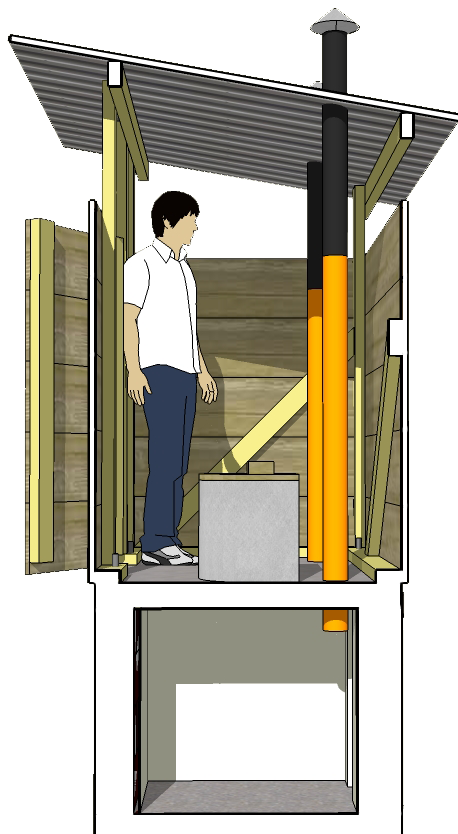


# Letrina Abonera Seca Familiar

v1.2



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Peace Corps Guatemala 2009



## What is an LASF?

The LASF (*letrina abonera seca familiar*) is a dry composting latrine. Feces and organic matter enter a sealed box, where they break down into fertilizer over the course of 6 to 9 months. Two separate chambers allows the family to use one while the other is making compost, then switch when the in-use chamber fills up.

## Why an LASF?

It has several advantages:

- + It lasts indefinitely.
- + It does not contaminate groundwater.
- + It block major disease vector like flies and rodents.
- + It makes fertilizer.
- + It doesn't stink (if properly maintained).
- + It can also dispose of other organic wastes.

And only a few disadvantages:

- It has regular maintenance requirements.
- It is more costly than most other latrine types.

# Letrina Abonera Seca Familiar- materiales

v1.4

Material	Cantidad Medida	Precio c/u	Precio total	Notas
Concreto:				
pedrín	0.5 camioneta	Q200	Q100	*for slab. Mixed size. 8 carretillas
sabieta	6 saco	Q10	Q60	*for mortar
sand for repello	6 saco	Q15	Q90	*for repello
cemento	8 saco	Q65	Q520	*for slab and mortar and repello
hierro 3/8" x 20' [6m]	6 c/u		Q0	
alambre de amarre	1 rollo	Q7	Q7	
block 6"x8"x16"	60 c/u	Q6	Q360	
taza especial	1 c/u		Q0	*urine-separation type
manguera 3/4"	7 m		Q0	
tablas de 3 barras [2.5m]	1 c/u	Q25	Q25	para tapones y puertas abajas
PVC tubo 4" [100mm] x 20' [6m]	1 c/u		Q0	
PVC copla 4" [100mm]	2 c/u		Q0	
maya fina	1 yarda		Q0	
techito por tubo 4" (o dos codos)	2 c/u		Q0	
pintura negra	1 lata		Q0	
<b>Total Cajon</b>			<b>Q1,162</b>	

## La Casita (puede substituir otras cosas)

clavos, 3"	1 libra	Q7	Q7	
clavos de lamina	0.5 libra	Q7	Q4	
bisagras	2 c/u	Q3	Q6	
lamina 6 pies	3 c/u	Q50	Q150	
reglas 2x3 de 5 barras [4.25m]	8 c/u	Q25	Q200	
tablas de 3 barras [2.5m]	13 c/u	Q25	Q325	(5)x 6', (10)x 4', (15)x 2'
<b>Total Casita</b>			<b>Q692</b>	
<b>Total de LASF</b>			<b>Q1,854</b>	

## Materiales desechables/ reusables

aceite de motor (puede ser usado)	0.5 galón	Q0	Q0
periódicos viejos	algunos	Q0	Q0
reglas 2x3 de 5 barras [4.25m]	8 c/u	Q25	Q200
tablas de 3 barras [2.5m]	4 c/u	Q25	Q100
cubeta de lamina como molde	2 c/u	Q25	Q50
agua	bastante		Q0
<b>Total Desechables/ Reusables</b>			<b>Q350</b>

nota: las cosas desechables se puede usar otravez en otros proyectos (como formaleas, por ejemplo)

## Herramientas

nivel  
brocha  
azadones  
martillo  
tenaza  
cuchara  
planchas (hierro y madera)  
grifas  
metra  
hilo  
serrucho  
sierra  
cubetas de 5 galones

You can separate this sheet from the packet to distribute to suppliers for price quotes.

Note: Price data (and therefore price totals) are incomplete in this Beta version of the LASF directions. Please adjust accordingly, and upgrade to v2.0 when it's available.

## Getting Ready

Besides the obvious stuff like making sure you have all the materials and tools, there is some important prep work you have to do beforehand. An infrastructure project needs to follow a thorough educational campaign. Host seminars and train the families on the importance of hygiene, and how a sanitary latrine can prevent diseases. You want them to really understand the value of the latrine, so they will continue using and maintaining it after you're gone. When the latrine is complete, host a refresher clinic on how to maintain it properly.

The management of the project is also important. The family should provide a significant portion of the materials and most of the labor. If they have to sacrifice a little to get the latrine, they will have ownership and think twice before abandoning or dismantling it. Another benefit of them providing the labor is that they will learn how to construct their own latrines for families and neighbors in the future.

Tools Required	
level	nivel
brocha	drill
azadon	hoe
martillo	hammer
tenaza	wire cutter
cuchara	trowel
plancha	float
grifas	rebar benders
metra	tape measure
hilo	mason's string
sierra	wood saw
serrucho	hacksaw
cubetas	buckets

Work Schedule*		
Day 1	half day	level ground, build forms, arrange steel, mix concrete & pour slab
Day 2	full day	lay all block, plaster inside
Day 3	half day	build inner formwork, arrange upper steel, mix concrete & pour slab
- go do something else for a week, so the slab can cure -		
Day 4	full day	strip formwork, build casita, add roof & vent pipe
Day 5		possible extra day to tie up loose ends

\*2 person crew. Might go faster with 3 people. 4 would be falling over each other.

## How do I use and maintain an LASF?

The LASF has a special two-part seat to separate solid and liquid waste. Urine leaves the latrine via a tube, where it is collected and used as direct-application fertilizer when diluted to three parts water, or sent to a sump. Feces are collected in a vault below the latrine. After each use, a cup of ash, sawdust, or other carbon-rich matter is thrown in afterwards (two cups after diarrhea). Once a week, a cup of earth is added and the contents of the vault are stirred with a long pole to ensure even mixing.

Every 6-9 months, the family must perform a switchover. The cleanout door of the sealed vault is opened, and the fertilizer is removed. Then, an inch of fresh dirt is spread on the floor of the vault, and the cleanout door resealed. The *taza* (seat) from the in-use vault is moved to the newly emptied vault. The contents of the full vault are thoroughly stirred and a few more cups of ashes are added, then it's sealed with the lid that used to be on the other vault. After about 6 months, the process can be repeated, though in colder climates it may take a few extra months for the microbes to completely break down the compost.

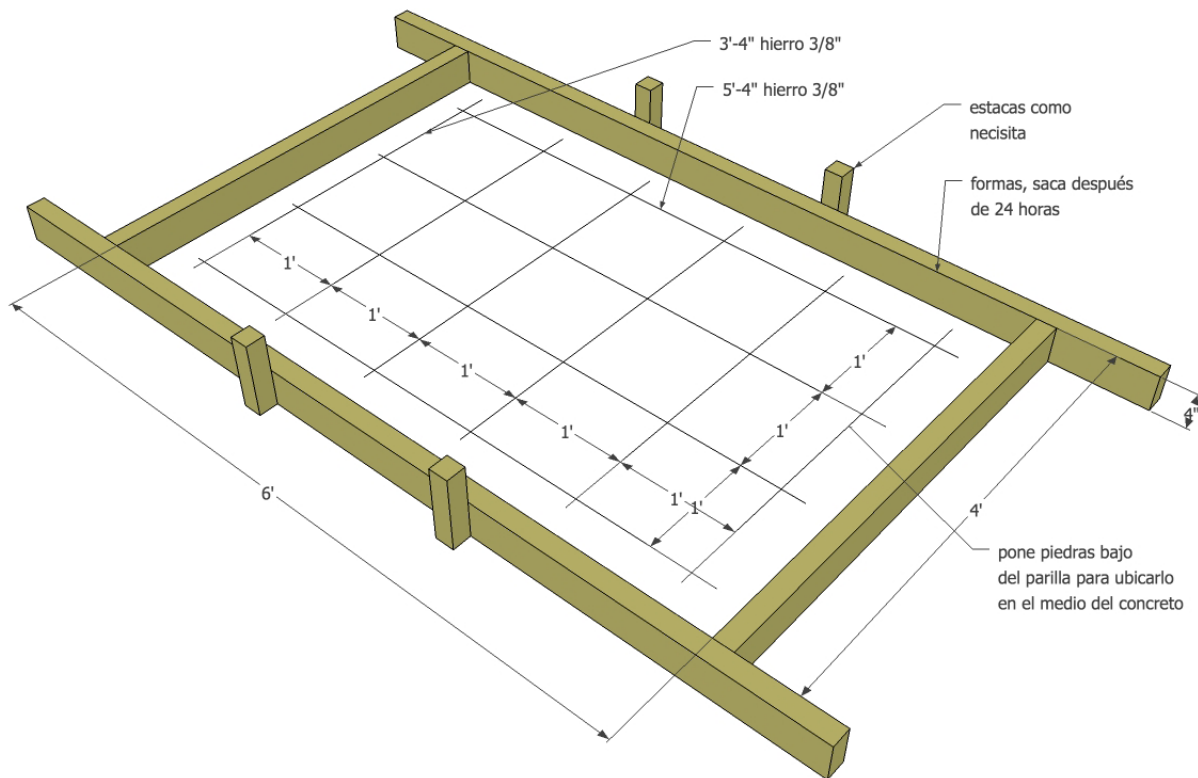
## Picking a site

The family should be involved in this, because it's their life. The LASF should be close enough to the house to be convenient. Unlike pit latrines, it can be near a water source, but make sure it's somewhere the ground won't erode. Locating it on a hillside is helpful, because you can put the entry on the uphill side and the cleanout door on the downhill side, thus avoiding the need to construct stairs.

## General warnings and info

Review your plan with a local *albañil* if possible, because each region has its own ways of measuring and proportioning things. For example, in Santa Eulalia, gravel comes by the truckload, not the wheelbarrow, and sand is not available- it comes premixed in with the gravel, so the concrete ratio is 1 bag cement : 3 carretillas mixed gravel & sand.

When in use, the contents of the latrine must be pretty dry. No urine, no water. If it starts to get a bad smell or look soupy, add more ash or sawdust to remedy it.



## Construction- Day 1

Clear and level the ground. Assemble the form-work and cut the steel reinforcing to the sizes shown on the pages with dimension. Using the *alambre de amarra*, wire the reinforcing grid together to hold it in the correct shape when you pour the concrete. Place small stones under the grid to hold it in position in the middle of the slab while pouring.

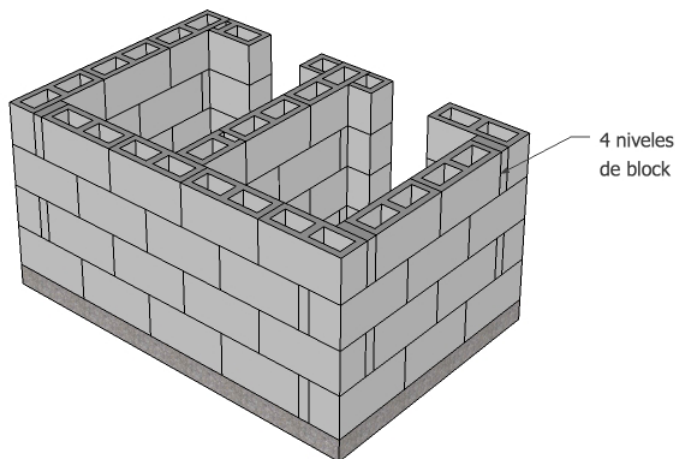
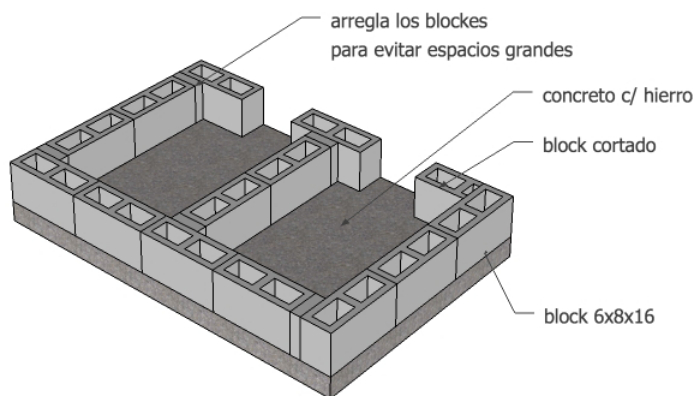
Mix up the concrete and pour the slab. Screed level, then finish with a steel trowel when it starts to set. If it looks like rain, cover with nylon.

## Day 2

The slab will still be “green”, so go easy on it, but it will support a few courses of block. Lay out the block on the slab to be sure it fits right and the openings for taking out the compost are facing AWAY from the side where you want the entry.

Mix up enough mortar bit-by-bit, so it doesn't cure before you use it. Sprinkle the blocks with water to help the mortar stick to them better, then assemble the block walls as shown, with mortar joints. 6” block is common in Guatemala, so if you're using it, you will need to spread the extra two inches of joint evenly between all the other joints to make it look nice (in real life, all joints should be 3/8”).

Each progressive course of block should be staggered over the first, so the joints do not line up. This will make the wall stronger. As you work, check to be sure everything is plumb and level.



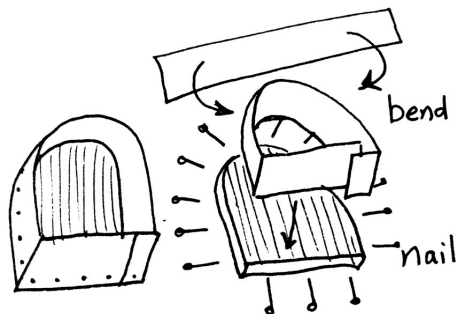
Mix up plaster using only sand and cement (no gravel). Wet the face of the blocks to help the plaster bond, and trowel on a coat of plaster over the entire inside of each chamber. Finish with a steel trowel, to make it as smooth as possible and avoid places to trap poop.

### Day 3

Start by making the formwork that will go inside the boxes to support the upper slab until it cures. Cut some 2x4s and nail them together into sawhorses that are about an inch lower than the surrounding block. Then, lay boards across the sawhorses to fill the opening. Cut the boards to leave as little gap as possible, and don't forget to fit boards into the openings for the cleanout doors. If you have a good fit, you won't need to nail the boards to the 2x4s, and it will make it easier to get them out when the slab is done.

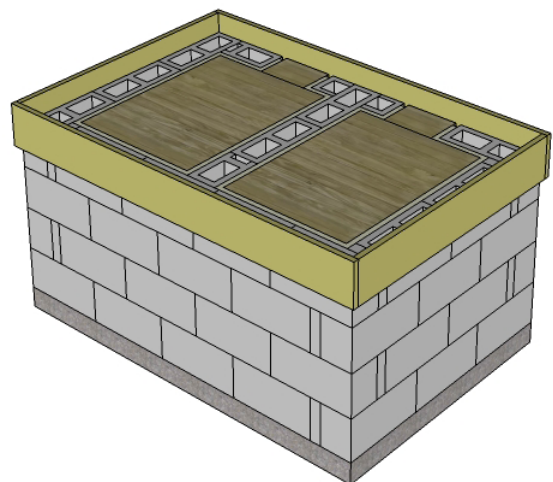
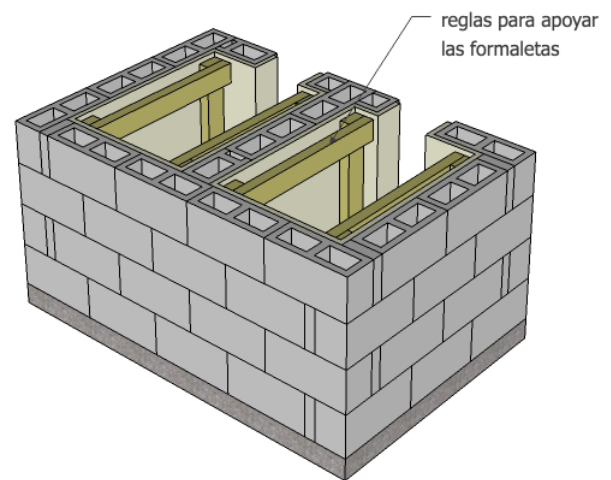
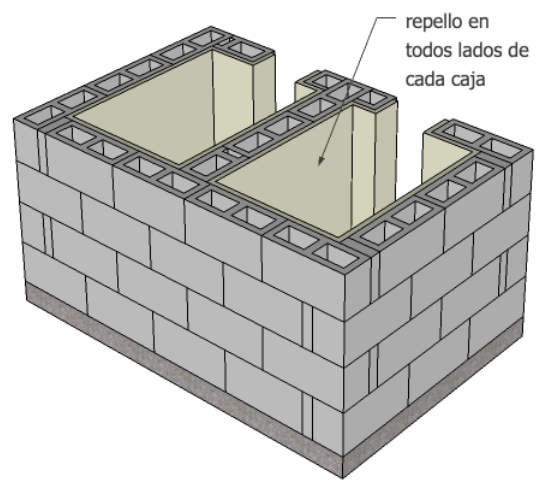
Next, cut boards for the edge of the slab. If you drive a nail through a board close to each end, 4" up from the bottom edge, you can rest the nail on the top of the block and your slab will be pretty close to 4" thick. Then, using a level, make sure the boards at the edges of the slab are level. You can stick a little rock under the nail to adjust, or just take the nail out and put it in a little higher or lower. Nail the corners together, then run braces out to the ground to prevent the forms from bowing outward under the pressure of the concrete.

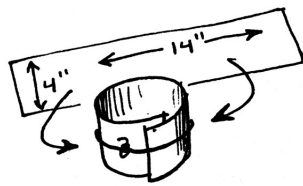
The formwork for the *taza* needs to be worked out pretty carefully, and will vary with the specific *taza*. Trace the bottom of the *taza* (if it has a flange that sits



inside) or the inside of the *taza* (if it just rests upon the slab) onto a piece of wood. Cut out the shape, giving yourself about a quarter inch extra all the way around to accommodate error. Then, cut a strip of *lamina lisa* (sheet metal) 4" wide and long enough to wrap all the way around the wooden base. Nail the sheetmetal to the wood, then fill the form with packed dirt/mud so that it doesn't collapse from the weight of the wet concrete.

You could cast the vent tubes right into the concrete, but they get in the way of levelling the slab. It's much easier to make the hole separately then add the pipes later. One option is to buy a PVC connector that fits the tube and cast that into the slab, putting tape over the





ends so no concrete gets inside. Another option is to cut a piece of sheetmetal 4"x14", and

wrap it into a tube a little bit bigger than the vent tube. Use a bit of tie wire to hold it round, then cover both ends with tape and use it as a form. You can leave it in place in the floor after the slab cures.

Place the forms for the *taza* holes about where shown in the drawing. You can move them around a little until they're in a place that is convenient for the user.

The vent pipe holes are most conveniently located where shown in the drawing, but if you need to move them somewhere else to accommodate your specific project, it doesn't really matter exactly where they are. Just don't put them where they'll get in the way of the entry door or people moving about in the latrine above.

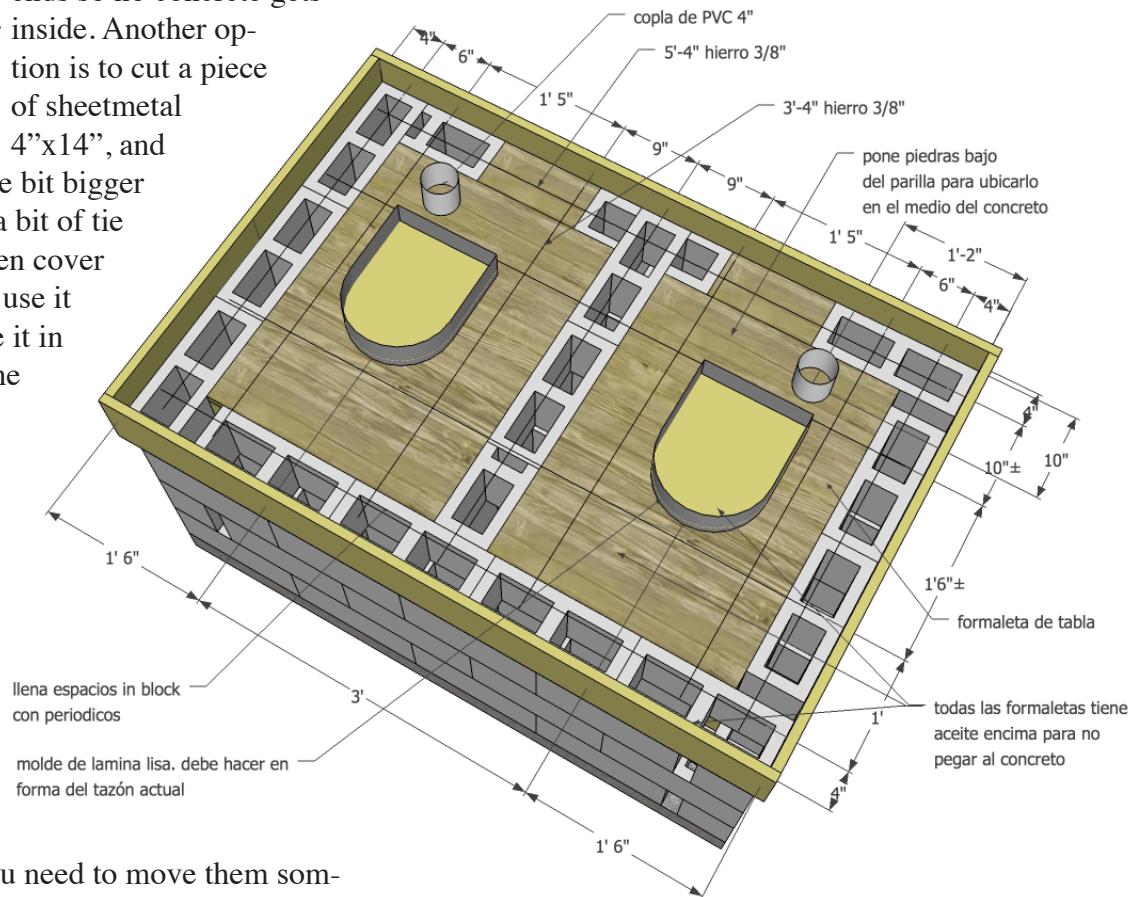
Use a rag or old brush to coat the formwork (and anything else you don't want to become a permanent part of the latrine) with motor oil.

Stuff all small gaps in the formwork, as well as open cores of the block, with crumpled newspaper or empty sacks from the cement.

Place the reinforcing steel as shown in the diagram. You will probably have to adjust the positions somewhat to match your specific conditions and the shape of the hole you need for the *taza*. The important ideas are:

- All steel should stop within about 1"-2" of the edge of the slab. More space makes the slab weak, less space might allow the steel to rust.
- You want full length pieces wherever possible.
- No two parallel bars are to be more than 12" apart.
- You should have a continuous piece of steel bordering all sides of an opening (and obeying the first rule).

Once you have the *parilla* (reinforcing grid) layed out, tie every intersection together with wire and place a few small rocks underneath it to hold it an inch or so off of the formwork. While you're still messing with the steel, cut eight pieces



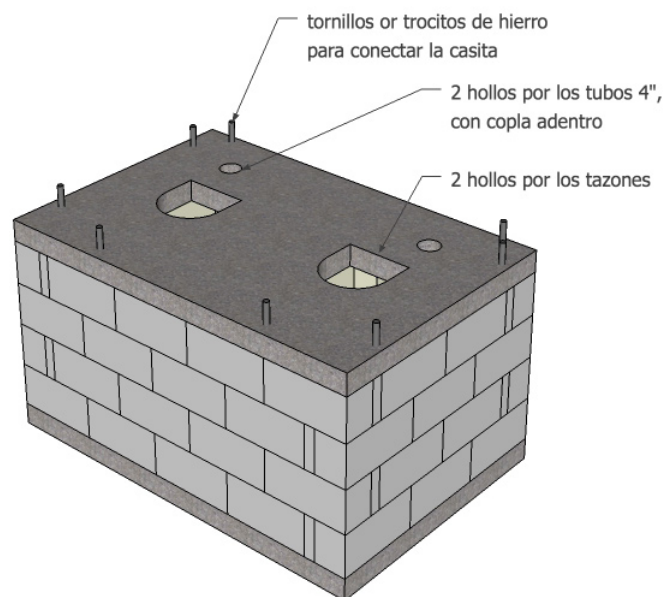
about a foot long each and bend them to a 90-degree angle about 4" from one end. These will be anchors for the structure above, so set them aside for later.

If you want to take a break, do so after the forms are ready and before you start mixing the concrete.

Mix the concrete and place it in the forms, tamping it in thoroughly with a spare chunk of rebar or a clean stick. Make sure it is packed in tightly against all formwork and underneath the reinforcing steel. Using a straight board, screed the concrete off so it's flat and level with the edge forms.

Grab the anchors you made from the bent pieces of rebar, and push them down into the slab about two inches in from the edge, where shown. Wiggle them to hook under the *parilla* (it takes some practice, but you can do it). They should stick out vertically about 4-6 inches.

Once the concrete starts to set, trowel it smooth with a *plancha* (steel float). If you expect rain in the next 24 hours, cover it with plastic overnight. Do not put weight on it for the next week, and return daily to spray a little water on it to help it cure evenly without cracking.



## Day 4

After the concrete has cured for a week, you can strip the forms off.

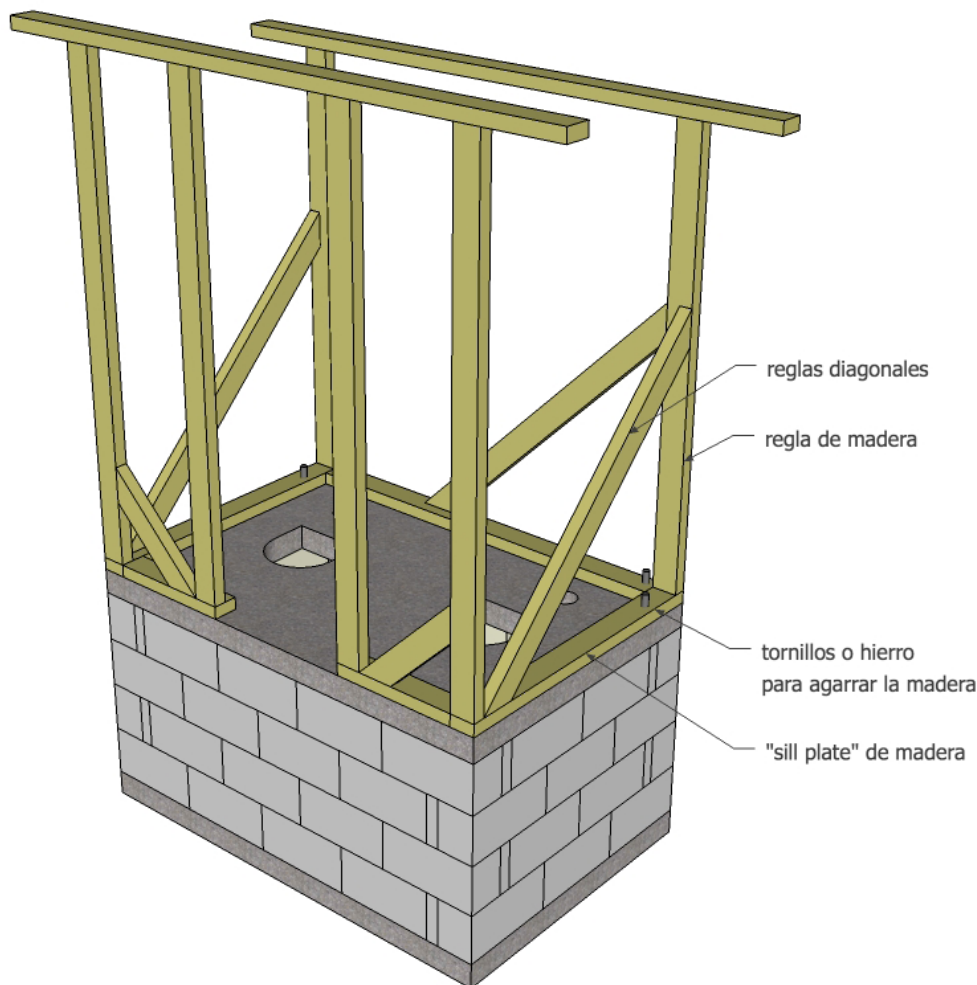
Cut wooden sill plates to make the base of the *casita* (outhouse). The outside edge of the wood should match up with the outside edge of the concrete. Drill holes in the sill so the anchor rods can pass through it, then bend the anchor rods over so they grab the wooden sill and keep it from moving.

Next, cut 2x4 *reglas* (boards) to the height desired for the outhouse. The back wall should be shorter than the front, so the rain drains away from the door. Nail them to the sill plates, then add diagonal wood braces to keep the walls from collapsing in the wind.

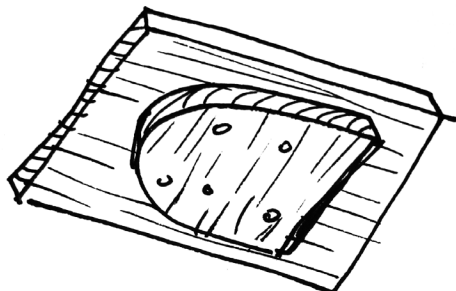
The roof lamina is supported by two 2x4 *reglas* 8 feet long. The outhouse is 6 feet wide, so that leaves an extra foot on either end to help keep the rain away from the wooden walls.

Now is a good time to install the *taza*. Set it in place over the active compost bin, and connect the hose to the urine collection part of the *taza*. Run the hose down and out the opening in the back of the compost box. Make sure the hose doesn't pass below the opening in the seat, interfering with falling feces.

At the box without the *taza*, you will have to make something to plug

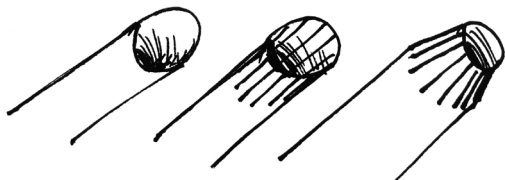


up the unoccupied hole. You can make a nice lid by using the wood from the form you made earlier for the *taza* hole, then nailing another board on top of it like this. It should



fit perfectly in the open hole. Sometimes the two holes aren't exactly the same size/shape due to construction variances, so you may have to make a separate lid for each opening (though one will not be in use at any given time). Make sure the lid seals tightly, so flies cannot enter.

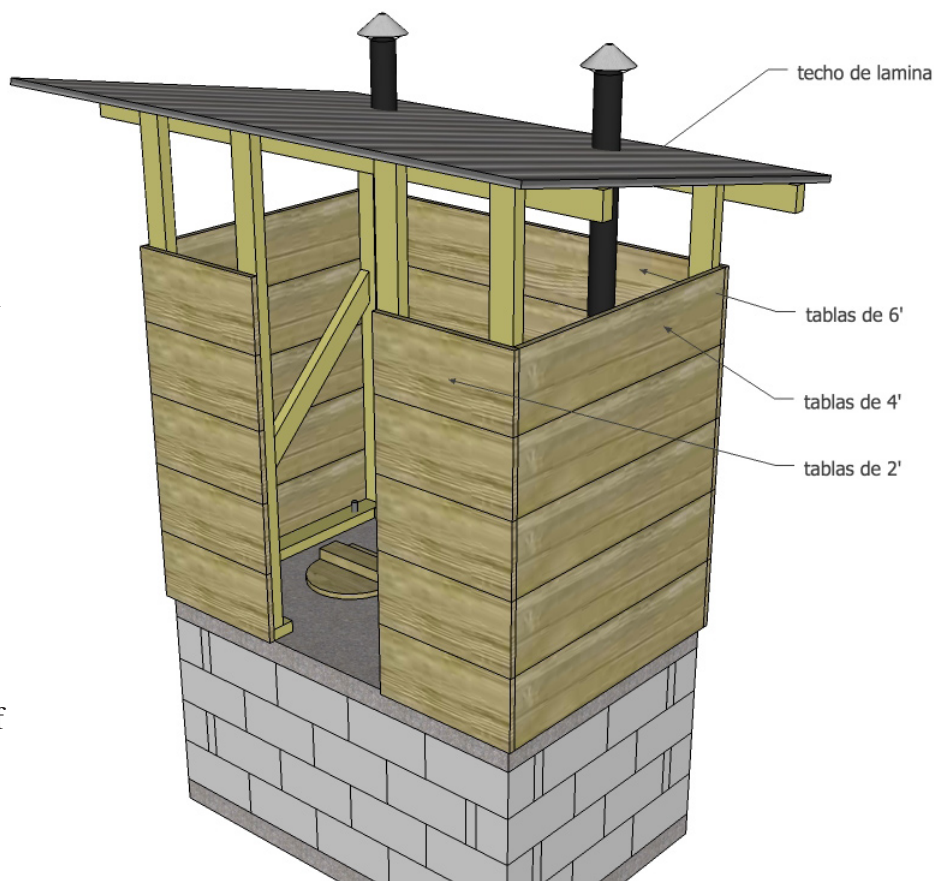
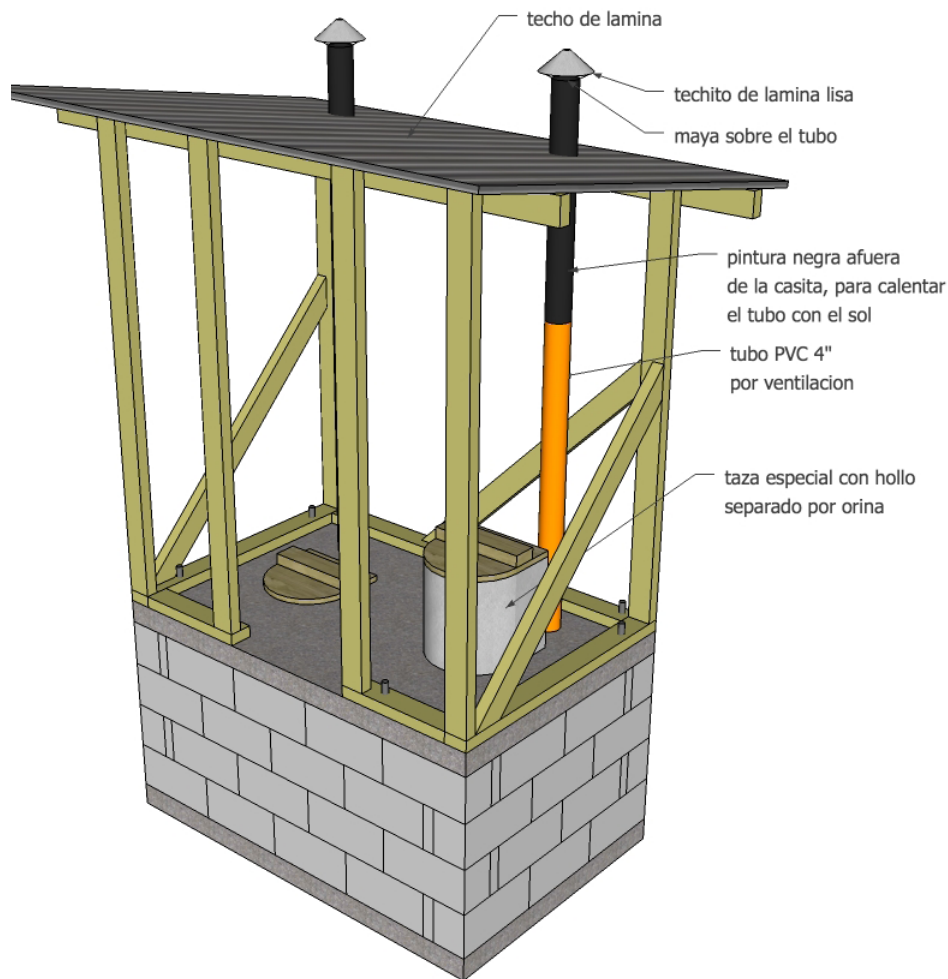
Temporarily install the vent tubes, so you can mark the *lamina* in the correct place to cut a hole. Sometimes the hole in the concrete is a little too small to fit the tube; in this case, you can cut radial slots in the tube so it can be pinched a little

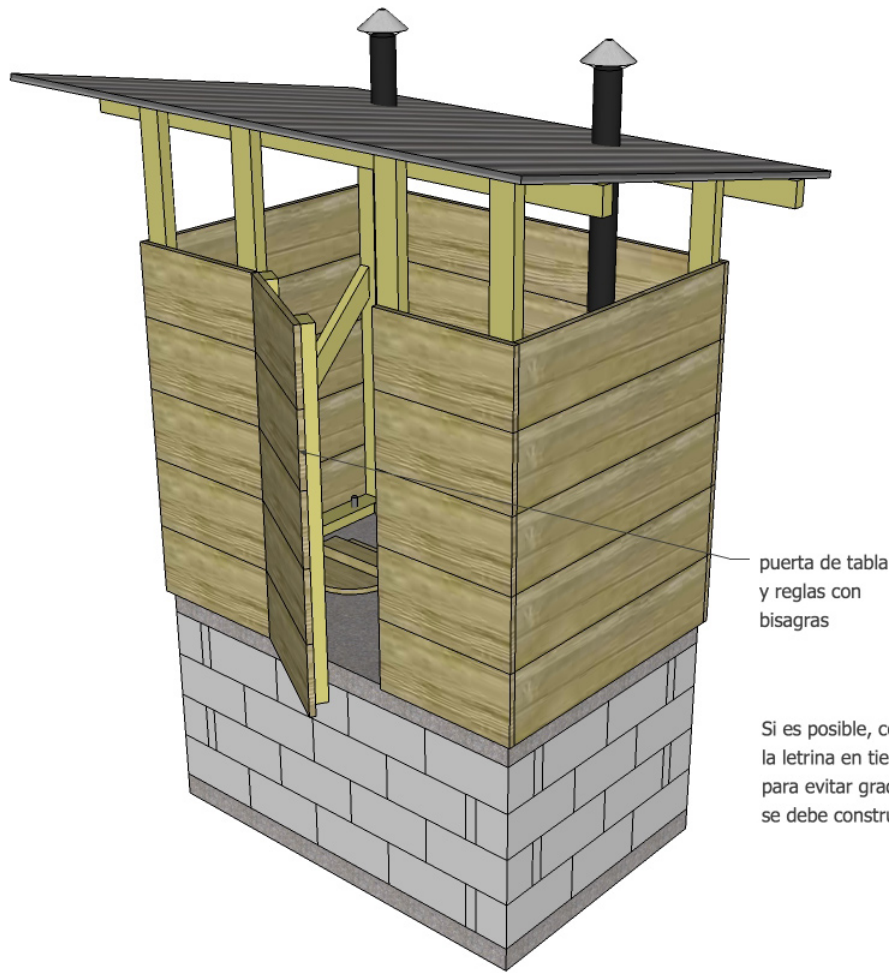


smaller. Remove the tube, and paint it black. The black helps it heat up in the sun, and start a convective current to ventilate the chamber below.

Nail the *lamina* to the supports with lamina nails, making sure to nail at the high point of the ribbing (otherwise, water will come through the nail holes). Use at least 8 nails per sheet.

Pass the vent tube through the hole in the roof, then plug it into the hole in the concrete. Cover the top of the tube with fine wire mesh to keep out flies, and install the *techito* over that to keep the rain out.





We're almost done! All that's left is to cut the tablas to the sizes shown, then nail them to the wood supports. It's important to add some extra nails along the bottom edge of the bottommost board, to connect the upper structure to the sill plates. If wood is expensive in your area and lamina is cheap, you might want to look into the option of using lamina on the sides of the outhouse instead of wood.

You can make a door with two vertical reglas and 24" tablas nailed across them. Connect the door to the outhouse with the *bisagras* (hinges), to keep animals out.

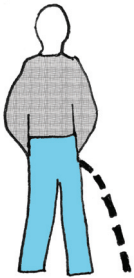
Finally, the last step. Using a wide board, make two doors that fit snugly into the cleanout holes in the back of the compost box, leaving a little notch at the top of the door to pass the urine tube. Prime the compost box with one inch of fresh earth in the bottom. The doors can be secured with a large stake at the bottom and wedges at the top. Mix up a little bit of mortar and pack it into the gaps all around, making sure that there are no holes where flies or other insects can enter. Run the urine tube to a jug or sump, and you are ready for business.

Attached to the end of this paper is a two-page handout describing the regular maintenance needed for this latrine, as well as what is required to switch over to the empty bin once the active bin is full. If you print them out and laminate them, they make a really nice housewarming gift for the new latrine. Tack them to the wall inside, so that they can be read over and over by people sitting on the *taza*.



# Cada Vez

  
**NO**



**ORINA**

  
**NO**



**AGUJAS**

  
**NO**



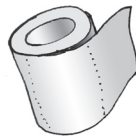
**BASURA**

  
**NO**



**QUÍMICOS**

  
**SI**



**PAPEL  
HIGIENICO**

**1 copa  
cada vez**



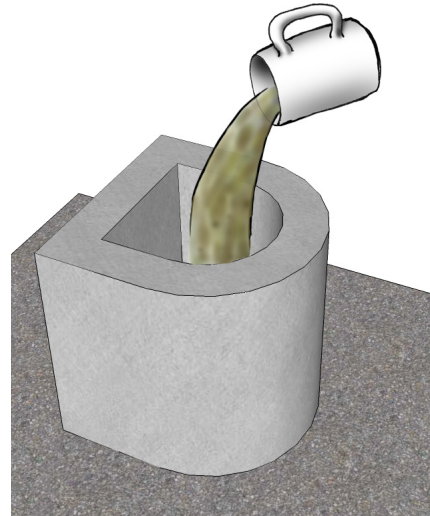
**CENIZA, ASERRÍN, O TIERRA**

**2 copas  
con diarea**

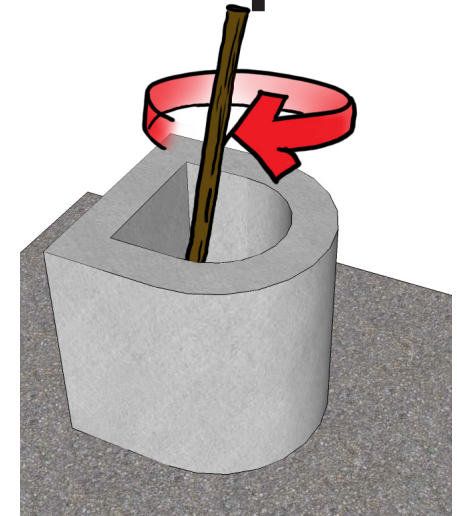


# Cada Semana

**Echar 1 copa  
de tierra**



**Mezclar  
con palo**



**Limpiar la  
casita**

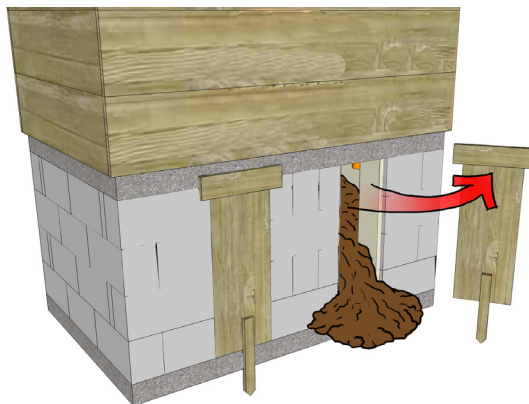


Como Cuidar Mi Letrina Abonera: deja este cartel en la casita

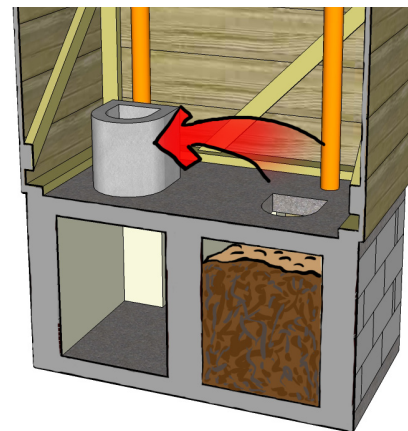
## **CUANDO EL CAJÓN ESTA LLENO**



## **Destapar el cajón viejo y sacar el abono**



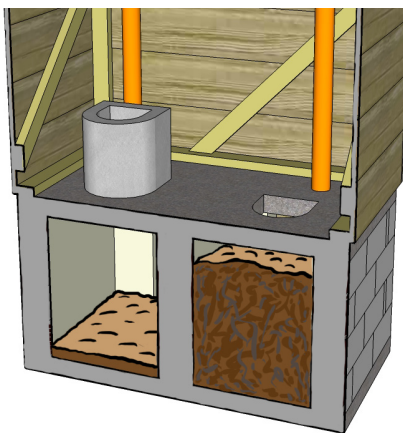
## **Mover el tazón**



## **Connectar la otra manguera**



## **Echar 1" tierra en el suelo del cajón vacío**



## **Tapar el cajón lleno y dejarlo 6+ meses**

