The Money Is In The Dirt
By George Porter

Have you ever traveled the same path for years and then one day noticed something rather large and obvious, but you never saw it previously? To make the occasion even more embarrassing, after you decide that it wasn't there before and that is why you didn't see it, it becomes clear that it was there all along. We like to think that we take things in as we go along. We have fairly active brains and we don't miss too much. If we want to see something new we need to look someplace we haven't gone before; explore new ground; range out into the unknown; well… not necessarily. Sometimes the best place to hide something is right under your nose, the last place you would think of looking.

One of these moments happened to me recently. I was working on developing an installation manual for a company and was looking for a new way to show the charts for weights and footing sizes. The object was to make them as simple as possible without becoming "overkill." For instance you could actually eliminate all this calculating by requiring a huge massively thick slab under every home as big as the home. $8,000 to $10,000 worth of concrete would solve 99.9999% of all foundation problems in the whole industry. However, these problems would be replaced by a "cost of the deal" dilemma. Who would finance this super slab? Who would spend the extra money to own these many truckloads of concrete? Some people would and do in fact pay for this arrangement and they are not wrong or silly. It is an option that some may choose, but to make it mandatory in an installation manual from a factory would be the proverbial "bullet in the foot."

I decided to see how simple I could make a chart and still have it divided up enough to yield some savings where possible. I am still looking at this but this is what I found so far.

Let's look at main beams only for now. All charts divide up the homes by spacing, roof load, and size of home. The reason is of course that these are all the things that affect the weight of the home. But some have a bigger effect than others. For instance the difference between a 12-foot wide, 20# roof load supported every 8 feet, and a14-foot wide with a 40# roof load supported every 8 feet under the main beams is an average of around 1600 pounds. Some homes are heaver but the difference as a percentage of the total weight varies even less the "beefier" the home gets. For example the difference between a 20# and a 40# lighter weight home is probably the same 1600#'s but because the home is not very heavy to begin with, the home gains a larger percentage of its own weight. The observation is that one of these kinds of homes is a lot heaver when you go to a 40-pound roof load. Yes, but notice that both types of homes go up by the same weight. (An additional 20 pounds per square foot on the roof, plus a little extra wood in the walls and roof to hold it all up)

This means that the actual pound increase is fairly constant for all homes! So, what good is that to know? Well... the footings are calculated on the weight they have to hold, not the increase in weight as a percentage of the home. 20 pounds on a fat guy is the same 20 pounds as 20 pounds on a skinny guy. Even though the scales will stop at very different places, the increase is exactly the same. So all we have to do is hold the extra weight in each case. If you are still with me congratulations, I will guarantee you many are gone by now and we are just getting to the good part.

My problem was focusing on the roof load and the weight of the home as big controlling factors when in fact they are more like little controlling factors. Lets go back to the original example: 12 wide, 20# roof, and 8 ft. spacing as opposed to 14 wide, 40# roof and 8 ft. spacing. When the soil is 4000 psf, the difference between the footing sizes is 1.5 inches per side! The exact footing sizes are 13 X 13 inches for the 12 wide home and 14 .5 X 14.5 inches for the 14 wide home. This is peanuts, it is the width of two fingers and both footings are less than the 16-inch by 16-inch surface required to fit a double stack of blocks on! This nearly comes under the heading of splitting hairs! The point is, if you use only the larger figures you have "over-killed" by 1.5 inches per side. (Like who is going to dig a hole in the ground in these increments anyway?)

So, if we move to skip all the small roof loads and widths and use only the larger we can make a VERY simple chart. The spacing of the footings matters big! 8 feet apart is always twice as much weight to hold as 4 feet apart in all homes. We have to keep the spacing; it makes too much difference in things.

And then there is the dirt. People have tried to simplify the process by "messing with the dirt chart" You just can't do that. Just as an 8-foot spacing is double the weight of a 4-foot spacing, so is 4000 psf soil double the supporting power of 2000 psf soil, but it gets worse. 1000 psf soil is **4 times less** holding ability than 4000 psf soil. These are big differences and can affect the cost and labor factor a bunch! To simply tell everyone that you have to calculate using 1000-psf soil is to increase the cost of the footings by 400% if what you really needed to calculate the footings was 4000 psf because that is what the dirt was.

The largest controlling factor in footing calculation for the average home is the load bearing capacity of the soil (dirt). It can change the sizing or number of footings and therefore cost, by up to 400% with all other factors being the same.

My first chart (see figure 1) will have a list of spacings for the main beam and the weight for each spacing next to it. These weights will be for all homes with sections of 12 and 14 feet and all roof loads 40 psf and under. It will be just two columns as opposed to an industry average of nine or more.

Figure 1

	24, 26, 28, Wide
Span Between Piers (FT.)	Pier Load in lbs 40 PSF or under Roof Load
4	3144
5	3930
6	4716
7	5502
8	6288

9	7074
10	7860

The next chart (figure 2) will be for the marriage line, done the same way, just two columns.

Figure 2

	24, 26, 28, Wide
Span Between Columns (FT.)	Pier Load at each end of opening in lbs 40 PSF or under Roof Load
6	2250
10	3750
12	4500
14	5250
16	6000
18	6750
20	7500
24	9000

The third chart will be for the dirt and it will look pretty much like lots of other dirt charts, I haven't really decided yet. This actually doesn't matter though, because all dirt charts are the very same calculations, they just express themselves differently. Think about it, 10,000 pounds of Fleetwood weighs exactly the same as 10,000 pounds of Champion or 10, 000 pounds of feathers for that matter.

These charts should make the manual a lot more user friendly without requiring too much over sizing. The lumping together here creates only slight differences in the footings.

So if you want to save time and money, getting the dirt right will make the most difference. It is where the biggest mistakes can be made and it is also where the greatest savings can be found.