

THE EXCAVATION

Generally footing depth is 12" deep or 12" below the frost line. Interior footings can sometimes be as little as 6" to 8" deep depending on the foundation plan. Some plans permit pads on grade or gravel for interior piers. Check the plan and check with the local building department if the site is located in areas where frost heave is an issue.

Many builders scratch footings (sink in a bucket to break the ground) with an excavator bucket and then hand-dig them. Scratching them often goes too deep leaving a good portion of the footing as loose fill compacted by workers feet. Hand digging them without the aid of an excavator is hard work but can be made easier with an electric jack hammer using a shovel bit. I find that the smallest jackhammers are the easiest to use and anything larger is hard on the back.

I prefer to drill interior footings with a 24" auger on a skid steer tractor or excavator. The auger may jump around if rocks are encountered, but most of the time it does a fine job and grinds the spoils to small bits for easy hand removal. I like to drive into the pad straddling the footing row, go to the end and work my way backwards to the other end. Some times it is necessary to approach from a side. Generally I try to never turn while I am on a marked line or point so I do not disturb it. When lining up to drill the footing, the bit tends to swing about so I find a helper is useful for placing the bit. Once placed, the helper must step out of the way since the bit may encounter a rock and jump around. After the bit is 6" deep it is usually safe to approach and the footing should be drilled to the correct depth. It is nearly impossible to tell how deep you are drilling by just looking at the bit, so I have the helper sight the auger to depth using a marked rod and sighting across the top of the auger assembly. This method gets us within an inch almost every time. Choose your help carefully, cheap help can be expensive.

After the footings are dug, bail out the interior footings and pile spoils into the middle of the chassis rails for scooping out with a bucket loader or load directly into the loader as you go. I do not bail out the footings on the perimeter pier footings since excavating the perimeter wall footing will spill spoils into the perimeter pier footings and they will have to be cleaned out again. Dump spoils along perimeter of building far enough away to not disturb your work. Later you can use the spoils for back fill and finish grade. Next dig the perimeter footings, hanging the bucket 3" or about 1 tooth outside chalk line. Usually this is best performed digging counter clockwise with an excavator which will give a line of site along the boom to the bucket on the left side. Be careful with the bucket placement or you may have to go back and hand shave the side of the trench for forming. For depth on a level pad, I determine the pad elevation with a laser level and then move the receiver up the rod 1' which gives a 12" footing depth. Have a helper check your footing depth as you go, being careful not to over dig. If the trench is dug too deep, fill the low spots with clean compactable mist fill and compact with a jumping jack compactor. Clean the footings and finish cleaning the interior perimeter pier footings as you go.



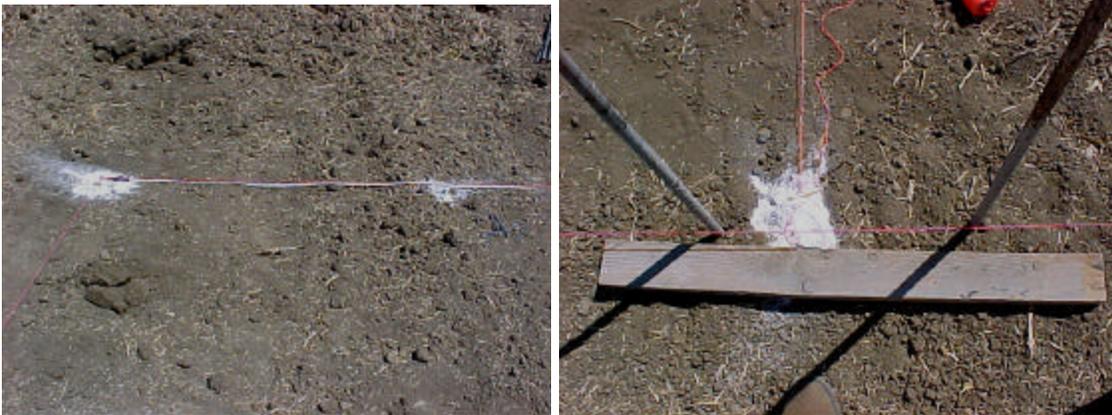
THE BATTER BOARDS

The elevation of the concrete must be determined keeping in mind backfill, drainage away from the home, venting etc. I usually start at form height above base grade. Base grade should allow back fill as needed leaving at least 6" of exposed concrete between the siding and the soil. Set up a laser level or water level. I recommend a self-leveling laser level set at 1/8" accuracy. Adjust the rod and receiver or leveling device in use to the height of the proposed concrete wall. Lay lengths of 2x4 across the batter board layout spikes that were placed for the layout rectangle. Place the batter board so the string line will cross it near the middle and the batter board will be parallel to the perimeter layout. Drive steel form stakes at each end of the batter board adequately long enough for correct batter board height. Using a helper and a level, fasten the batter boards on the outside of the stakes at the level chosen for the stem wall. Drive in a stabilizing diagonal stake with the top pointed away from the foundation and fasten under tension to prevent movement of the batter board. Pull a tape from the original layout hubs to the 3' point or what ever measurement you used in the layout. This should be directly above the layout spikes. Using a carpenters level, transfer the 3' mark accurately to the batter boards above the spike. The spikes are accurate enough for excavation but not for the forms, so measurements must be taken from the original hub points. Install a screw or nail and repeat the process all the way around. If a hub was damaged, measure from the opposing batter board pin to locate the one needed. All four sides should be measured in this way to find any errors in the transfer to the batter boards. If necessary, find the error and adjust but make sure the dimensions on opposing batter boards match the dimensions of

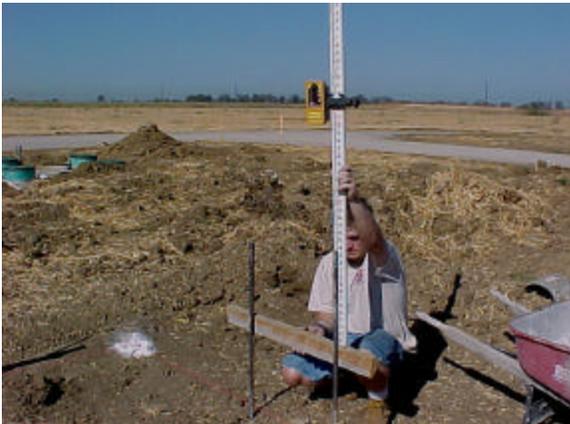
the home. Install taught string lines from batter board to batter board across the foundation. Check the string line diagonals, lengths and widths. If the diagonals are uneven but the lengths and widths are correct, adjust by racking one side pair of batter board points in equal amounts as needed fore and aft to achieve even diagonals without changing the length or width. Now on the longitudinal wall strings, add screws $\frac{1}{4}$ " inside and $\frac{1}{4}$ " outside the correct string line screw. The inner screw is used for the string line while forming. Maintain $\frac{1}{8}$ to $\frac{1}{4}$ " clearance to this string line which keeps the concrete wall inside the home's footprint. The outer line is used for installing the sill plate after the concrete is cured placing the string $\frac{1}{4}$ " outside the footprint so the plate can be installed with clearance from the string line.

Prior to forming, check the excavation trench for 3" clearance outside inside and 8" inside the string to accommodate form boards and stakes. Proceed with forming.

Locate the batter board and stakes



Level the batter board and fasten to the outside of the stakes.



Install a tension stake with the top pointed away from the foundation to keep the batter board stable.



Measure from the layout hubs and transfer the offset from the tape measure to the batter board.



The level is transferring from the tape measure pulled from the hub to the batter board, not the layout pin.



Measure from one batter board pin on the same wall side to set another batter board pin if a hub is lost.



After the batter boards are all set and pinned, string line across all the boards to create a string around the largest dimensions of the home, then measure diagonals and perfect the batter board pins as needed by racking one pair fore and aft in equal amounts. When finished, the pins should measure the same as the home dimensions and the diagonals must be within 1/8".



The screw inside is used for the forming, the center is the actual footprint and the outer is used to place the plate. By using offset string lines, the string can remain untouched and straight.



For concrete foundation installations, the sill plate should be installed and checked for square, parallel and level. It is best to mark the plate with the marriage lines and marriage gaps of $5/16$ " each marriage. The plate should be installed with the extra width planned for marriage line insulation. Framing or sheer blocking should be installed or ready to install after the home is positioned and set.