

## FOUNDATION LAYOUT



The first thing you do when you go to build a building is to level and compact the area to be built on. Compaction should be done every 4 to 6" as you move the fill dirt in. If you push 12" of fill dirt over an area and compact it, the bottom 6" of dirt will not be compacted.

On this job we used a backhoe to compact the fill.

When I go to lay a building out the first thing I do is to establish a building line, this is the primary frame line and this frame line stays the frame line all the way to the soffit. I do not, as a lot of builders I know, have 2 or 3 different lines that I have to deal with.

Some builders set their batterboard lines to the outside of their forms, some set their batterboard lines to the center of the ditch they are going to excavate for their footing. I don't, I set the line so that the inside form boards, edge of the slab or footing, stem wall, rim for a wood floor, and wall frame are all one line.

After you establish your primary building line you need to paint a 6 or 8" area at all of the corners of the building, very close to where the corners will be. I, as most builders, use the 345 method and I also use the diagonal (rake) length that I calculate to double check the square.

If you have a building 20'x30' and you want the diagonal length from opposite corner to opposite corner, you simply square a length and a width and the square root of the sum is the diagonal length.

$400+900=1300$ , square root of 1300 is 36'.05 Read "[Construction Formulas](#)" and see what you do with that .05 you have left over.

When I have the bright orange corners marked and I double check it I am ready to put in the corner nails. I do this exactly opposite of most of the carpenters that I see that build batterboards and foundation lines. I see carpenters all the time trying to measure, on the stringlines that are already on the batterboards, the square, length and the width of a building with a 100' tape that is sagging 10" in the center.

There is absolutely no way they can get an accurate measurement with a sagging tape.

With these orange corners marked you can build the batterboards (about 3' from the corners) and install the primary

building line above the orange marks, be careful and do not use a drawline if you are going to have any marks or measurements on your stringlines.



A drawline will slip and not you or anyone else will know it. Use loop lines only. I have 17 pages in the CB (Carpenters Book) on layout and batterboards, this should tell you how important I know it is to the construction of a building. It is without doubt the most important and most overlooked part of construction. The sagging tapes are a very good example.

I now install two 50 or 60d nails at the two corners of the primary building line, exactly under the line, as shown in the picture. Then I set a temporary nail at each of the other corners, using two tapes I get one of them at exactly the width and diagonal measurement, and then I set the other corner simply measuring the width and length of the building.

I check and double check these nails and then install the drylines (stringlines) exactly above the

nails that I have painted blue. As you will see my flimsy 100' steel (no fiberglass tape should ever be used when laying out the exact corners. Fibered tapes are used for estimating distances, not for measuring distances) is lying on the ground and is not sagging. If you are measuring a 100' length and your tape is sagging 10" in the center, you are marking 99' 10½". Try it.

Now I am going to tell you something that some of you are not going to believe. As you see on TV all the time, they say if you cross measure a wall or a slab or a floor and the measurement is the same it is square.

**This is not always true.** The only time it is true is when both of the lengths and widths are exact. You can have a wall that has a 16' plate on the bottom and a 15½" plate on top and you will get an equal cross measurement, but there is not a square corner in this wall, they are all out of square and you got equal cross measurements. Try it.

Back to the sagging tape. You measure a length on one side (no sag) and mark a 100'. Good. Then you measure and mark the other side, 100' wide building x 100' long, 99' 10½" (tape sagged) and the two lines are exactly parallel with each other. You will get a measurement of 141' 4" both ways and most will call it square. It's not. It should measure 141' 5". Not much, but more than I will tolerate when I

know for a fact that the wrong procedure was used, so why not do it the correct way? Measurements on the ground, not in the air...

On some of the large construction jobs I have been on the measurements were checked using a reflective laser and a SMR (Spherical Mirror Reflector) and this little tool can detect 1/1,000,000 of an inch. They didn't do this to get a bunch of concrete and bowed forms within a 1/1,000,000 of an inch, they did it so they could record and document the layout of the building. They are using a CD disc and a Total Station.

We aren't into that on a house, but we can use the proper procedures to get the buildings square as to the best of mine and your knowledge.

I hope you understand the importance of a building layout, especially the part about the sagging tape and knowing that your lengths and widths are exactly the same.

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**Bob Johnston, carpenter**