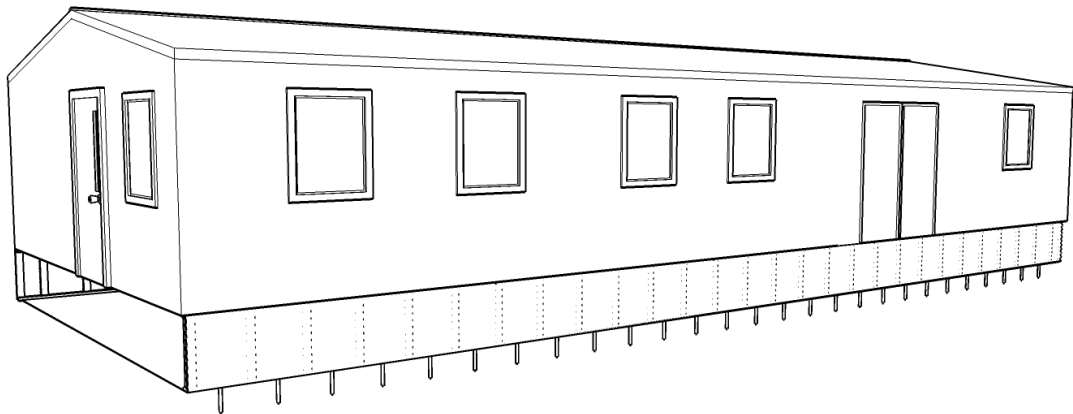


CCC Project Manual

UNDERPINNING



Project Components & How-To's

Underpinning

Common Materials

- 2x4 for framework
- Tin Roofing for underpinning
- Tin roofing nails/screws
- Decking Screws for attaching top plate to home
- Rebar for anchoring framework to ground
- Hinges (optional) for access door
- 16d nails

Underpinning Specific Tools

- Tin Snips
- Composite blades for circular saw (optional)
- Gloves
- Drill with Phillips head bits
- 1/2" bit for drill holes for rebar

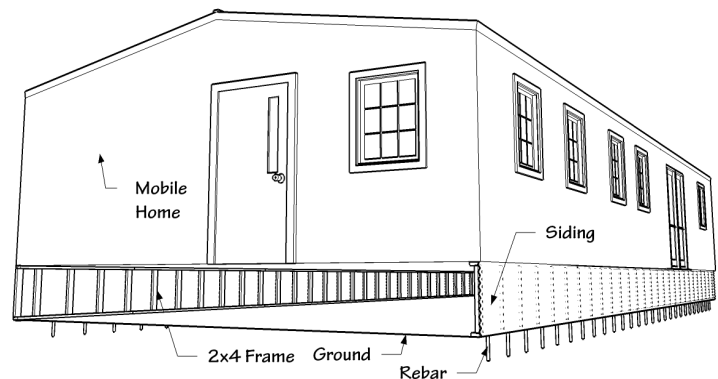
Common Measurements

- Framing studs are 24" on center

Underpinning Components

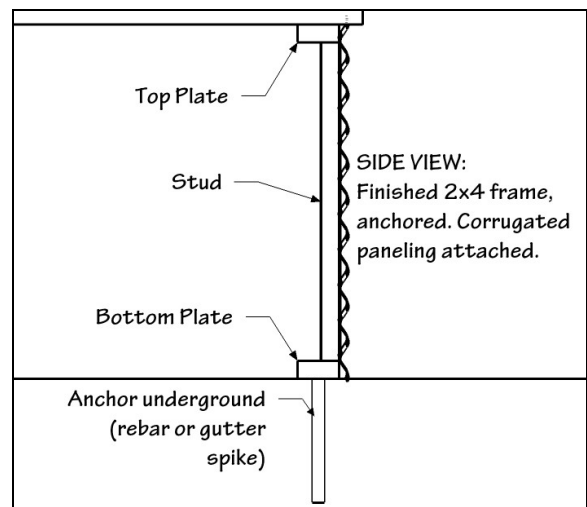
- The Mobile Home (aka, trailer)

- ☞ Mobile homes come in a variety of lengths and widths. Most modern mobile homes (middle-class and lower) are called "single-wide" or "double-wide."
- ☞ The average single-wide trailer measures about 14'x68' or 14'x72'.
- ☞ The average double-wide trailer measures about 28'x68' or 28'x72'.
- ☞ Remember: these are AVERAGES. Every home may be different, so make sure you measure first for absolute certainty.



- Frame

- ☞ The frame for the underpinning is not load-bearing (i.e. no one will ever stand on it), so you should use pressure-treated 2x4 boards for all sections of the frame.
- ☞ The frame consists of the "top plate," "studs," and the "bottom plate."
- ☞ The top plate runs along the underside of the trailer. The bottom plate runs along the ground.
- ☞ The studs are the short, vertical 2x4 pieces between the top and bottom plates. Studs should be about 2' on center.
- ☞ The frame should be anchored to the ground with 12" long pieces of 3/8" rebar (short for "reinforcing bar").
- ☞ Sometimes you may have to dig a small ditch for metal panels to be partially buried. This may help you avoid having to cut them to size. You don't need to dig trenches for the 2x4 frame, unless the ground is very bumpy and uneven.



Underpinning

- Siding
 - ☞ Metal sheets should be used for underpinning. 2' wide corrugate roofing works very well and reduces the likelihood that you'll have to cut any metal, as you can overlap by nearly any amount. Corrugations should run horizontally.
 - ☞ Some home improvement stores also carry "underpinning panels," usually 3'x5' sections.
 - ☞ Sheets of siding must overlap by at least 3". The siding of the home should overlap the underpinning siding, not the other way around.
 - ☞ Use roofing nails with rubber washers to attach metal underpinning, in order to get a waterproof seal. Using a nail set will make it much easier to hammer nails.
 - ☞ You should not paint underpinning.
 - ☞ Metal siding CAN be cut, however, the more cutting you can avoid, the better off you'll be. The process is not easy, and it can be dangerous handling cut metal edges, which are very sharp. Therefore, make plans such that you keep cutting to a minimum. Always wear thick work gloves when handling cut metal.

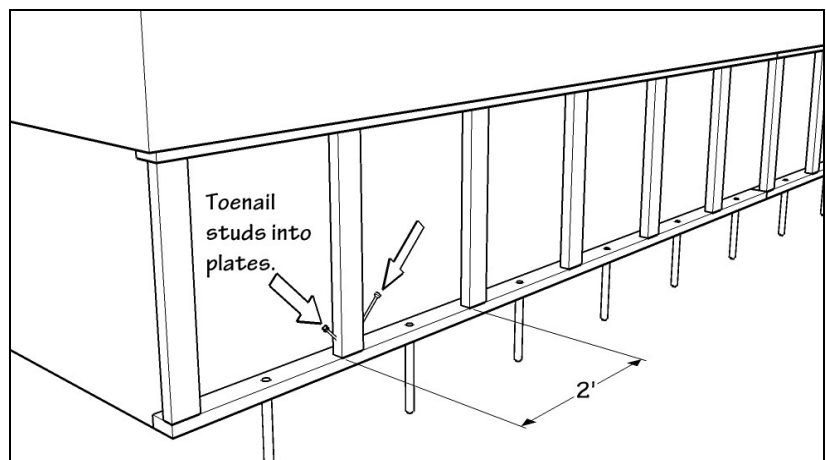
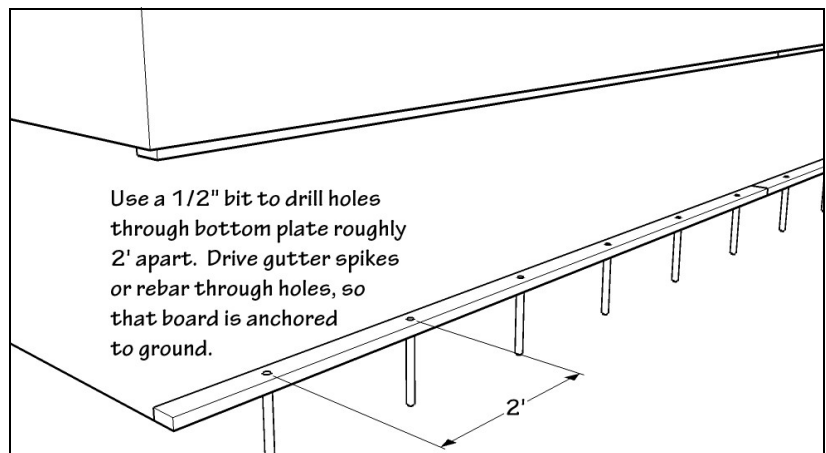
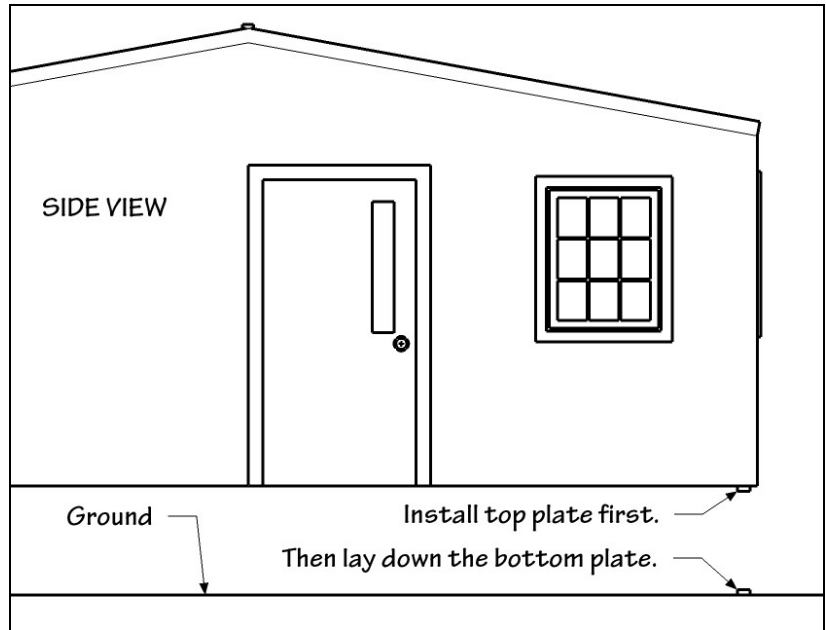
- Access Door
 - ☞ If there is not one, you must also build a small access door panel is required so that the homeowner, repairmen, etc. may get underneath the home.
 - ☞ A simple access door panel made up of a small 2x4 box and small piece of metal siding is sufficient.
 - ☞ You can make an access door to fit within one "bay" between studs, or if the homeowner wants a bigger door, leave out one stud, and create an access door panel covering the width of two "bays."
 - ☞ The siding of the door must overlap the adjacent underpinning panels by about three inches.
 - ☞ The access door does not have to be complex, though if you have enough time, materials, and expertise, you can attach the door with hinges, latches, etc.

How to Install Metal Underpinning

1. Remove any dilapidated underpinning, rotten frame boards, and other debris that will be in the way of installing the new underpinning. If you are only replacing underpinning for part of the house, then only clean up the area in which you will be doing repairs. Be careful in this clean-up process: there could be sharp objects, sewage, and other health hazards underneath the home. Use gloves. Do not remove any boards or structures that might be load-bearing (holding up the house)! If there is an existing wooden frame that is not too rotten, you may choose to use it and simply reinforce it. This example will assume that no frame exists or that it is rotten, and that you will need to start by installing a new wooden frame.
2. It is not necessary to level the ground perfectly before installing the frame, but you may find it helpful to do use a rake and/or hoe to at least make the ground flat and easier to work around.
3. The wooden frame that you will install should be comprised of treated 2x4 boards. You will install boards running along the ground ("bottom plate"), boards running along the underside of the home ("top plate"), and short boards running vertically between the top and bottom boards ("studs"). Your frame will look a bit like a ladder laying on its side. See diagram. Installing the wooden frame is not an exact science. Every home is different. In some cases, you may be able to construct the entire "ladder frame" first on the ground, and then slide it into place. This should only be done if the ground is very level, with no changes in elevations. In most cases, it's better to install the frame in sections. These instructions will show you how to do the latter method.
4. We recommend installing the top plate first, since you cannot make as many adjustments to it as you can the bottom plate and the studs. Install the top plate using deck screws or 16d nails, running into wood of the home itself. Start at one of the corners of the home.

Underpinning

- Next, put in 2x4 boards for the bottom plate. As you are laying these boards along the ground, make sure that you are keeping a fairly vertical plane between the top and bottom plate. To anchor the bottom plate to the ground, you will use rebar or gutter spikes. Using 1/2" spade bit, drill holes through the bottom plate boards, one about every two feet. Use a hammer to pound rebar or gutter spikes into place.
- At one corner of the house, measure the distance between the top plate and the bottom plate. Use this distance to determine how long to cut the first stud. One you have cut it, install it, wide-side out, flush with the outside of the top and bottom plates. Toe-nail with 8d nails or use deck screws to attach the stud. See diagram.
- From the stud you just installed, pull a tape measure and mark off the positions for the rest of the studs. Studs should be 2' on center. Mark on both the top and bottom plates.
- Measure the distances between each of the "on-center" marks you made, and cut studs accordingly. Measure each stud individually, as distances may change as you go along. Install the studs in the same as the first.
- Now you can begin installing the metal siding/underpinning. Don't ever leave a gap between panels, exposing wood or space. Always overlap panels, but don't overlap by too much. Use roofing nails with rubber gaskets to attach panels to the 2x4 frame.
- Try to avoid cutting panels if at all possible (it's a noisy and potentially hazardous task). Dig a trench if panels need to go lower. If you absolutely have to cut panels, make sure those people handling metal are wearing thick, rugged work gloves. There



Underpinning

are a few ways to cut metal siding:

- a. Use tin snips to cut. Make sure you use “straight cut” tin snips – these usually have a yellow handle. Other handle colors are designations for tin snips that make curved cuts, which you don’t want in this process. Be careful! Edges can be very sharp and can cut you very easily. Wear rugged leather work gloves.
 - b. Use a circular saw to cut metal, but with the blade turned BACKWARDS! Unplug the saw, unscrew the saw blade, turn it around backwards (so that the saw blade “teeth” are facing the other direction), and screw it back in tightly. Plywood blades work best because they are very fine-toothed. **WARNING:** this method of cutting can be dangerous, due to sharp edges and flying metal particles! The saw can also be difficult to maneuver. Use extreme caution! Wear a mask, long-sleeve shirt, safety goggles, and work gloves.
 - c. You can also use circular saw blades specifically designed for cutting metal, once again, being very cautious.
11. Always make sure that you install a small “access door” somewhere in the underpinning structure. This is required in case the homeowner or repairmen need to get underneath the house to make repairs to plumbing, electrical, etc. The access door does not have to be complex, though if you have enough materials and expertise, you can build a nice door with hinges, latches, etc. Easiest method: make one small panel that covers one “bay” between studs and overlaps the two adjacent panels. Make sure the two adjacent panels end on the studs. To attach the access door panel, drive a few sheet metal Phillips head screws at top of this panel, into the top plate. Make sure these screws are secure, yet can be easily removed with a screwdriver. Make sure the homeowner has a screwdriver that will work for these screws, and if not, then make sure we provide them with one.

