



4/1/10

Notes from a builder on a concrete free slabi in the Covid19 era

Comment:

Here is a random list of the details and reasons for them in no particular order:

1. If this is slab on grade, make sure the excavator infills the foundation with good material that compacts easily and without issue. My excavator uses 3" minus recycled asphalt because it doesn't take much to compact and it WILL NOT settle. That gives me confidence. We then dress the top 4-6 inches with 1/2" stone to create a space for any drainage pipes, plumbing or passive radon pipes. The skill of the excavator has a huge impact on the success of this system. Excavation contractors typically work with increments that round to the nearest 1-2 inches. This system requires that they are capable of dialing into the nearest 1/4" or so. The screed layers allows you to dial it in the rest of the way.
2. If this is a basement with a concrete wall on a footing then we install 3/4" stone and then dress the top with 2-3" of 1/2" stone. Top of the stone is the top of the footing. Any load bearing footings in the basement are even with the top of the exterior footing which brings up the next point
3. Design the elevations in the layers so you create a screed point for the stone. In number 2, the screed point is the top of the footings. In a slab on grade building, we pour the walls with an interior brick shelf so that the bottom of the shelf is the top of the stone. This interior shelf also allows us to eliminate a big thermal bridge point by replacing concrete with insulation.
4. We use stone because it is self compacting, and we use the 1/2" stone because it is easier/faster to screed. If the quantity of 1/2" stone needed isn't cost effective to deliver (depends on the size of the truck - doesn't make sense to make a special trip for 1/2" stone) then we just suck it up and level the 3/4" stone.
5. Did I mention that the excavator is critical?
6. If this is a slab on grade building with a double stud wall, then the elevation of the layers isn't as critical
7. If this is a single exterior wall, then we detail the elevations precisely. This requires that you know how thick all your materials are:
 - 7a. One time we ordered 5" thick EPS foam and it came at 4 7/8" thick.
 - 7b. A double PT sill with a capillary break and a caulk joint under it might add up to 3 5/16"
 - 7c. If you don't think about the last 2 points then you just added more time and materials to the process
8. We install a single layer of type IX EPS. Because it is a more rigid base than multiple thin layers. The thicker sheets are cut to fit with precision with a festool saw by skilled carpenters. These sheets are also cut on a cnc machine, so they are very dimensionally consistent You can't fit a piece of paper between the sheets when we are done installing. If you energy model down to the gnat fart, then by all means use multiple layers of thinner sheets and stagger the seams.
9. We install the vapor barrier on top of the foam and connect it directly to the capillary break on top of the foundation wall if it's a slab on grade install. Top of foam is either level with foundation or 1 1/2- 3 1/2" above foundation - see comments below.
10. Basement installs are easy, install the parts after the house is dried in. For slab on grade installs, you need to design the system to go in after the shell is dried in or you are going to make a big ol' mess. Double stud construction makes this easy. Frame you building like normal until it is a weathertite shell and then install the foam all the way to the inside of the interior brick shelf that was formed in the foundation wall, and then install the plywood to the outside of the interior wall you are framing. With a single 2x6 stud wall there are a few options. The first time, we just bolted a 2x8 sill down and then framed the house with 2x6 walls and dried in the shell. The foam was installed level with the top of the first plate and the first layer of advantech was screwed into the 1 3/4" of the sill plate that was visible to the interior. We use a layer of 12" wide grace vycor (no sill seal - that's a different conversation) as a capillary break under the sill. The vycor is installed with a flap to the inside enough that the vapor barrier could be taped to the top of it before subfloor went down. In this case the foundation was extremely level. If you don't trust your foundation contractor to form perfectly level walls (most do not) then I would install a double 2x8 plate and shim between the plates so that the top of the 2nd plate is 3 1/2" above top of foundation. The top of that 2nd plate becomes the top of foam and the rest of the layers go in the same. Shimming to an exact elevation allows you to layout with confidence from the first layer.
11. We are turning an existing garage with slab into living space right now and using this same system with a 2x6 floor joist system on top of the foam like Elizabeth talked about because that is the easiest way to get the plumbing and electrical lines through. otherwise, I don't see the need for the additional labor and materials because it is easier



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for the trades to run everything through the ceiling joists above and down the walls and it also requires less planning and coordination in the field. If you really need the space, I would recommend taking the time to plan the piping in the crushed stone like you would for a normal slab on grade installation. If there really is that much additional stuff that needs to go under the slab, then I would consider a 2x6 floor system. With the floor joists, you can eliminate the second layer of advantech subfloor. There is also a benefit to the floor joists in that it creates an old school balloon frame condition at the exterior walls which makes for a nice insulation detail that eliminates some thermal bridging.

Comment;

1. The real key is getting the surface under the foam flat/level and compacted. The 3/4" stone worked well, we tried compacting it, but it didn't move at all, hence the conclusion that it compacts enough on its own. The stone level long felt like it was slow going, it just seemed like we could be doing better, hence the switch to 1/2" stone. Another time we tried using sand. It screened very easily and level, but it does compact, so if you don't compact it and then screed another thin layer over the top, I think it will settle over time. That's where we settled on the 1/2" stone.
2. Another tip on screeding - if the distances between footings are really far, have the foundation company form and pour a couple of small interior footings level with the screed points on the exterior walls. This will speed things up by providing an interior point from which to level the material.
3. I have another good anecdote to share that some of you might already know about. The first plywood floor we did like this had a major water disaster about a year after we installed it. The main water line from the street burst in the basement. No one was home and the entire basement filled up with about 7" of water - a total of about 7000 gallons of water. This was a walkout basement, so we opened the doors to get most of the water out. The rest was a pump and vacuums. After that, it turned into a standard water repair job. The finished floors were removed, the bottom 24" of trim, plaster and insulation was removed, everything was dried out, dehumidifiers were run for 3 weeks and then we put it all back together. The advantech floor held up totally fine!

Comment:

On all of our installations we just screwed the two layers together with 1 1/4" screws - 6-8" on center on the edges and at all the nail sheathing marks in the field without any glue (we also space all the sheets a full 1/8" since we weren't following a joist layout). We used the simpson quick drive system. I never felt like the additional gluing was necessary. And if you don't need it, why add the labor/materials/chemicals into the house? The only advantage I can see to adding the glue is that it would stiffen the floor a bit. I personally found that the 2 layers without glue was an extremely comfortable walking surface and didn't feel like it needed stiffening. Maybe glue the sheets if the finish surface was to be tile, especially if the tile is big?

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