Effect of Grain Size on Weathering ◄ ► My Opinion

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Q: We're considering specifying a sandstone for an exterior application. The quartz grains are really fine in this material; the vendor claims this this improves the weathering performance of the stone. Is the effect of grain size versus weathering documented anywhere?

A: I know of no document that would provide a general rule for this, and the grains themselves are not likely to be as influential to weathering performance as other factors. A sandstone, by definition, doesn't necessarily need to have grains consisting of quartz, although usually those that are used as dimension stone are quartz-based.

What defines a stone as sandstone is that the clasts (grains) are of a "sand size". A sand sized particle is defined by geologists as a particle that has a volume greater than that of a sphere measuring 1/16 mm (0.0025) diameter, but less than that of a sphere measuring 2 mm (0.08") diameter. With respect to weathering, of greater importance than the particle size would be its shape and the mineral that cements them together. Sand size grains can be well rounded, almost spherical, or very angular and irregular. Angular grains tend to interlock well, and would therefore, contribute to durability better than spherical shapes. The biggest influence with respect to weathering would be the material cementing the sand sized grains together.

The most common cementing materials found in sandstone, in decreasing order of desirability, would be silica, carbonate, iron oxide, and clay. There is a comprehensive discussion regarding this in the Geology Chapter of the *Dimension Stone Design Manual*, and I would encourage you to read it.

Q: What is the industry standard for overhang of countertops? We're working with a designer that wants zero overhang.

A: There isn't really a "standard", but rather a "rule of thumb", that the countertop should extend to, or slightly beyond, a line that is plumb with the drawer/door pull hardware (reference *Dimension Stone Design Manual* Detail 17-D-7). The designer has a right to design whatever he/she feels is visually pleasing, although I wouldn't recommend zero overhang because it creates a zero tolerance condition for both the cabinet and countertop components.

Q: I'm reviewing a shop drawing submission for a small low-rise façade on a retail property, and I'm confused by the contractor's anchor placement. The stone is 1¼" thick, but the anchors are only ½" back from the face. Logically, shouldn't they be at ⅝" back from the face, which would be the center of the panel's edge?

A: Most fabricators will locate anchorage preps a bit closer to the face of the panel than the back, and there are several good reasons for this. Proper panel alignment for stones sharing a common anchor requires that the anchor preps be gauged off of the finished face of the panel. Not doing so would create a risk of unacceptable lippage in the installation.

This means that this dimension is controlled, and the dimension from the anchor to the back of the panel is subject to variation due to the slab thickness tolerance. If the stone slab is severely under its target thickness, there will be less material behind the anchor to resist the load in that direction. Secondly, wind loads are frequently greater in the negative direction than in the positive, particularly at regions of façade discontinuity, such as building corners. This makes a good argument for having more stone behind the anchor than in front of it. Lastly, should there be a failure due to overloading or due to an inappropriate filler (such as an expansive material) in the anchor slot, we would prefer to see the anchor blow out the face of the stone as opposed to the back of the stone.

A failure at the stone's face would be visible, alerting building maintenance personnel that there is a problem, and also less likely to be an imminent public safety concern, as the stone would be allowed to fall inward to the cavity, not outward toward occupied space.