Anchor Placement for Cladding Stones ◄ ► My Opinion

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Q: What is the correct anchor placement for cladding stones? I've seen details that show the anchors at ¼ points, and I also see details, for instance in the *Dimension Stone Design Manual*, that show the anchors at 1/5 points? Is there a particular advantage to either one?

A: It depends on the jointing scheme of the cladding. In the case of staggered joints ("running bond" type pattern), the ¼ points is the better option, because shared anchors, like split-tail straps, will then be at ¼ points for both courses. Many designers simply use ¼ points for their standard anchor position regardless if the jointery is staggered or stacked. When you encounter really geeky guys like me, we prefer to switch to 1/5th points for stacked jointery, single courses, back anchors, or anytime no compelling reason exists to use other placement. This is done to reduce flexural stress in the stone panel. The stone panel is essentially a beam that carries a uniform load (wind, or seismic) back to reaction points (anchors). Due to the cantilever of the stone extending past the anchor position, there is a bending stress concentrated over the anchor location. There is another bending stress concentration, albeit in the opposite direction, located mid span (assuming symmetrical anchor positions) between the anchors. If the anchors are located at 0.207 times the length of the panel (for all practical purposes 1/5th points), the flexural stress experienced at these two locations will be equal. When achievable and/or practical, this condition represents the optimum anchor placement because it takes advantage of the contraflexure in the panel to produce the lowest possible maximum stress in the panel. Consider the accompanying graphic (Figure A), showing a 60 inch tall, 1¼" thick panel, subjected to 30 lbs/ft² windload. The bending stress experienced by the panel at both the anchor position and mid-span is shown in the accompanying table and graph. In the illustration (Figures B & C), moving the anchors a tiny distance from their optimum position of 12.42" (0.207 x the length) to 15" (¼ points) increases the flexural stress in the panel by a factor of nearly 1.5.

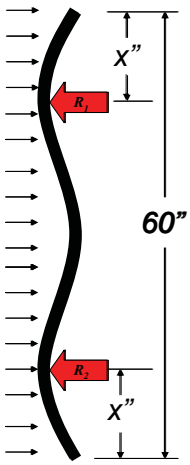

Figure A

Flexural Stress in Stone Panel (60 inch panel, 1¼" thick, 30 lbs/ft² windload)			
Distance from End of Panels to Anchors (in)	Stress @ Anchor (lbs/in²)	Stress @ Mid-Span (lbs/in²)	Maximum Stress (lbs/in²)
0	-	360	360
2	2	312	312
4	6	264	264
6	14	216	216
8	26	168	168
10	40	120	120
12	58	72	72
12.42	62	62	62
14	78	24	78
15	90	0	90
16	102	24	102
18	130	72	130
20	160	120	160
22	194	168	194
24	230	216	230
26	270	264	270
28	314	312	314
30	360	360	360

Figure B

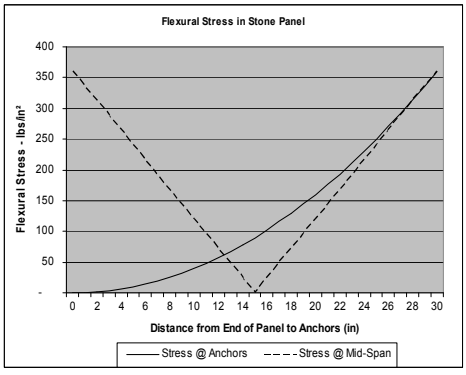

Figure C

Q: I have an architect that wants to know the proper substrate material and thickness for a 2cm granite countertop? Is it different than the 3cm?

A: During the last revision of the countertop installation manual (chapter 17 in the *Dimension Stone Design Manual*), we surveyed common practices in various regions of the country. Most installers weren't using an underlayment beneath 20mm stone of reasonable soundness, and that there wasn't any significant number of failures attributable to the practice. The use of 20mm stone countertops without an underlayment was then endorsed. The onus is still on the installer, however, to recognize stones that are of reduced soundness and therefore still require an underlayment, regardless of thickness.