

Backed-Up By Design

MORE EFFECTIVE ANCHORING OF STONE VENEER

Stone is beautiful. Granite. Marble. Cut limestone. Its use is evocative of a time gone by, a simpler time. Natural textures conjure up a feeling of coziness and of home fires burning. In commercial and public works, stone projects grandeur and strength. Its use depicts a building built to last.

The use of stone has fluctuated throughout the centuries. The recent decline started in the post war years, when returning GIs needed homes built quickly and affordably. The new world demanded stark simplicity reflected in straight lines and flat planes. Extracting, fabricating and installing natural stone was not inexpensive. This was especially clear when compared to newer architectural products fabricated on high-speed production lines. Limestone was virtually reduced to an accent, seen only in square-cut windowsills and parapets.

That was then; this is now. Traditional masonry detailing began to reemerge in the late 1980s and 1990s. This was allowed not just by changing tastes, but with technological advances in quarrying, cutting, edging, shaping and shipping natural stone and processes for man-made stone.

Efficiencies in quarrying and fabrication

Today, using the latest cutting and water blasting techniques, raw material is quarried at a fraction of the cost and labor needed in past decades. From there, the fabricator slices, dices and shapes the stone on mechanized

production lines, resulting in unprecedented precision. Tolerances are so tight that joint spacing can be perfect. The crisp detailing allowed by today's technology affords designers an infinite choice of complex shapes and sizes with limitless color and texture options.

Designers use CAD to precisely detail shop drawings. They e-mail designs to fabricators who use computerized controls in production. The finished product is labeled, placed on pallets, wrapped, shipped and unloaded at the jobsite in an organized and logical order so masons can systematically complete the installation.

This has greatly reduced the time and cost from design to reality. As a result, designers are more inclined to include stone products in their projects. Increasingly, we see stone facades, door and window accents, corners, cornices, coping and even garden walls. The large number of reopened and new quarries, fabricators and retailers is a testament to natural stone's rapidly expanding demand.

Challenges inherent with studs

But this renewed popularity does present some challenges. The years of natural stone's limited use saw many changes in the ways buildings were designed. Today's designers and engineers are often inclined to build structures with less substantial substrates, often with metal stud backup systems, with studs spaced 16" oc.

In the past, designers didn't need to

put much thought into detailing anchors for stone veneer; the stone was simply fastened to a masonry backup in any head or bed joint location. Sometimes stone was even part of a thru-wall masonry system.

But how does one properly and safely anchor the beautiful and lasting stone materials to a stud system? Options are limited and often expensive. After all, compared to a CMU backup, the surface area to attach and anchor is reduced by 90%! (Photo A) This often results in convoluted anchoring devices, significantly increasing the cost of the project. In fact, for a six to eight piece metal stud system consisting of a pronged bracket, adjustable channel, either two screws or two sets of bolts with toggles, a weather gasket and the embeddable stone tie connector, \$7.00 must be allowed per anchor location, whereas for a two piece CMU backup set, only \$2.00 must be allowed per anchor location. In addition, labor savings can be up to 70% for stone anchor/tie installation for stone veneer on CMU backup.



Photo A. Head joint anchors miss 90% of metal stud area

Advantages of CMU Backup For Stone Veneer

- ✓ Increase potential anchor surface area by 90%
- ✓ Allow cost saving head joint anchoring
- ✓ Improve integrity of anchor system
- ✓ Reduce anchor and fastener cost
- ✓ Shorten construction schedule
- ✓ Single source (mason) responsibility for backup and veneer
- ✓ Improve thermal performance with cavity insulation
- ✓ Shift dew-point to air space away from backup – helps prevent mold and corrosion from developing
- ✓ Save design time – CMU backup allows limitless anchor locations

Optimum Areas of Savings

- ✓ First and second floor
- ✓ Piers, columns and pilasters
- ✓ Window and doors surrounds
- ✓ Parapets
- ✓ Arches

Two projects from the last few years work to illustrate some of the challenges inherent in trying to anchor stone veneer to 16" oc metal studs. One is a library built in the Detroit area and the other is a court facility near Flint.

The court facility was detailed with random ashlar bond. This required the installation of a continuous horizontal channel slot receiver, spaced 16" oc, which had to be backed up with pronged bracket plates in order to provide positive contact to the metal stud flanges and prevent the wind-loaded anchor from compressing the exterior sheathing. That could lead to a degradation of the exterior sheathing around the anchor, which could lead to ultimate failure. The studs themselves had to be pre-drilled to accommodate the stainless steel bolts, washers and lock nuts.

The library required individual, custom-made, heavy duty eight-piece stainless steel anchors. These were installed horizontally every 16" oc. This limited the masons to use bed joint anchoring, hindering their ability to meet minimum vertical spacing recommendations.

Both of these projects would have been more easily and cost effectively



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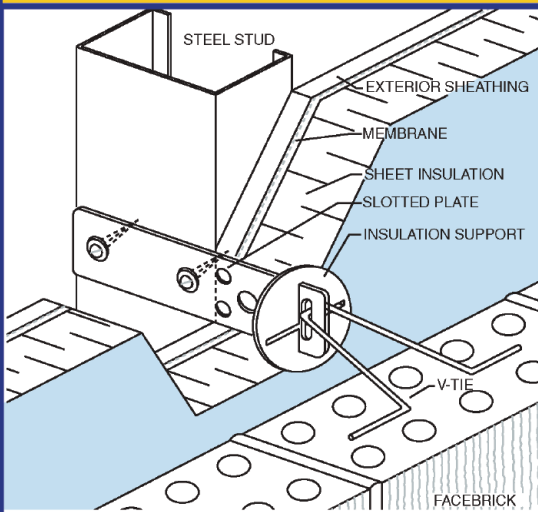
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Photo B. Head joint anchors never miss CMU back-up



Photo C. Stone is easily anchored to CMU jambs

completed if a CMU backup had been used instead of a metal stud system.

Efficiencies in backing stone

CMU backup has advantages beyond just the anchoring issues. Metal stud systems, and their resultant complex devices, are difficult to waterproof and impossible to cavity insulate. The dew point lies within the batt-insulated metal stud space. This poses a real threat of mold growth and corrosion. Anchoring devices themselves compromise the air space, negating any opportunity to double-net thermal performance with rigid cavity insulation.

Such stud designs lead to higher construction cost and greater energy consumption. The combination of metal stud backup systems and stone veneer also has a shorter expected life cycle compared to CMU backed-up stone.

CMU backed-up stone veneer provides masons the opportunity to install anchors in the head joint of each piece. (Photos B & C) Significant labor is saved when masons set and slide each piece of stone into position — up to 25% over the other option, lifting and setting each piece over stone anchors. The lift and set method limits spacing in a manner that leaves little margin of forgiveness.

Another great advantage of veneering stone over CMU is that fewer types of anchors are needed, simplifying installation. (Photo D w/ three anchors) The "L" shaped stainless steel split-tail anchor with a hole in the vertical leg

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BACKED-UP BY DESIGN

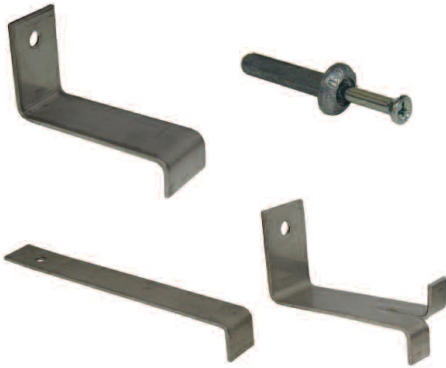



Photo D. A few anchors cover most stone veneer applications

sized to fit 1/4" diameter, 1200-1400 lb tension and shear capacity expansion pins is often the only style anchor needed to install most stone veneer. Occasionally, "Z" or straight "L" anchors may be required at terminations such as door and window openings.

If current trends continue, it will not be long before most designers use natural or cast stone in their designs. With unlimited color, texture and dimension options, these materials add unrivaled beauty and value to any building. By choosing a CMU backup for the stone veneer, they are giving the owner additional benefits. Designers can ensure their investment lasts by improving the integrity of the anchoring system and improving the thermal and moisture handling performance of the wall system. Schedules may be shortened and the overall quality and sustainability of the building are vastly improved, while actually lowering the initial cost of construction.

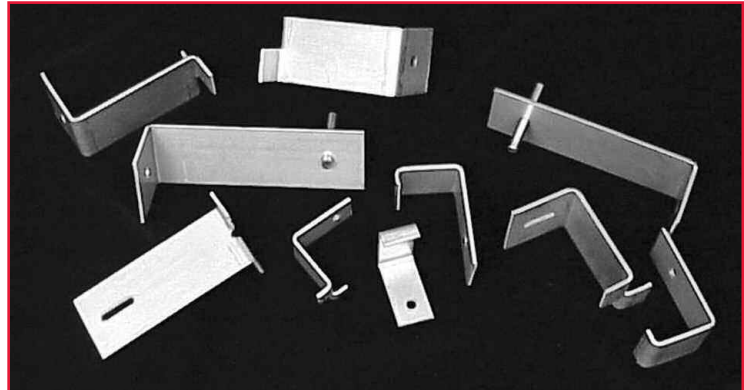
Designers can make a big difference for the owner by designing a building built to last. 



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