

### Application of Brick, Stone, or Masonry Veneer to Quad-Lock Walls

Application of brick, stone or masonry veneer finishes to an ICF wall is executed using the same basic techniques as other conventional structures. This means that provisions must be made for the following conditions:

**Support** for gravity loads

**Anchorage** to the supporting wall

**Moisture management** behind veneers

**Transitions** to other wall elements

## 1. Support for Gravity Loads

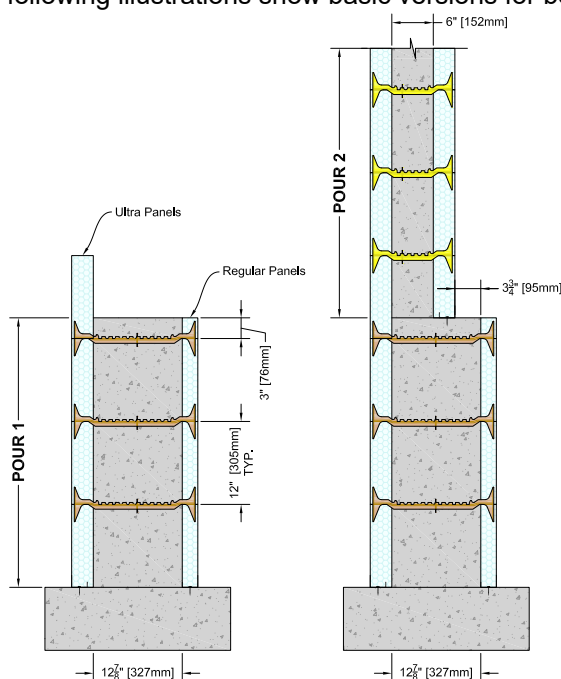
Gravity loads created by brick, stone, or masonry finishes are supported one or more methods. Quad-Lock (in order of preference) suggests the following:

- A brick ledge that carries gravity load directly to foundation elements
- A steel shelf angle anchored into the supporting concrete or masonry wall
- A corbel, or extension from the concrete wall

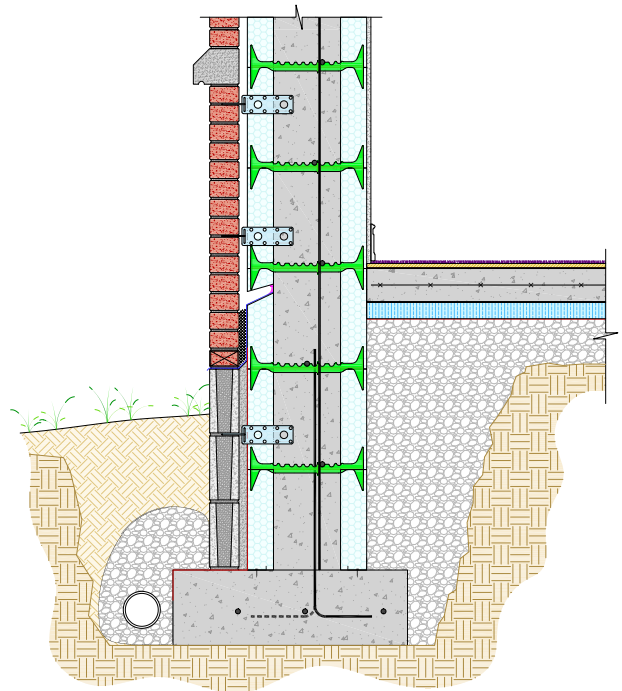
### Brick Ledges

A concrete or masonry brick ledge that carries the weight of veneer finishes directly to a footing or other foundation element offers the highest level of structural stability with the minimum amount of cost and time expended. Quad-Lock recommends brick ledge support of finish material weights exceeding 20 psf [100kg/m<sup>2</sup>]. Positioning the imposed load directly over the supporting concrete takes full advantage of the concrete's inherent compressive strength characteristics and minimizes (or eliminates) the need for additional reinforcement, like that required for corbels. The flush exterior face also minimizes the potential for damage to veneer finishes created by the upward expansion of freezing soils.

A brick ledge can be created in (or on) an ICF wall by either transitioning the width of the poured ICF concrete wall at the appropriate elevation, or by stacking masonry block next to the ICF wall to the bottom of finish elevation in order to support a minimum of 2/3 of the width of the brick or stone. Neither of these methods require concrete reinforcing beyond that required for the wall's primary function, (whether a foundation wall, a retaining wall, or an above-grade wall). The following illustrations show basic versions for both of these methods:



**Fig. 1:** ICF wall width transition creates a brick ledge



**Fig. 2:** Masonry block stacked next to ICF wall creates brick ledge

### Steel Shelf Angle

Where solid concrete or masonry support for veneer systems is not practical, a steel shelf angle can provide a wide range of solutions. For multi-story construction, a steel shelf angle can be installed at any elevation to limit the load on supporting elements below. “Eyebrow” applications over window openings are easily fashioned with custom or site cut steel components. Proprietary insert brackets make offsetting the steel angle through the ICF EPS layer cost effective and structurally sound. Products like FERO (Fero Angle Support Technology) by FAST, [www.ferocorp.com](http://www.ferocorp.com), make perfect sense in cases like those described above for ICF walls.

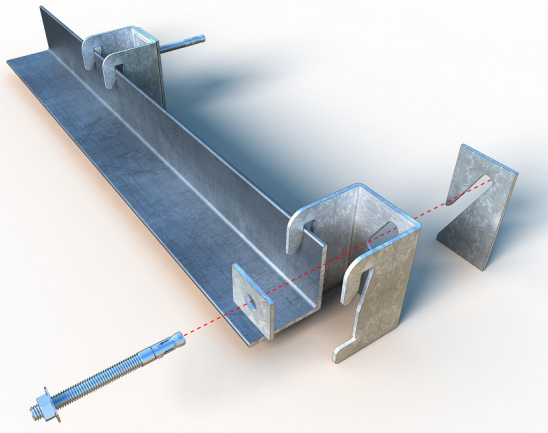


Fig. 4: Steel shelf angle and bracket

### Concrete Corbel

A concrete corbel is a highly-engineered, reinforced concrete element that is typically used to support pre-cast concrete beams. To insure against cracking or other failure, corbels must be designed with a precise shape and reinforcement method that is suited to each individual project, the cost of which may not be suited to smaller projects. Quad-Lock panels may be ripped to form a simple corbel, as shown in Fig. 5. Note that the face of the ICF is still in-plane with the rest of the wall. This is important in colder regions, as mentioned in the previous section.

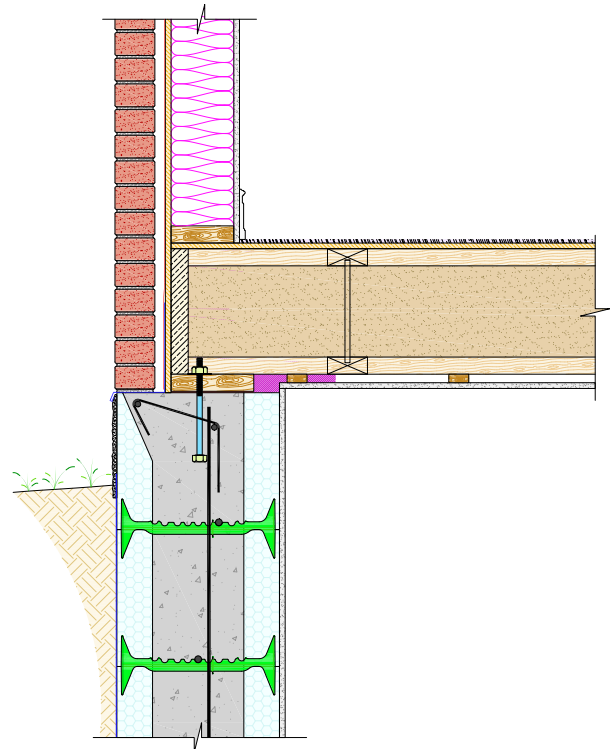


Fig. 5: Corbel formed by ripping the inner face of the top panel

## 2. Anchorage to Supporting Walls

### Tie-back Devices for ICF Walls

Quad-Lock recommends direct anchorage to concrete for natural stone or full brick veneer finishes. Typically, an adjustable “through-form” galvanized wire tie or combination wire/metal plate tie is placed in the ICF wall prior to concrete placement. (See Fig. 6 & 7 below). Installers may find it more cost effective to apply anchors post-pour with specially designed anchors (See Fig. 8). In either case, the project engineer must specify the spacing of ties to support the weight of the finish layer against lateral loads.

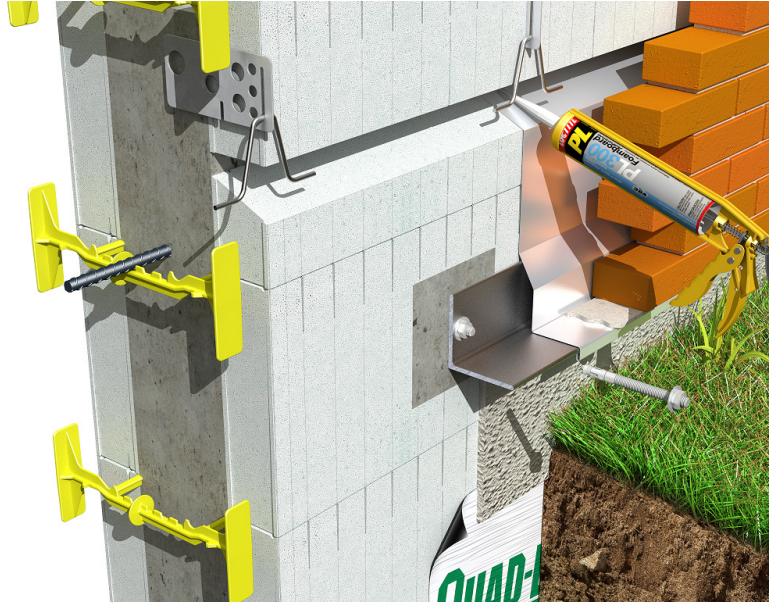


Fig. 3: Steel shelf angle attached directly to concrete

The length of each tie device must be sufficient to both pass through the ICF panel thickness and achieve sufficient embedment within the concrete wall to generate its specified pullout strength. When choosing ties, consider the thickness of all of the following: Recommended embedment in concrete, thickness of ICF EPS layer, & specified drainage/ventilation space between the ICF wall and the finish layer (if any). Examples of tie-back devices for both pre-pour and post-pour applications are shown below.

**Note:** Quad-Lock does not recommend attachment of brick ties to Quad-Lock plastic tie flanges as a means of stabilizing exterior veneer finishes.

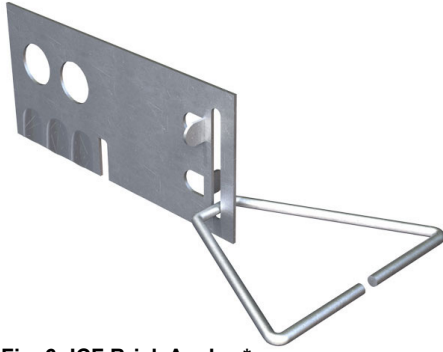


Fig. 6: ICF Brick Anchor\*  
(pre-pour installation)

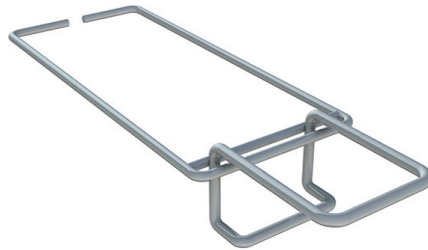


Fig. 7: Wire Anchor\*  
(pre-pour installation)



Fig. 8: Spiral anchor\*  
(post-pour drill & anchor)

\*Images courtesy <http://www.blok-lok.com/>

### 3. Moisture Management

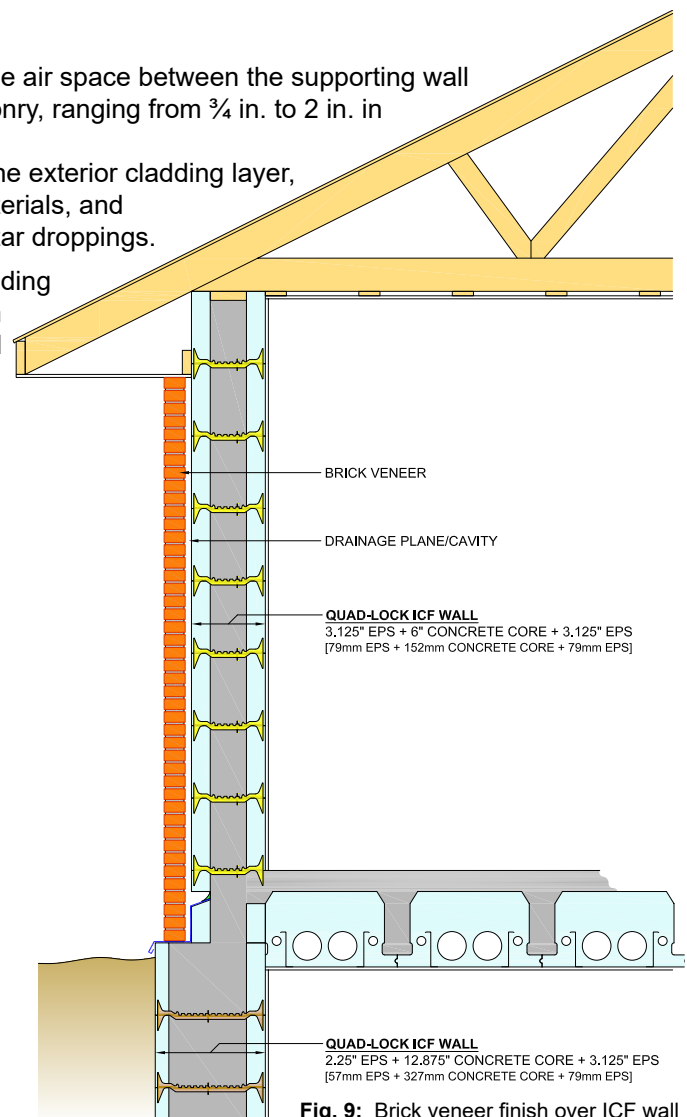
Exterior veneer claddings are generally thought to require a large air space between the supporting wall and the interior face of the veneer, whether brick, stone or masonry, ranging from  $\frac{3}{4}$  in. to 2 in. in width. The purpose of the air gap is three-fold:

- 1) to allow drainage of bulk (liquid) water that may breach the exterior cladding layer,
- 2) to allow ventilation of moisture stored in the cladding materials, and
- 3) to allow space for air to continue to circulate around mortar droppings.

As mentioned in the above section on anchorage of veneer cladding to walls, the length of the tie-back device must allow for creation of any such air gap if a drainage/ventilation airspace is specified in the construction documents.

Recent research\* has shown that the air gap solution may not be the only effective method for control of bulk water and water vapor behind the veneer cladding. ICF/concrete walls are considered by code to be “mass walls”, which are considered in US and Canadian code to be sufficiently water-tight to be exempt from secondary planes of moisture protection, like building paper, house wrap, and rain-screen air gaps. The EPS in most ICFs is sufficiently dense to be considered a vapor impermeable layer. Thus, the building structure is isolated from water vapor by the outer ICF layer, solving the issue of dissipation of moisture stored within the veneer cladding materials.

Drainage of bulk water can be achieved within a very small space, even as little as  $\frac{1}{4}$  in. according to leading building scientists. Thin drainage mats made from recycled plastics may be added to insure drainage in worst-case scenarios where exterior claddings fail and permit bulk water ingress.



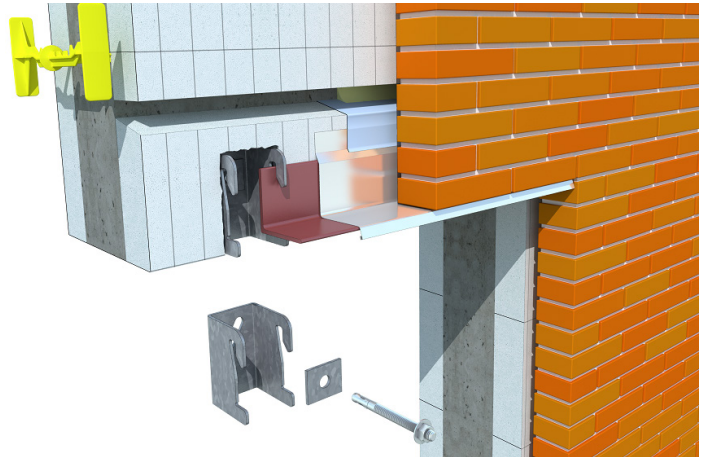
\*See Building Science Corp; Info-305 “Reservoir Claddings” Sept. 2014  
<https://buildingscience.com/documents/information-sheets/reservoir-claddings>

Fig. 9: Brick veneer finish over ICF wall



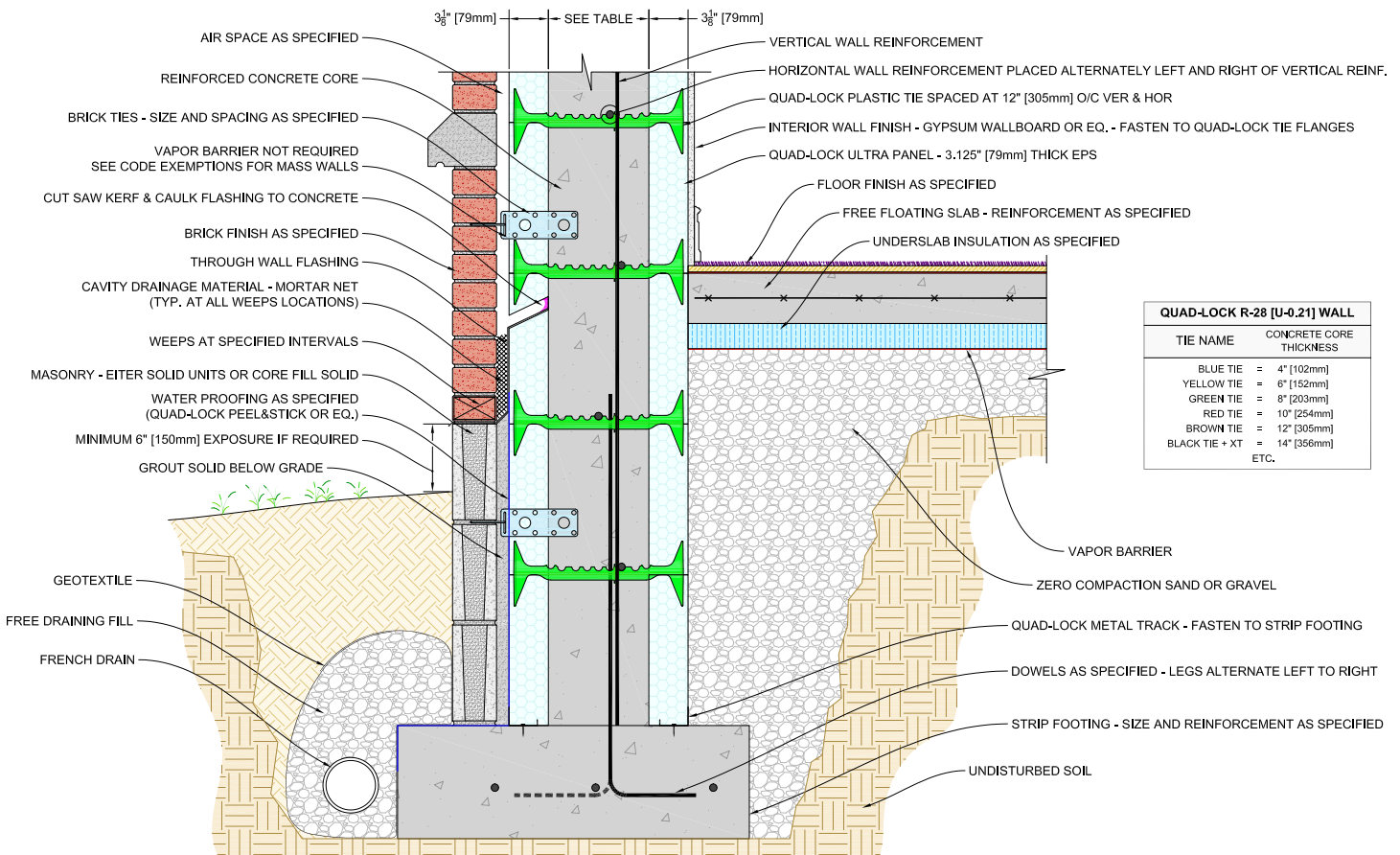
## 4. Transitions

Veneer claddings will inevitably come into contact with areas where other types of building finishes are used. Examples are building penetrations (windows, doors) and the transition between above-grade and below-grade wall surfaces. It is critical at such transitions that proper flashing and sealing is done to shed water to the exterior face of the building. In the case of ICF/concrete walls, it is advisable to carry the top edge of flashing materials back to the concrete core of the ICF wall in a "reglet" cut made into the outer EPS layer of the ICF. The flashing should be sealed with exterior grade sealant directly to the concrete. A basic example of a reglet cut and flashing is shown at right. This technique is recommended above all building penetrations where flashing are employed.



**Fig. 10:** Flashing adhered to concrete core inside sloped reglet in EPS

Where exterior veneer cladding terminates at grade level or at breaks in the finish type, a through-wall flashing is required in order to shed water to the exterior of the building. The illustration below shows a complete ICF wall assembly with a brick veneer finish, including a through wall flashing at grade level.



**Fig. 11:** ICF wall assembly with exterior brick veneer

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