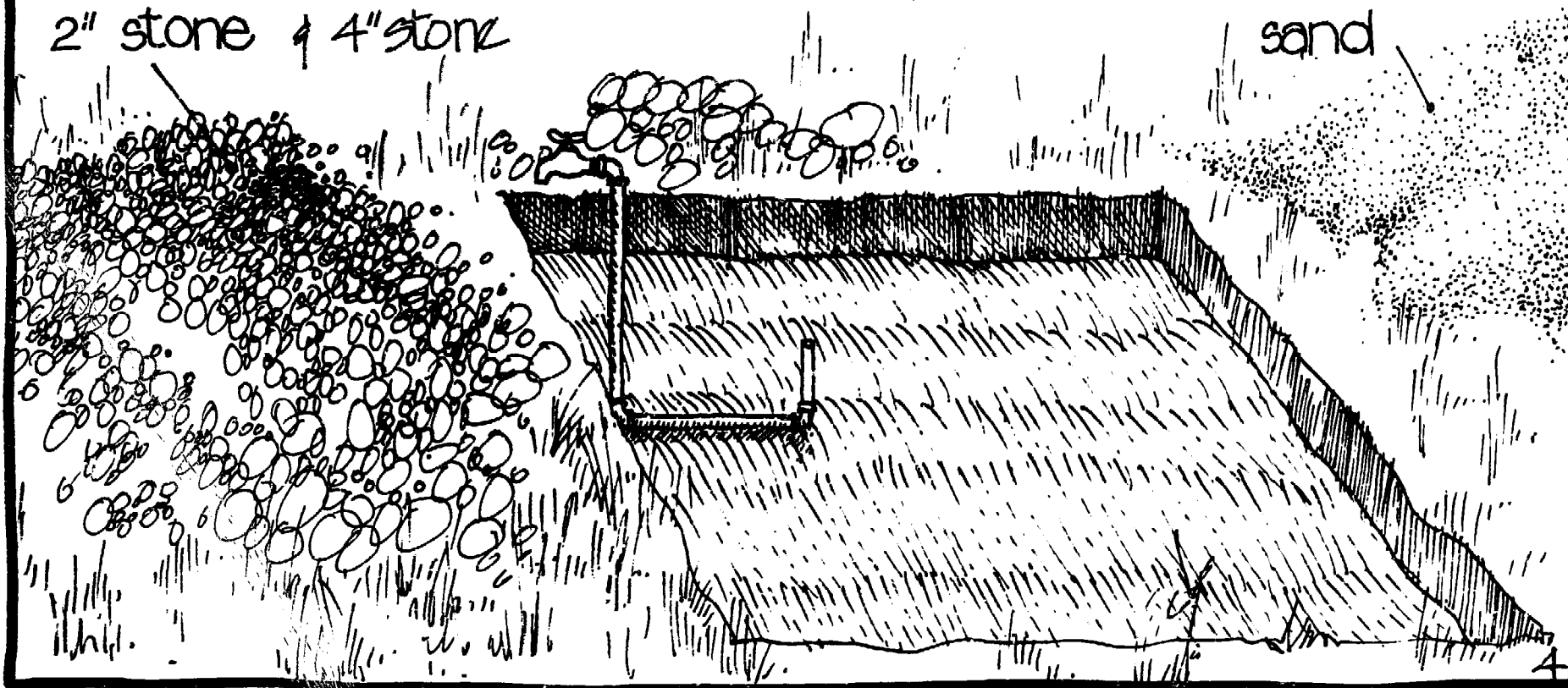
The pit measures 12 feet x 12 feet

and should be a minimum of 8 inches in depth. If on soils, undisturbed earth, on clay and fill, the pit should be at least 12" deep.



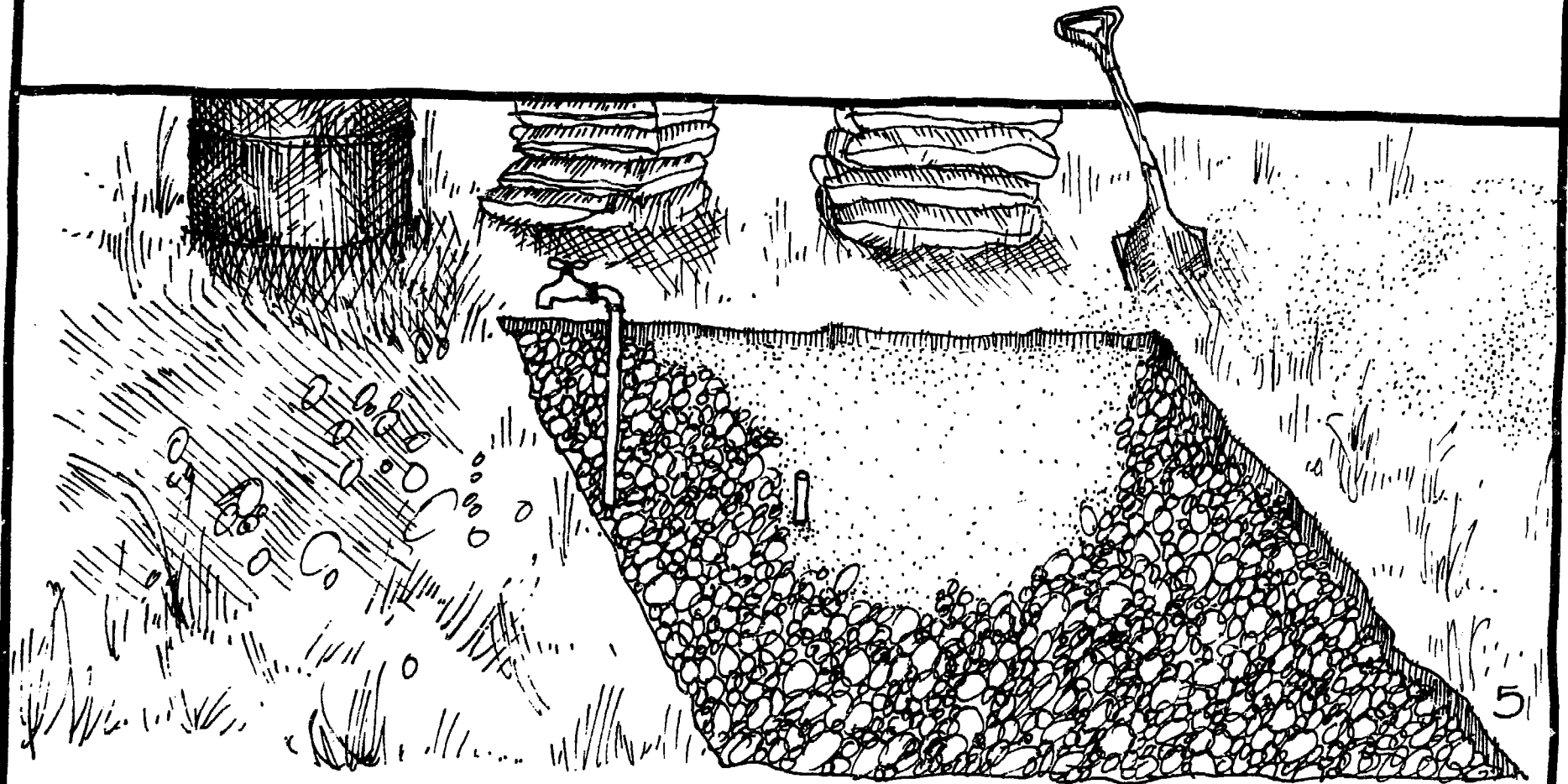
the water pipe with tap is placed at the desirable location and then the pit is filled with a layer of 4" stone and then a layer of 2" stone. this is then covered with a thin layer of sand.

note: place the tap about 6" from the edge of the pit.

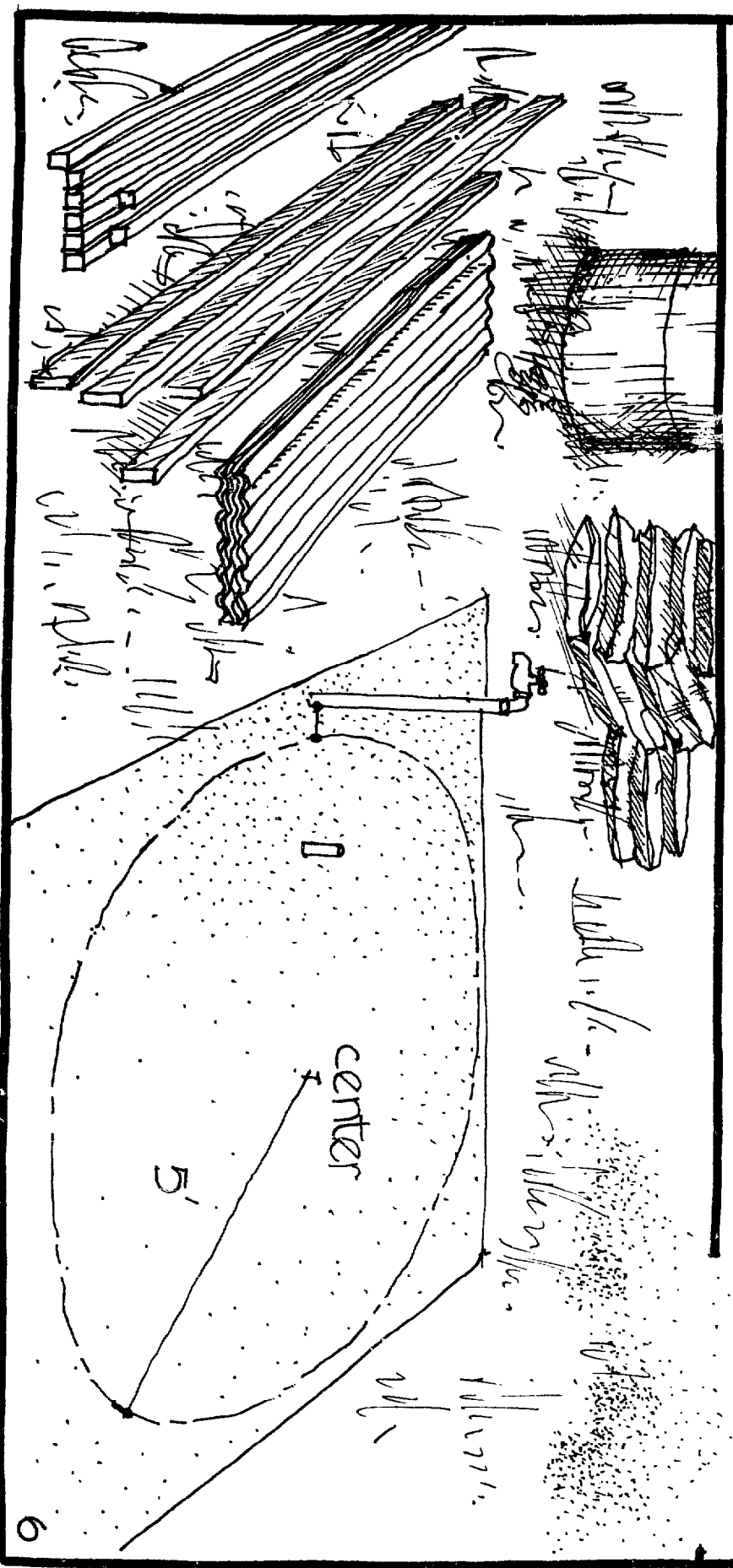


cement mixed: 1 part cement to 2 parts sand
to 4 parts gravel.

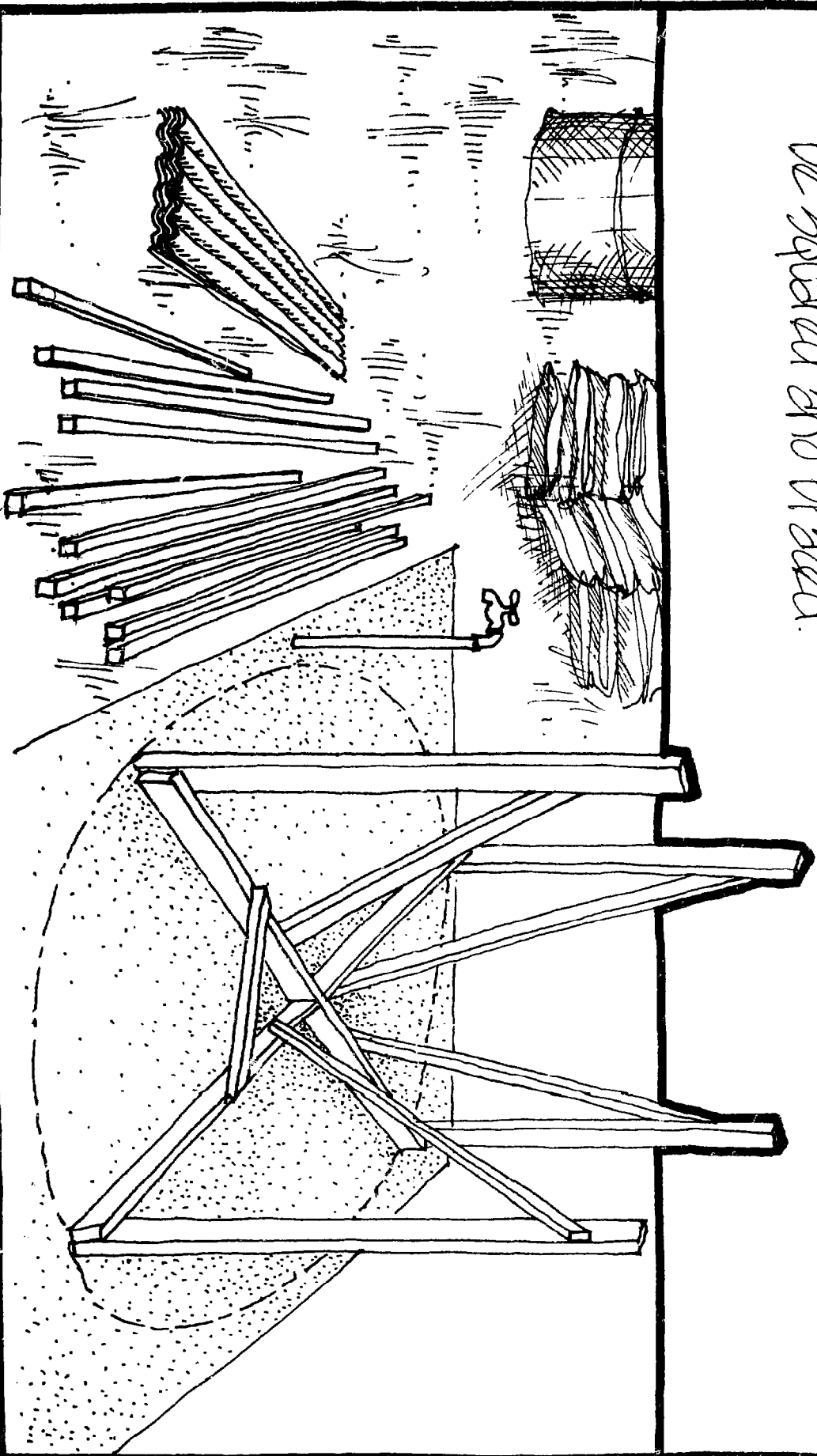
a 3" depth concrete slab is then cast covering the
12' x 12' stone and sand bed and securing the water
pipe. this is allowed to dry.



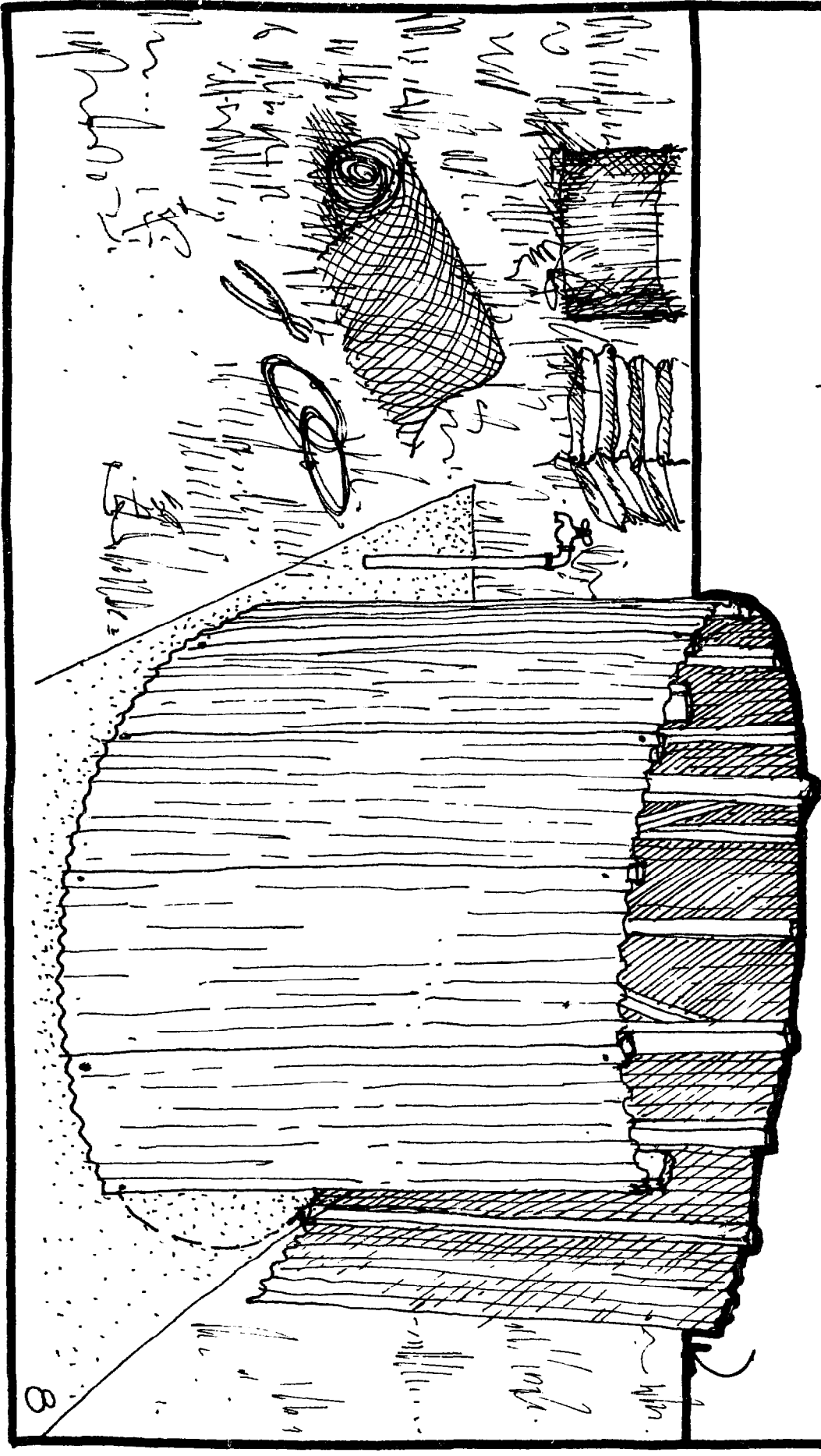
When the slab has dried, the center point of the slab is marked with a driven nail to which is tied a 5 foot length of string having chalk tied to the other end. This marks a 10 ft. circle for the positioning of the formwork. The circle should be adjusted to clear the water tap by 4 to 6".



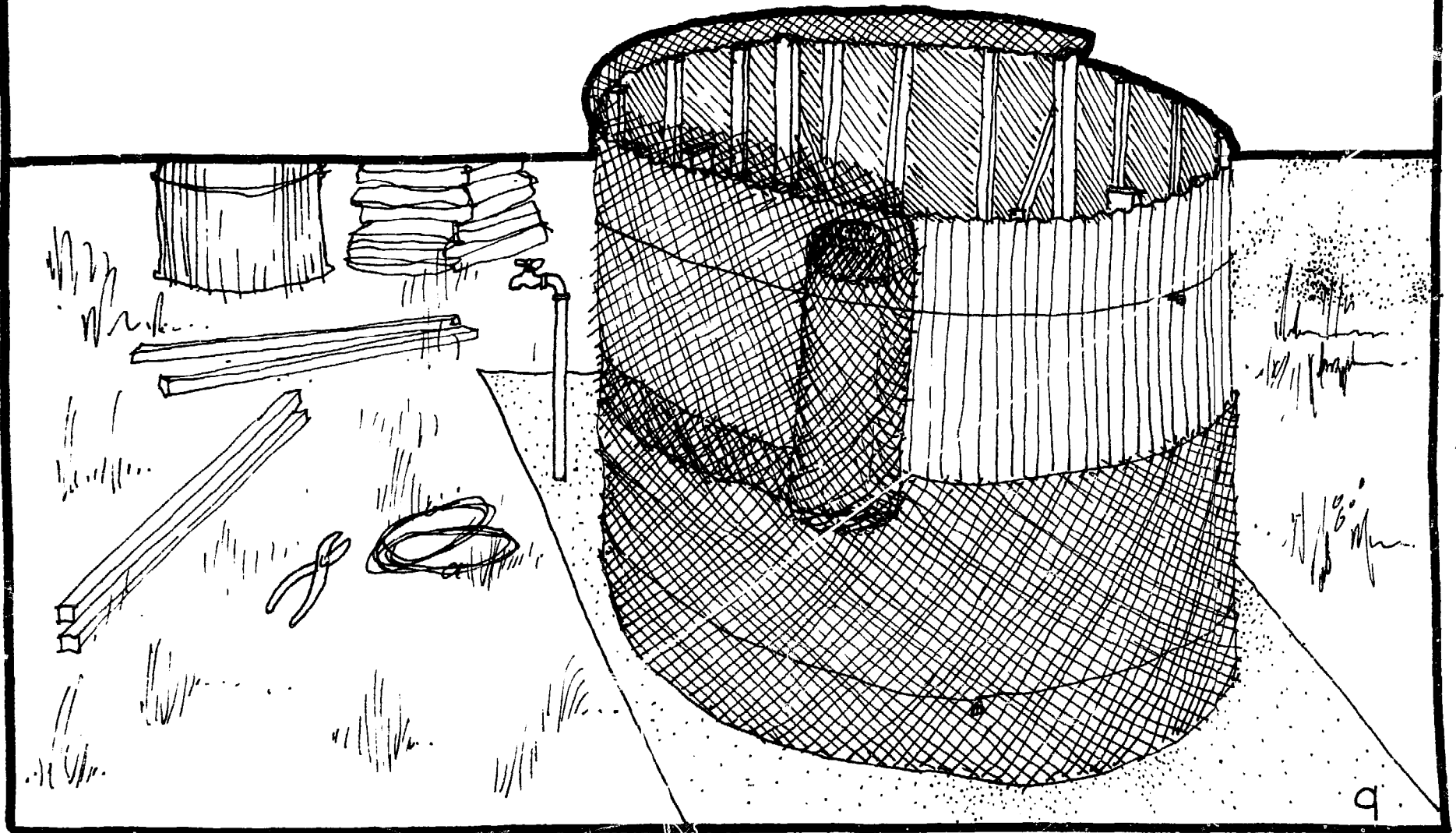
THE 10ft. 2x4's ARE NOTCHED halfway TO MAKE AN
EQUAL CROSS AND SECURED TO THE SLAB. THE 12ft
2x4's ARE CUT INTO 6ft. LENGTHS AND NAILS UPRIGHT TO
THE 4 ENDS OF THE CROSS. THE UPRIGHTS ARE THEN
PLUMBED AND BRACED WITH 2x2's. THE CROSS SHOULD ALSO
BE SQUARED AND BRACED.



the roofing sheets are nailed to 6ft. 2x2's and overlapped 1 corrugation. loosely nail at the top and bottom for easy removal. the sheets are tacked to the 2x4 uprights leaving one sheet un-nailed allowing entry for someone to construct a brace at the top, plumbing all the 2x2 posts from the inside.



soft wire can be tied tightly around the galvanized sheets at top and bottom allowing you to pull out the nails holding up the sheets. wire mesh is then rolled around the sheeting overlapping in the middle and overhanging the top. wire mesh must extend under the sheets to the inside of the tank. the wire mesh should be tightly tied.



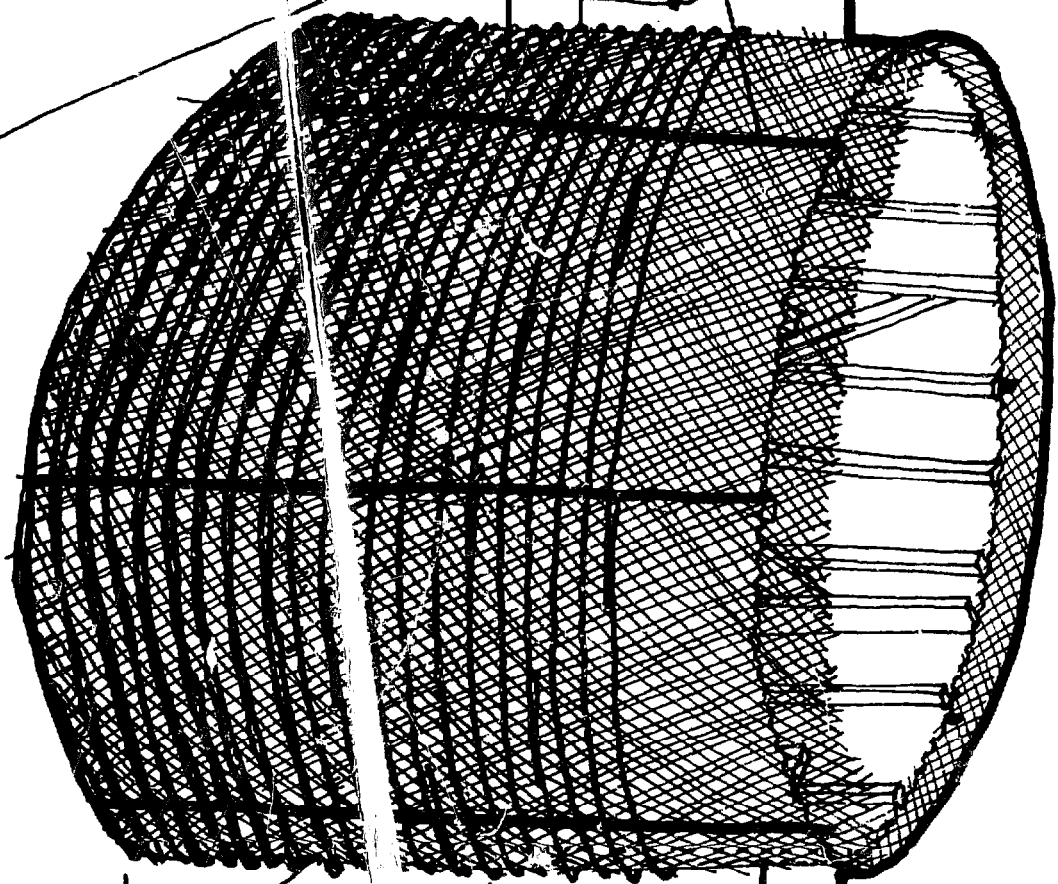
6 lengths of $\frac{1}{2}$ " steel are bent upright at equal spacings around the outside of the form. $\frac{1}{4}$ " steel is then bent around, being tied to the uprights at 3" spacing between each loop. The steel is tied end to end with a 12" overlap and spiralled around the tank form continuously. The $\frac{1}{4}$ " steel should run two together for the first 2 feet and again at the top of the form.



$\frac{1}{2}$ " steel

$\frac{1}{4}$ " steel

double each length for the first 2' from the base



3"

2'

10

over 2', should be 12" tie with binding wire.

a first coat of cement plaster is applied (troweled) onto the outside of the tank form.

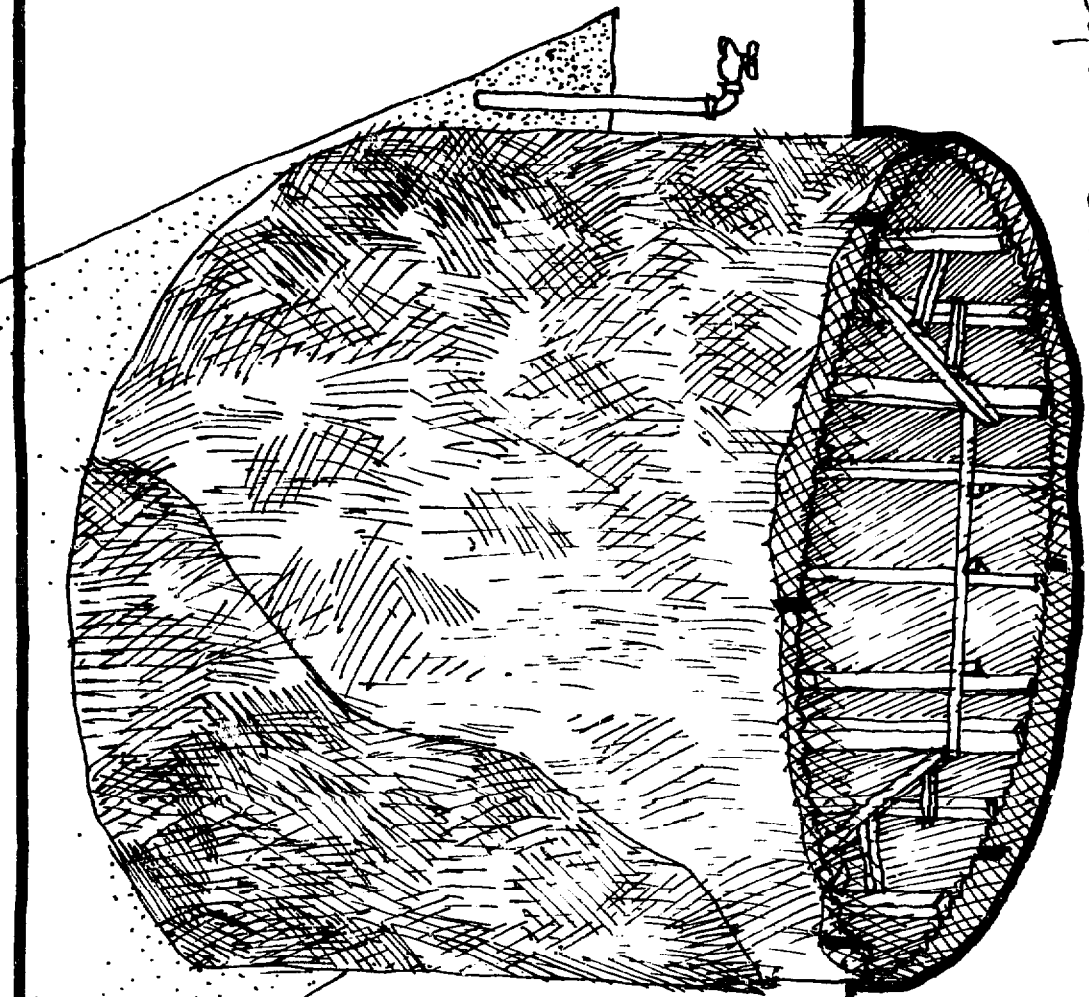
this is allowed to dry before a 2nd coat is applied. leave the double band of 1/4" steel around the top exposed so that the steel for the top may be tied along this ring.

cement mortar mix:

1 part cement to

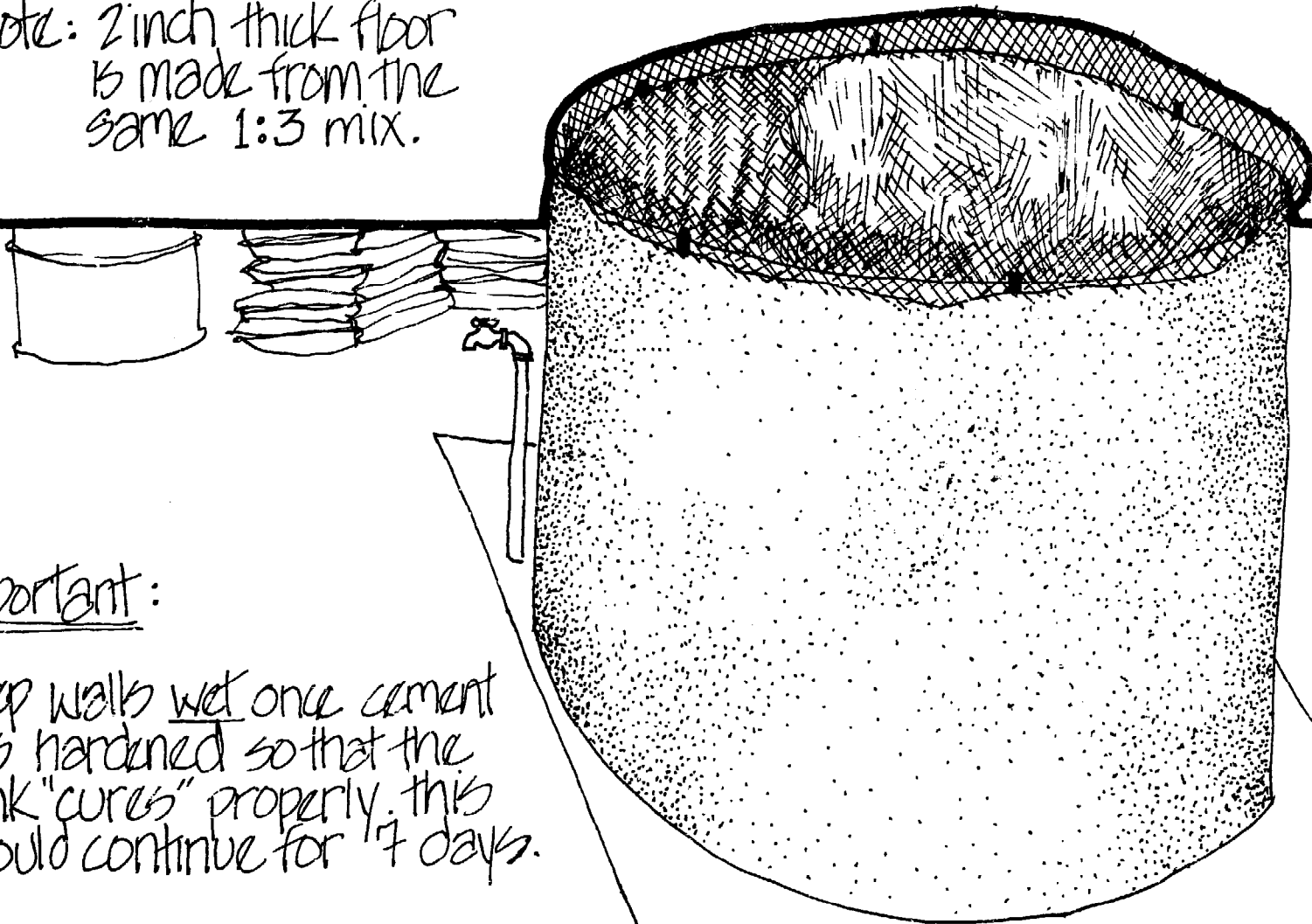
3 parts sand.

1:3



the finish coat of plaster is applied to the outside of the tank, and after removing the formwork, a first coat of mortar is trowelled onto the inside walls as well as a 2" layer poured for the floor at the same time. (after wall is coated.)

note: 2 inch thick floor
is made from the
same 1:3 mix.



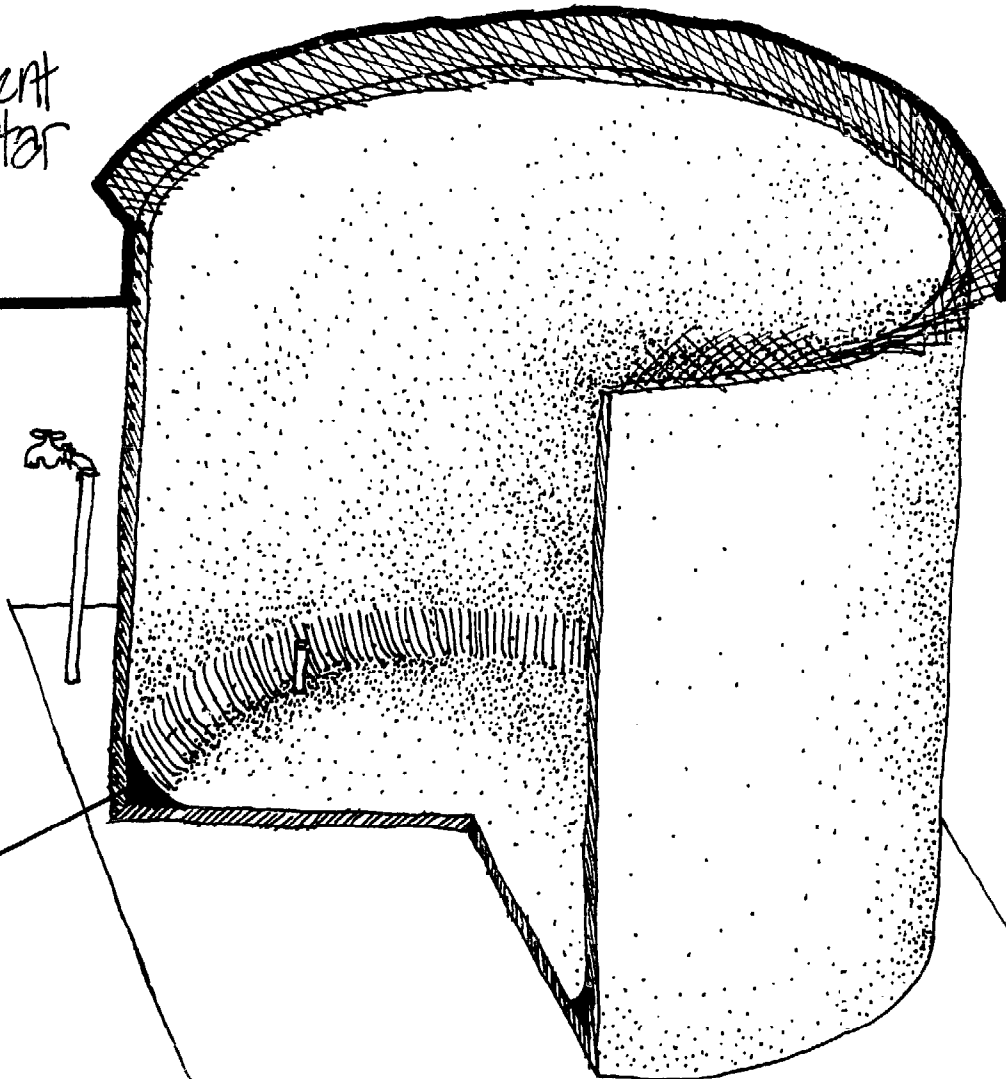
important:

Keep walls wet once cement has hardened so that the tank "cures" properly. this should continue for 7 days.

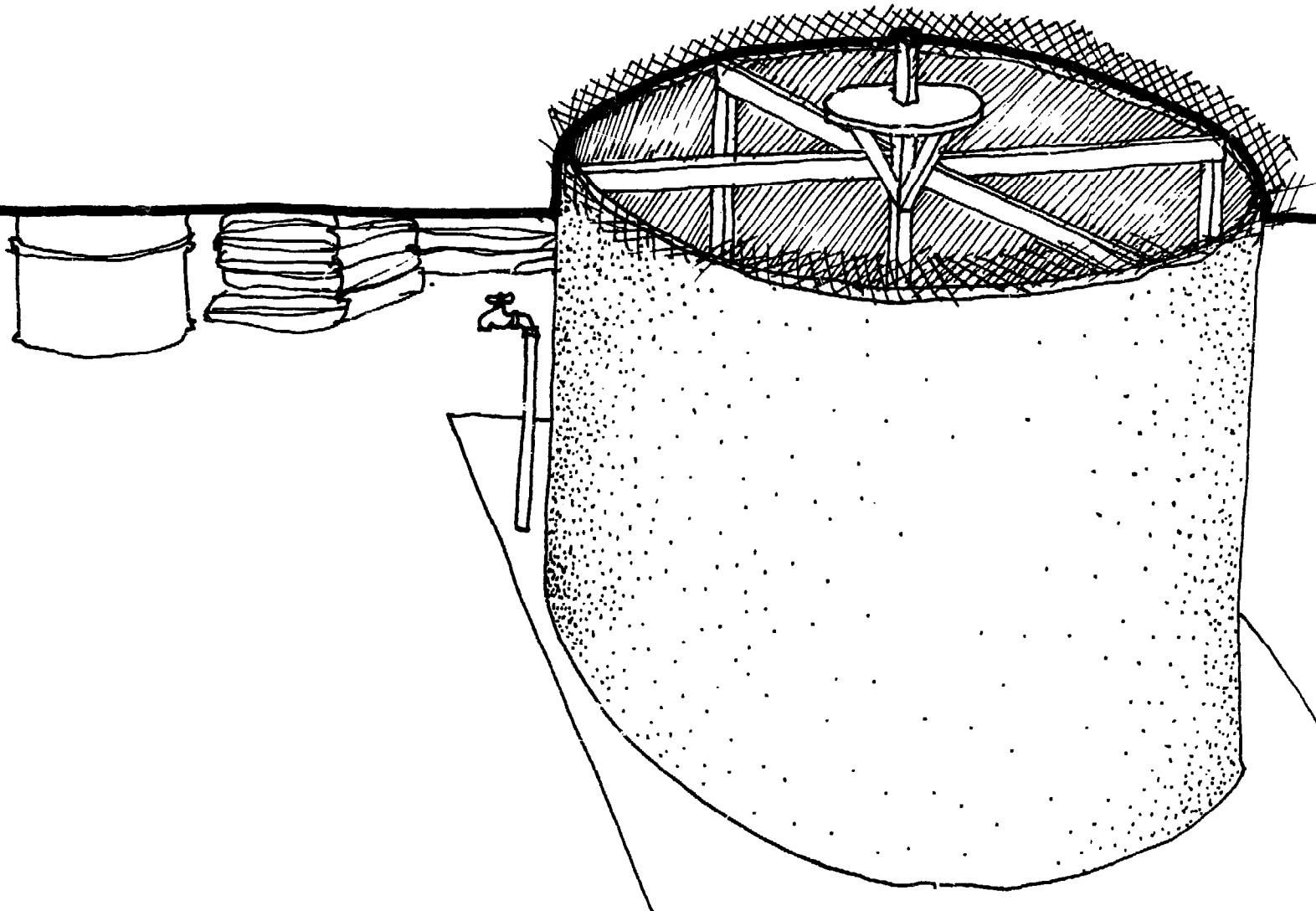
after the first coat of plaster on the inside of the wall has dried, and the floor has hardened, build up a 3 inch thick layer of mortar along the joint between the wall and floor. a finish coat is then applied to the wall.

note: a waterproofing agent may be added to the mortar mix used on the inside.

3" thick cement mortar to cover joint between wall & floor

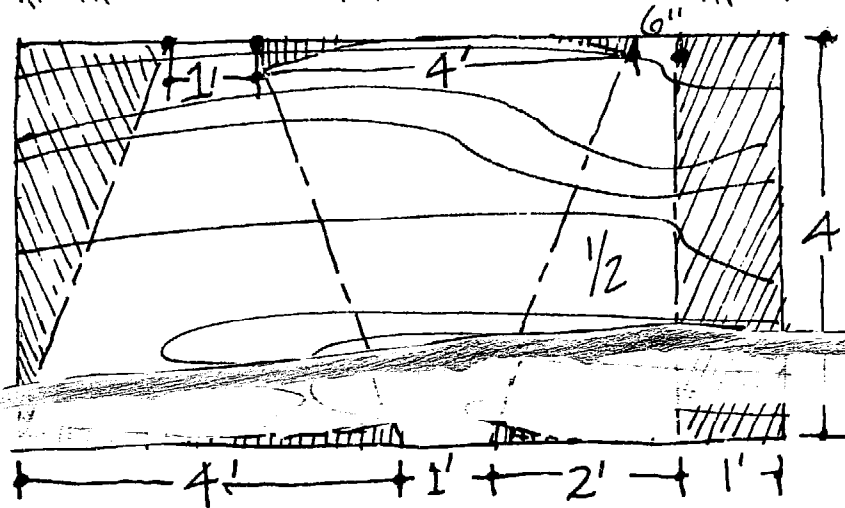


once the finish coat has dried, formwork to support the roof is constructed. an 7'-6" 2x2 is braced in the tank's center. A 2'-6" diameter plywood disc is braced to the 2x2 upright - 6" below the top of the 2x2 upright.



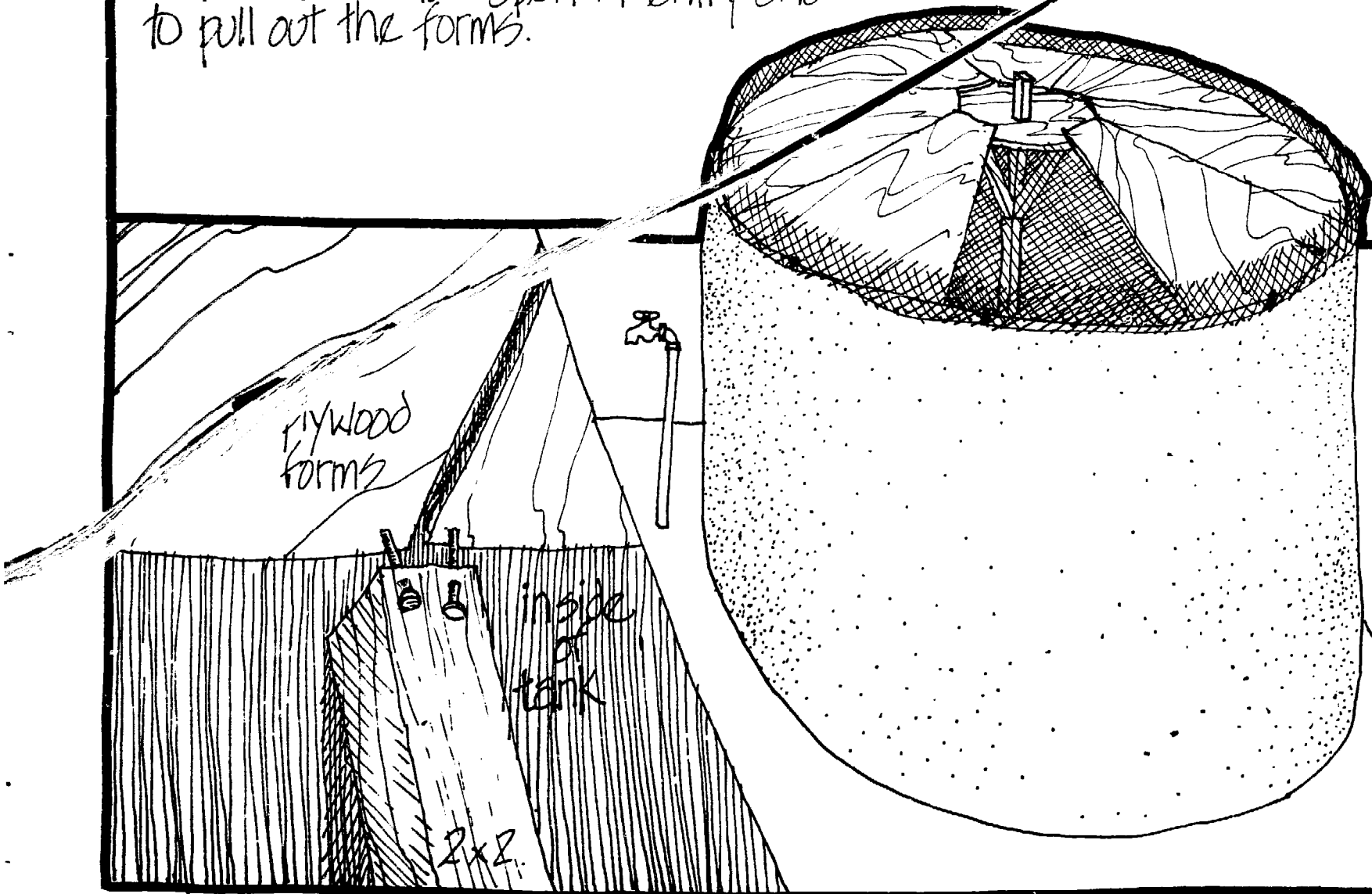
The forms for the roof are cut from 4'x8' sheets of 1/2" plywood in the patterns shown. The wedge shaped forms are cut at a slight "round" along the bottom to fit inside the tank wall.

The 2'-6" diameter plywood disc is also cut from one board. The cutting will make 7 wedge forms, one in 2 halves that can be braced together and used for the hatch section which is cast after the roof is plastered with a finish coat on all but the one section, left open to remove the formwork.



4'x8'x 1/2" plywood

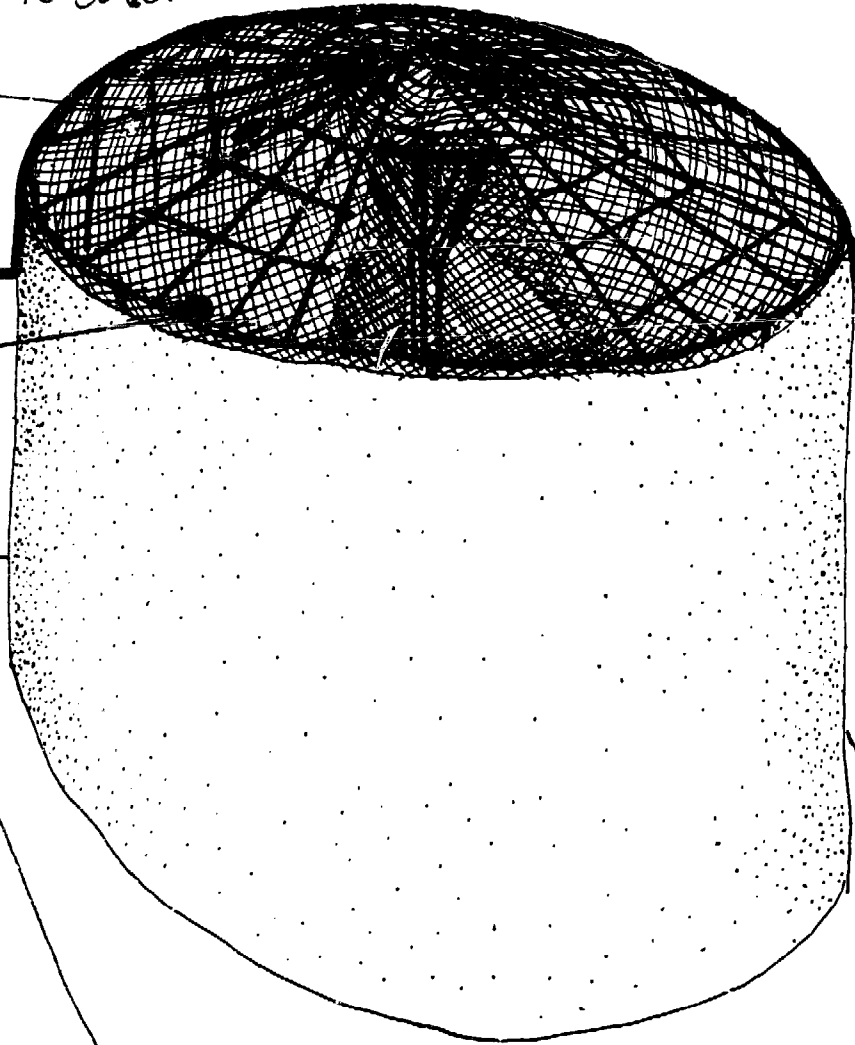
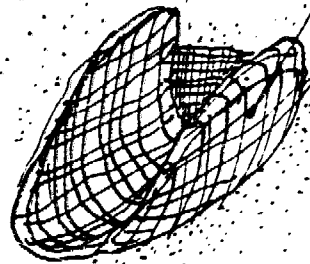
the plywood forms are placed around the tank, the wires part meeting the top of the wall. the forms are supported by the 6' 2x2's used to hold the tank wall form. a support should catch 2 forms at the bottom corners, 4' apart. the top edge of the forms will rest on the plywood disc. leave one section open for entry and to pull out the forms.



Wire mesh is tied to mesh extending from tank walls; covering the roof.
Next 1/4" steel running from the peak to the walls is tied at 8" centers
around the wall perimeter and tied with cross pieces of 1/4" steel at 10"
spacings. The plugs for the overflow and the spouting (downpipe) entry are
marked. Use fine wire screen to cover
the openings.

downpipe entry

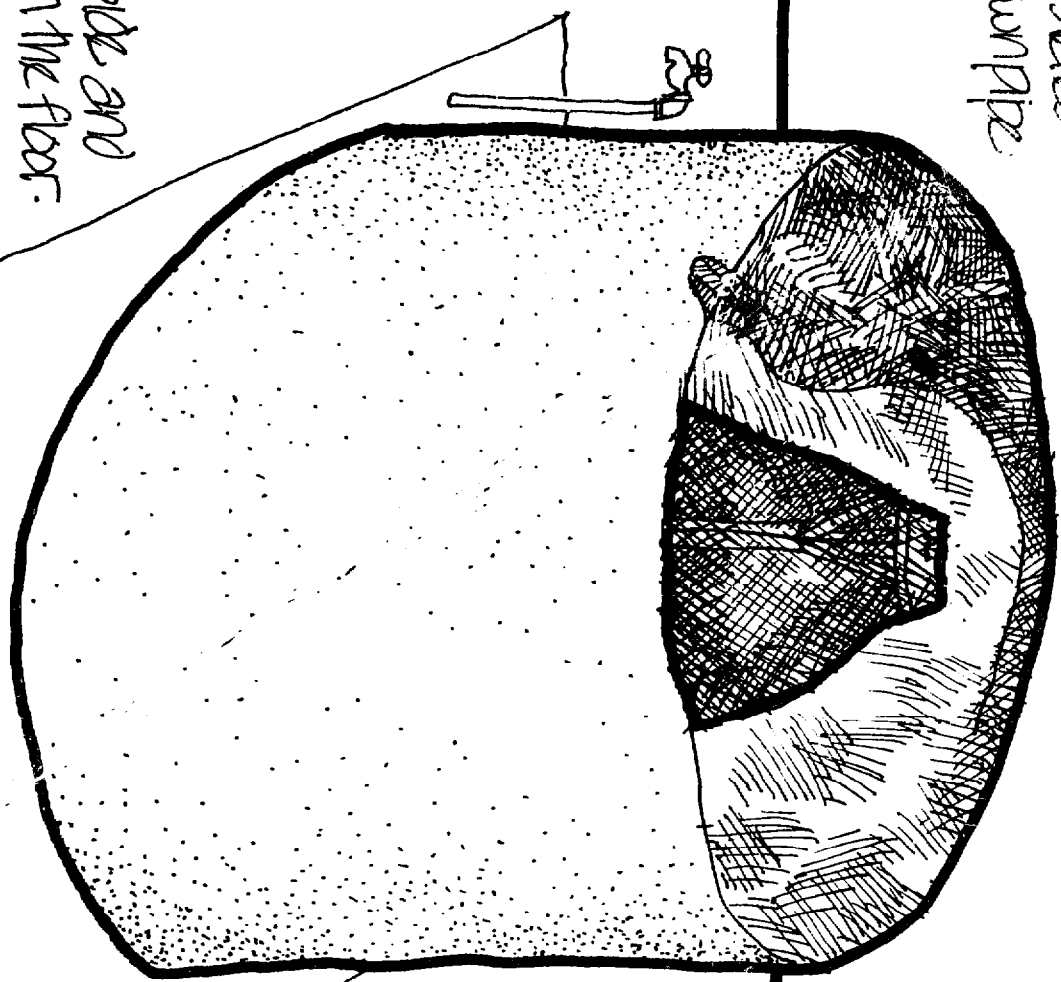
overflow spout should
be a few inches above
the top of the wall. The
spout can be formed by
bending the wire mesh
to shape and then plastering.



a first coat of mortar (1:3 mix) is trowelled on and after this dries, a second coat is applied. this is allowed to dry before a finish coat is applied.

The fine wire screen is plastered over the overflow and downpipe openings.

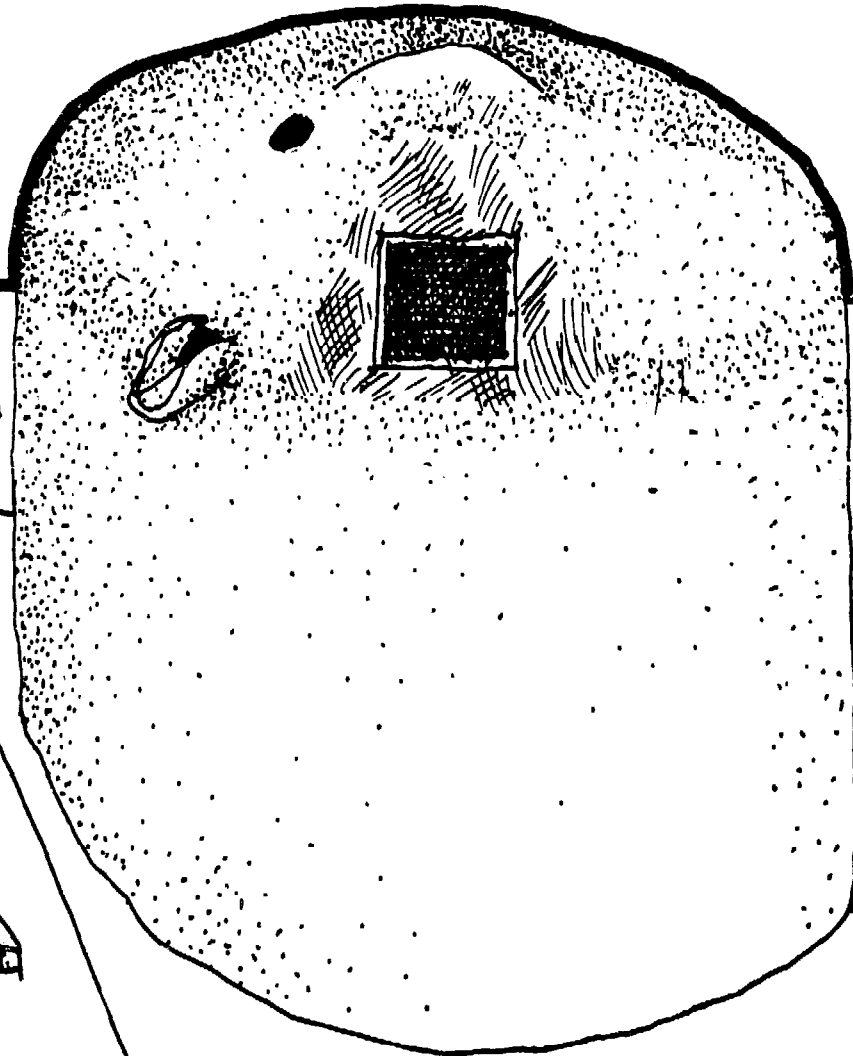
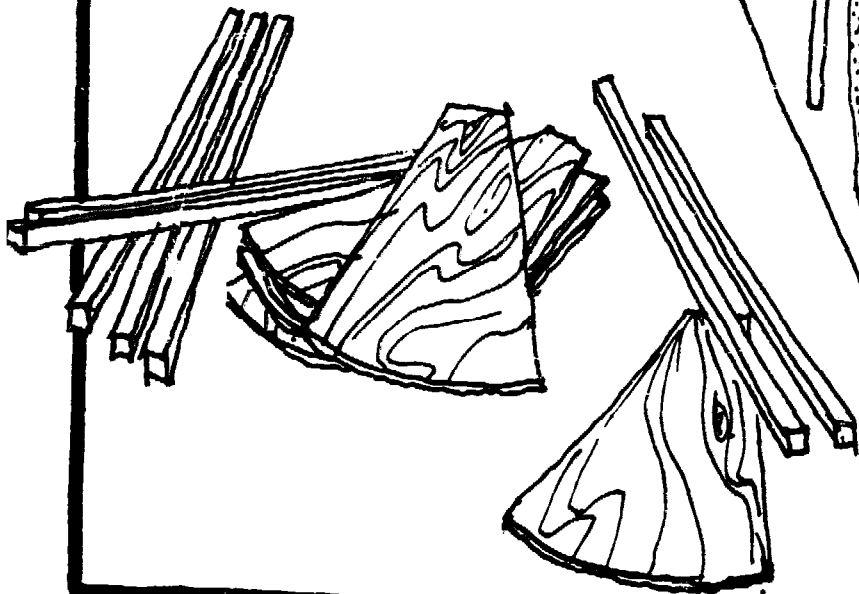
Keep tank wet on the outside and allow some water to stand on the floor.

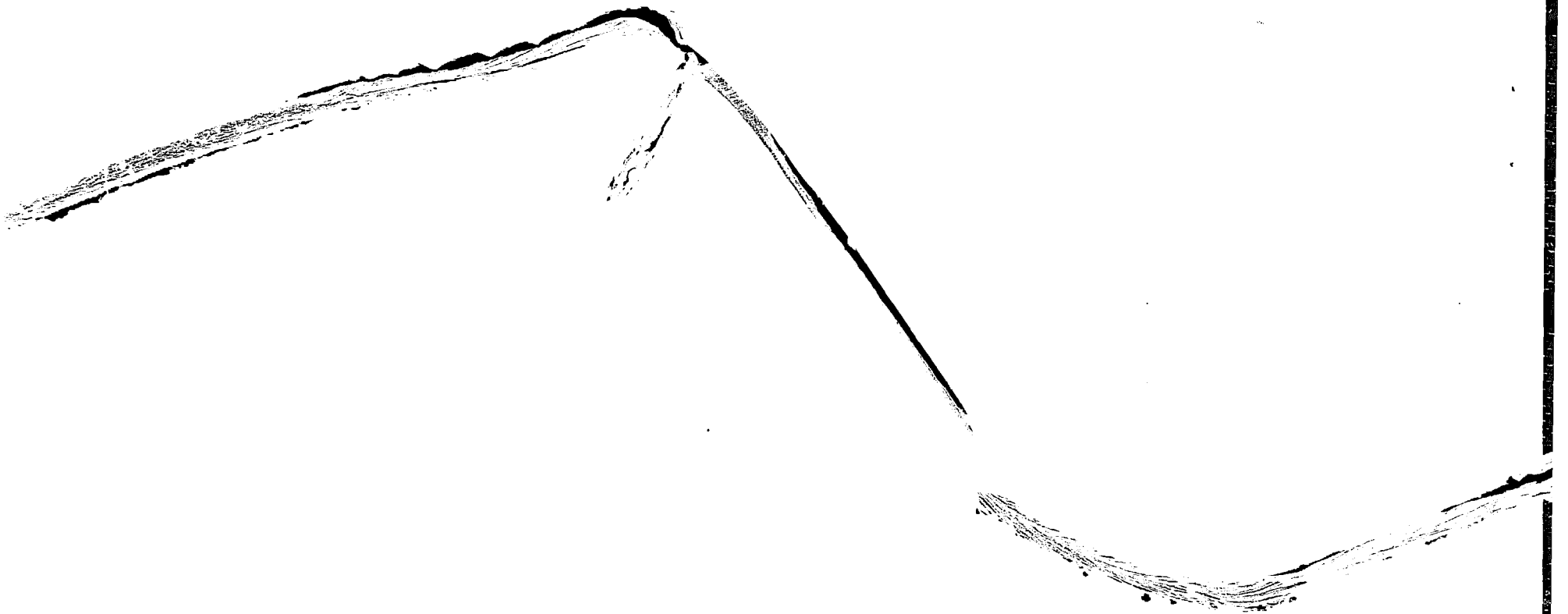


after the finish coat has dried for 24 hours the formwork is removed and the remaining section is cast with a 2' x 2' hatch, the rim made of 2x2 pine embedded in the 2nd coat of plaster, with an exposed 1" above the finish coat of plaster. the tank roof is then given a coat of plaster on the inside.

the walls and floor are then painted with a thick mixture of cement or cement and waterproofing.

allow water to sit in the tank covering the floor for 1 week.





A construction manual created by
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