

Contractor Focus

Raised Patio with Flowable Fill Reduces Construction Time



Before and After: Raised patios create an outdoor room more permanent and inviting than wood or plastic decks. Flowable fill enables faster construction solution for contractors enabling shorter delivery time to customers.

The market for raised patios continues to grow in answer to hardscaping backyards where the ground elevation is well below the rear entrance and when the backyard takes a steep slope away from the house. A construction method using flowable fill can shave off days of construction time for raised patios depending on their size and design. With a pancake batter consistency, flowable fill is a low-strength (150-200 psi or 1-1.4 MPa) concrete (sand, cement, air entraining agent and water) available in most markets from ready-mix concrete producers. While the material is about 4 to 5 times more expensive than dense-graded aggregate base typically used to raise patios, the labor savings can be more than worth the extra material cost.

Contractor Tom Arthur of West Grove, Pennsylvania was one of the first contractors to use this construction method in 2005 and provided the photos for this article. Mr. Arthur has done many raised patio projects with this construction method. For this Pennsylvania project built in 2004, a raised patio with flowable fill "reduced construction time by a week compared to endless compacting of dense-graded base." He

said that all of his raised patios use flowable fill as long as the ready-mix truck can access the backyard to deliver the fill.

Construction begins like a typical raised patio, i.e., a footer trench is dug as shown in Figure 1, lined with geotextile and filled with compacted, dense-graded aggregate and course raised to begin forming the concrete segmental retaining wall. Figure 2 shows an exposed concrete house foundation under a stucco wall surface that didn't need waterproofing since flowable fill was poured next to it. Other non-concrete exterior wall surfaces may require waterproofing and weep holes in brick walls will require outlets. All grass and topsoil are removed from the area inside the wall, the soil compacted and a layer of compacted dense-graded base provides a level surface for the flowable fill.

As the wall rises, it is lined with geotextile (Tytar) to prevent loss of flowable fill through joints. Any drain pipes and conduit for electrical lines are placed prior to each pour. The flowable fill is poured in layers and this project required four pours, each 18 in. (450 mm) deep (3 courses) with geogrids at each interval. This minimizes any lateral forces against the



Figure 1. Raised patio construction begins with excavating trenches for footers prior to lining them with geotextile and filling them with compacted, dense-graded aggregate. For this project the footer depth was a generous 3 ft (0.9 m). PVC pipe is readied for down-spout drainage.



Figure 2. At a minimum, the first course of retaining wall must be completely submerged within the ground. Retaining wall blocks must be at the correct elevation and be plumb before placing higher courses. All wall units in this project were glued with adhesive. Note the geotextile flaps emerging from under the footer and that the white PVC pipe for drains or can sleeve supply pipes.

wall units and the house during curing. Lateral forces are minimized once the flowable fill cures.

After each pour cures, the geotextile is trimmed away and geogrid installed between the next courses of wall units and positioned on the cured fill. Additional courses are placed, glued and geotextile placed against them in preparation for the next pour. Each pour was done in the afternoon and allowed to cure overnight so it could receive a new pour the next day. According to Mr. Arthur, this enabled

flexibility in delegating his crews to other projects while the flowable fill cured.

Figure 3 shows a cured flowable fill layer with the geotextile against the inside of the walls and geogrid in place for the next pour. Conduit is positioned for wiring step lights and the same treatment can be done for water, sewer, and storm drains, plus natural gas supply lines for barbecue grills, fireplaces and firepits. Because cured flowable fill can be dug with a shovel, it can be excavated to install lines



Figure 3. Each flowable fill pour is 18 in. (450 mm) deep and its pancake batter consistency fills around drainpipes and conduit.



Figure 4. The final (fourth) pour with conduit for wiring sprouting well above the surface with tops taped shut.



Figure 5. Placing and compacting a 4 in. (100 mm) thick base layer provides a medium to enhance the sloped surface for drainage.

after the pour, making it a forgiving material if a conduit is inadvertently left out.

Figure 4 shows the final pour. Each pour requires pulling and pushing the wet flowable fill away from the delivery chute by crew members and working the flowable fill for even distribution and leveling. Again, geotextile is containing the fill so that it doesn't move through wall joints. During pours, the stucco house wall is temporarily covered with geotextile to prevent flowable fill from staining the surface.

Once the final fill layer has cured, a 4 in. (100 mm) thick aggregate base is placed and compacted. While the outer wall elevations help frame a gentle slope for drainage from the fill surface, the base layer surface provides an opportunity to fine tune or sculpt the final slope for surface drainage. Figure 5



Figure 6. Once the bedding sand is placed and screeded, pavers are installed, cut, compacted, joints filled with sand and the area compacted again just like any at-grade patio project. Note the columns rising to accommodate fencing.

shows the base layer under compaction.

After the base is compacted, a 1 in., (25 mm) thick layer of bedding sand is screeded as in most interlocking concrete pavement jobs. Pavers are installed as in any patio project, i.e., placed, cut, compacted, joints sanded and the entire paver area compacted again. Figure 6 shows the pavers being cut to fit within the patio walls. A small strip of geotextile is placed against the wall units to prevent migration of bedding sand.

Figures 7, 8, 9 and 10 show the finished job and the superb results that have shown no settlement since construction. Flowable fill was used behind steps to help secure the block and provide a level surface for each subsequent step and capping.

For every hardscape project time is money and when labor



Figure 7. Finished view of steps

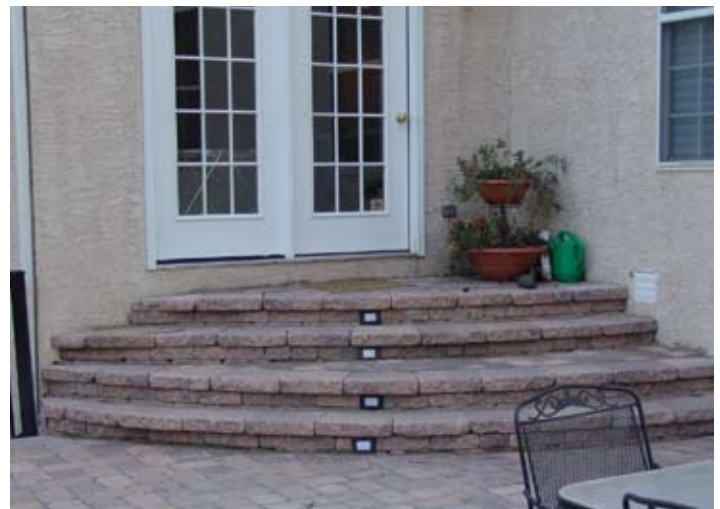


Figure 8

is saved, money is saved. That's the idea behind using flowable fill. Assuming site access by the delivery truck, a raised patio project should be estimated comparing aggregate base to flowable fill to compare the

labor cost savings, faster project delivery and potential for doing more projects per year. ❖

