DUCERE CONSTRUCTION SERVICES — TECHNICAL BRIEF

# The Hidden System: 7 Layers That Make Brick Veneer Last 100 Years

Brick doesn't fail; the system behind it does — the foundation, air space, flashing, anchors, and materials nobody sees once the wall is closed up

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**THE 7 LAYERS AT A GLANCE**

① **Support it right** — a noncombustible foundation, or a properly engineered steel angle where wood carries the load.

② **Maintain the air space** — a minimum 1-inch drainage gap behind every brick veneer wall.

③ **Flash every interruption** — foundations, openings, and roof lines all need a path for water to exit.

④ **Anchor to code, not by eye** — corrosion-resistant ties at prescribed spacing, tied into the studs.

⑤ **Size lintels for the load** — every opening needs steel or reinforced masonry sized to the span above it.

⑥ **Use the right materials** — graded brick, ASTM-compliant mortar, and corrosion-rated anchors, matched to the exposure.

⑦ **Respect height limits** — wood-framed backing caps how tall brick veneer can safely go, and seismic category tightens that cap further.

**Brick doesn't fail — the system behind it does.** This brief walks through the seven critical layers, from the foundation footing to the anchor ties, that Ducere builds into every brick veneer wall so it resists water, wind, and time for a century, not a decade.

Unlike a solid masonry wall, a veneer relies on a 1-inch air gap to drain water, flashing to channel that water out, and specific anchors to hold the brick to the wood frame behind it. **Miss any one of these, and the wall will leak — not in 10 years, but as soon as the next heavy rain.** Ducere builds to the Brick Industry Association's Technical Note 28 and Georgia's current state minimum standard codes, verifying every detail before the framing is closed up.

## 1. The Anatomy of a Brick Veneer Wall

A brick veneer wall is not a solid brick wall. From the inside out, the assembly is: interior drywall, then the wood stud with batt insulation between studs, then exterior sheathing, then a water-resistive barrier (house wrap or felt), then a 1-inch air space — the drainage gap — and finally the brick veneer itself, tied back to the studs with corrosion-resistant metal anchors.

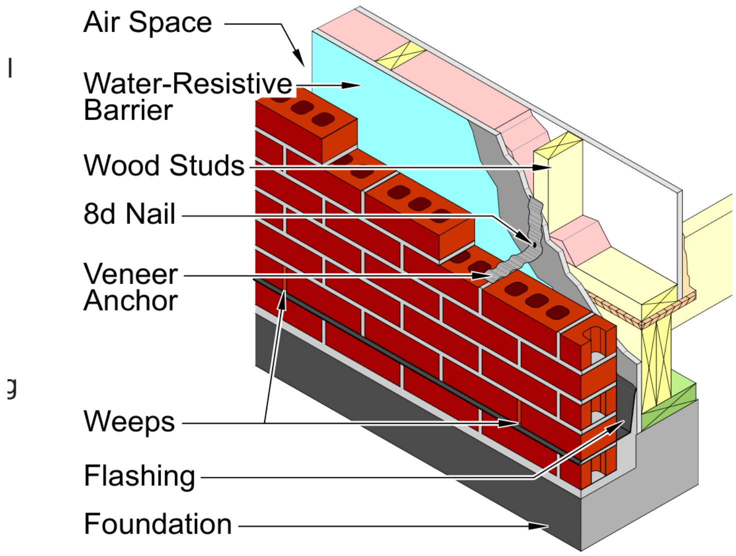



Fig. 1 — Anatomy of a brick veneer/wood stud wall: air space, water-resistive barrier over the sheathing, wood studs, veneer anchor, weeps, flashing, and foundation. **Why it matters: every one of these layers is doing a specific job — skip or shortcut any single one and the whole drainage system stops working, brick above it notwithstanding.**

**The code ignores the brick's ability to resist lateral loads entirely** — wind and seismic forces pass straight through the anchors to the wood frame, which is the real structure. The brick's job is to shed water and look good doing it. Anchored brick veneer walls are classified as **drainage walls**: some water will get through the brick, which is expected and normal, even in well-built masonry. What matters is what happens next — the air space lets that water run down the back of the brick instead of soaking into the frame, and flashing collects it at the bottom and routes it back outside through weep holes. **Block that drainage path and you've turned a normal, expected amount of water into a moisture problem trapped inside the wall.**

## 2. Foundations: Supporting the Veneer's Own Weight

Brick veneer carries its own weight straight down to a foundation or another vertical support — it does not lean on the wood frame for that. **At least two-thirds of the brick wythe's thickness has to bear directly on the foundation**, which must extend below the local frost line and account for differential settlement and any concentrated loads, such as columns or a fireplace.

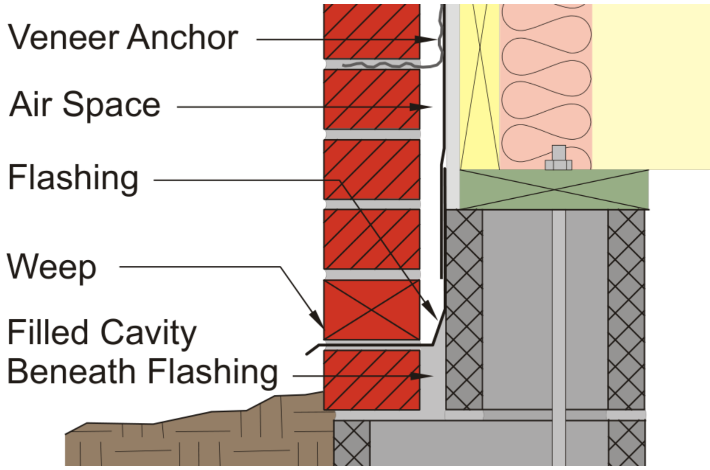



Fig. 2a — CMU foundation with wood floor framing above.

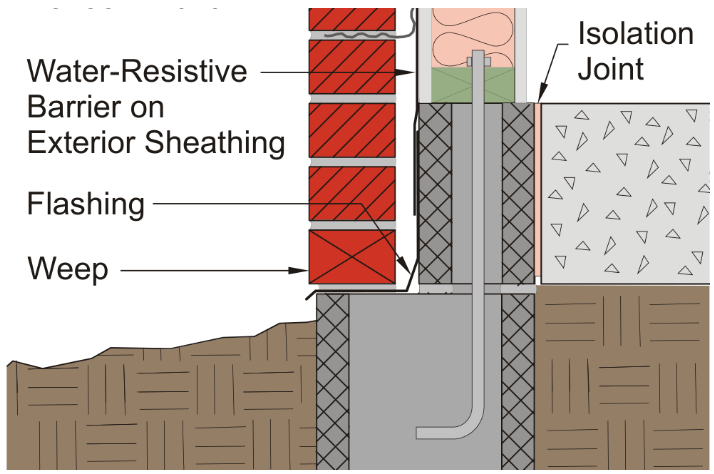



Fig. 2b — CMU foundation with slab on grade, using an isolation joint to absorb differential movement between the veneer and the slab.

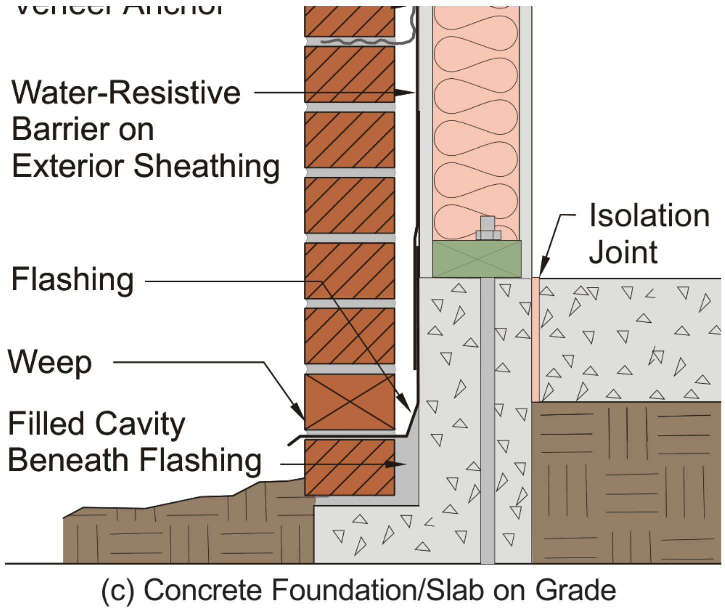



Fig. 2c — Concrete foundation with slab on grade. All three conditions share the same non-negotiables: flashing at the first course above grade, an air space maintained straight through, and the cavity below flashing completely filled with grout or mortar. **Why it matters: the foundation-to-wall transition is a deliberate bond break — brick expands and concrete shrinks, and flashing at this joint absorbs that movement instead of letting it crack the wall.**

Concrete or masonry foundations are the recommended support, though wood foundations are permitted under the IRC in buildings of two floors or fewer — anything taller, or any building in Seismic Design Category D or above, requires an engineer to design the wood foundation rather than relying on prescriptive tables.

### When the Frame Itself Carries the Brick

Sometimes it isn't practical to run brick straight down to the foundation — a one-story garage abutting a two-story house is the classic case. In that condition, code allows two prescribed methods: a steel angle bolted to double studs, or a loose steel angle resting on triple 2×6 rafters. **Either way, the brick supported on wood construction must be isolated from the brick supported on the foundation with an expansion joint**, and the deflection of whatever wood is doing the carrying can't exceed L/600 or 0.3 inches — tighter than typical framing deflection limits, because brick doesn't flex to absorb sag the way drywall or siding does. Up to 12 feet 8 inches of veneer weighing 40 psf or less can be supported this way, provided at least two-thirds of the brick bears on the angle and a minimum 1-inch air space is maintained. In no case does code allow the brick to bear directly on roof sheathing.

## 3. The Air Space: Non-Negotiable, and Easy to Get Wrong

Code requires a minimum **1-inch air space** behind the brick, and Ducere holds to it on every wood-framed brick veneer wall we build. That gap has to stay clear — mortar droppings, insulation pushed too far out, or a sloppy pour can bridge the gap and give water a direct path to the sheathing.

- Where **corrugated anchors** are used, the air space cannot exceed 1 inch — these anchors don't transfer load reliably across a wider gap.

- With other anchor types, up to 4-1/2 inches is allowed if the anchors are sized and spaced for it.
- Where continuous exterior insulation sits in the cavity, a full 1-inch clear space still has to be maintained between the back of the brick and the face of the insulation — which also rules out corrugated anchors on that wall.
- On commercial work, Ducere recommends widening the air space to 2 inches — commercial buildings typically have less roof overhang protecting the wall from wind-driven rain.

> **Why this is baseline, not optional:** a bridged or undersized air space is invisible from the curb and stays invisible for years — until moisture works its way into the wall cavity, the sheathing, or the framing behind it. By then the fix means opening up finished wall to find and correct a problem that a correctly maintained air space would have prevented from the start.

## 4. Flashing and Weeps: Where the Water Actually Leaves

Flashing has to be installed everywhere the air space is interrupted — at the foundation, above windows and doors, under sills and copings, and at roof intersections. Every flashing run does three jobs, in this order:

> **1. The Route:** Flashing directs water to the exterior, extending at least 8 inches vertically at the wall base and out past the face of the brick to form a drip edge.
>
> **2. The Seals:** Where flashing is discontinuous — over and under a window opening, for example — the ends turn up at least 1 inch into a head joint to form an end dam, so water can't run out the sides.
>
> **3. The Exit:** Weeps sit in the mortar joints directly above every run of flashing. Open head joint weeps, spaced no more than 24 inches on center, are preferred and must stay unobstructed — a weep clogged with mortar droppings defeats the whole system.

Flashing susceptible to UV breakdown gets covered by brickwork as soon as possible after installation, and asphalt-impregnated felt or house wrap is never an acceptable substitute for real flashing material.

## 5. Anchors: The Connection That Has to Move (a Little) and Hold (a Lot)

Anchors — often called wall ties — are the only physical connection between the brick and the frame. They're engineered to resist tension and compression pulling the brick away from or into the wall, **but deliberately not to resist shear** — that flexibility lets the frame and the brick move independently as temperature and moisture change, without cracking the wall.

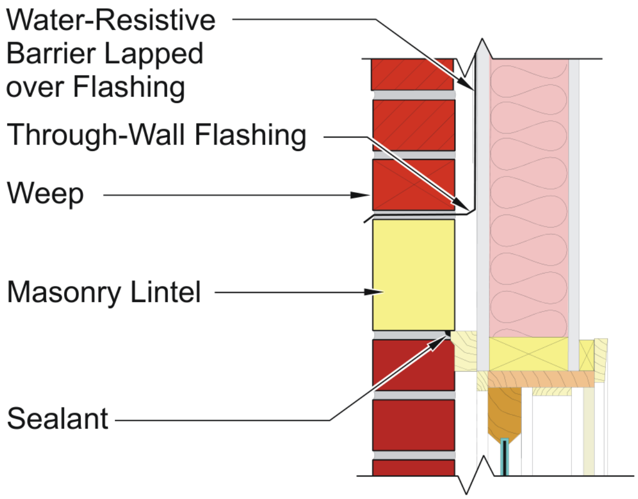

Fig. 3 — The four anchor types most commonly used with wood stud backing: base & vee, corrugated, eye & pintle, and wire & screw. **Why it matters: corrugated anchors are the traditional choice but corrode faster than wire — Ducere specifies adjustable wire anchors on wood-framed brick veneer for better load transfer and longer service life.**

- One anchor for every 2-2/3 square feet of wall area, minimum — spaced no more than 32 inches horizontally and 24 to 25 inches vertically depending on code.
- Extra anchors required within 12 inches of any opening larger than 16 inches, spaced at 3 feet on center around it.
- Anchors fasten to the **studs through the sheathing** — never to the sheathing alone — with a corrosion-resistant 8d nail placed within half an inch of the anchor's bend, and driven at least 1-1/2 inches into the stud.
- In higher seismic categories and high-wind zones, anchor spacing tightens and nail requirements step up to ring-shank fasteners for greater pull-out strength.
- Where veneer is laid in stack bond rather than running bond, single wire joint reinforcement is required — stack bond doesn't get the interlocking strength running bond provides, and the reinforcement makes up the difference.

## 6. Lintels: Carrying the Brick Over Every Opening

Every window and door interrupts the brick wythe, and that brick above the opening still has weight that needs somewhere to go. Lintels — steel angles, reinforced brick, or reinforced concrete masonry — carry that load down to the brickwork on either side of the opening rather than back to the building frame.

(a) Loose Steel Lintel




(b) Masonry Lintel

Fig. 4 — Loose steel lintel and reinforced masonry lintel details, both showing the through-wall flashing and weep that must accompany every lintel — a lintel without flashing above it just creates a new spot for water to collect. **Why it matters: a lintel is a structural element and a drainage interruption at the same time — both jobs have to be detailed correctly.**

Steel lintels bear at least 4 inches on the brickwork at each end, and the horizontal leg has to be sized to support at least two-thirds of the brick wythe's thickness — typically a 3-1/2-inch leg for nominal 4-inch brick. **Getting that leg size wrong has a visible consequence:** a leg that's too short fails to fully support the inner wythe of the brick, and the result shows up as a horizontal crack directly above the opening — not a hidden defect, but one that shows up on the finished elevation.

Spans, story count above the opening, and how many stories of brick that lintel is carrying all factor into the required size — a lintel sized for a single-story opening won't necessarily hold up two stories of veneer above it. Reinforced brick lintels are a viable alternative to steel: more efficient use of material, inherent fire resistance, no differential-movement mismatch with the surrounding brick, and no ongoing maintenance from rust or repainting. Ducere considers both on a project-by-project basis, driven by span and load rather than habit.

## 7. Openings: Head, Jamb, and Sill Details

Windows and doors are where most brick veneer water problems actually show up, because there are more seams, more transitions, and more opportunities to miss a detail. **Window and door frames attach to the backing, never to the brick veneer** — the brick and the frame need room to move independently.

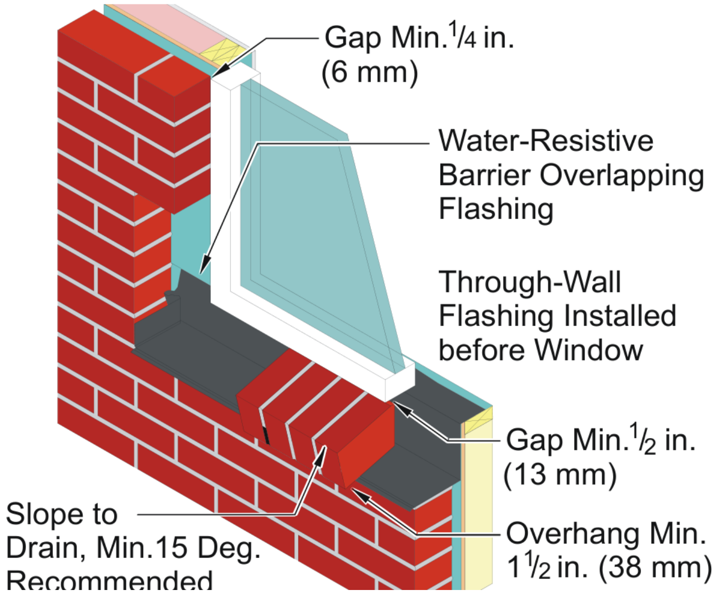



Fig. 5 — Window jamb and sill detail: through-wall flashing installed before the window, a sill sloped at least 15 degrees to drain, and a minimum half-inch gap between the window frame and the sill below. **Why it matters: a sill that doesn't slope, or a gap that's too tight, turns a window sill into a reservoir instead of a drain.**

- All sills slope to the outside — a minimum 15 degrees from horizontal for brick rowlock sills.
- Sealant joints at window and door perimeters are kept free of mortar for the full thickness of the veneer, using a backer rod and sealant — not caulk troweled over mortar — and are generally no less than 1/4 inch wide.
- Window and door flashing has to integrate with the water-resistive barrier behind the sheathing, forming one continuous barrier rather than two systems that happen to overlap.
- Sills that install with few or no joints — stone or precast — carry fewer opportunities for water to find a way in than a built-up masonry sill.

## 8. Materials: What Actually Goes Into a Code-Compliant Wall

The details above only perform as designed if the materials behind them meet spec. Ducere doesn't treat brick, mortar, and anchors as commodity line items — each has a grade or class matched to the exposure the wall will actually see.

- **Brick** — Grade SW (severe weathering) is specified for exterior veneer, chosen for its high and uniform resistance to cyclic freeze damage when saturated. Grade MW is acceptable only where the brick will be damp but never saturated when freezing occurs.
- **Mortar** — ASTM C270 compliant, Type N for most veneer applications, stepping up to Type S where basic wind speed exceeds 110 mph or where a higher degree of flexural resistance is needed. The rule is to use the *lowest* compressive strength that's compatible with the project, not the highest available.
- **Water-resistive barrier** — No. 15 asphalt felt, building paper, or an approved house wrap. Not every plastic membrane performs the same — some act as vapor retarders and can trap moisture inside the stud wall, so product selection is checked against the wall assembly, not assumed interchangeable.

- **Anchors** — carbon steel anchors are hot-dip galvanized or epoxy-coated for corrosion resistance; stainless steel needs no additional coating. Corrugated anchors run a minimum 22-gauge base metal; wire anchors are sized W1.7 (9 gauge) minimum.
- **Sheathing** — exterior-grade gypsum or glass-mat sheathing, rigid foam, OSB, or exterior-grade plywood, each with its own minimum thickness — and often dictated as much by the wall-bracing requirements of the frame as by the veneer itself.

Salvaged or reclaimed brick is allowed under the IRC with building-official approval, but the IBC requires salvaged brick to meet the same ASTM standards as new brick — salvaged units are generally less durable than new production, so this is confirmed rather than assumed on any reclaimed-brick request.

## 9. How Tall Can Brick Veneer Go on Wood Framing?

Because wood shrinks and brick expands at different rates, code caps how much brick veneer a wood frame can carry — and that cap gets stricter in higher seismic categories. This matters most when a homeowner wants full brick on a two- or three-story build, or brick above a garage or lower roofline.

| Building Type | Seismic Category | Stories | Max Height | Max Veneer Weight |
|---|---|---|---|---|
| All buildings | A, B, or C | 1, 2, or 3 | 30 ft | 50 psf |
| One- & two-family detached | D0 | 1 or 2 | 20 ft | 40 psf |
| One- & two-family detached | D0 | 3 | 30 ft | 40 psf |
| One- & two-family detached | D1 | 1, 2, or 3 | 20 ft | 40 psf |
| One- & two-family detached | D2 | 1 or 2 | 20 ft | 30 psf |

Per the IRC (Table 1, height limits for anchored brick veneer above noncombustible foundations). Gable end walls get an additional 8 feet of allowance, and D0/D1 veneer is permitted to reach 30 ft where the lower 10 ft has a concrete or masonry backing instead of wood. **Georgia's metro-Atlanta counties generally fall in lower seismic categories**, which gives more headroom than these tighter figures — but Ducere verifies the actual SDC for every site before finalizing a veneer height, rather than assuming.

## 10. Commercial Construction: Where the IBC Gets Stricter Than the IRC

A shopping center build-out, a light commercial addition, or anything outside one- and two-family residential falls under the IBC rather than the IRC — and the IBC tightens several of the numbers above rather than just repeating them. Ducere checks which code applies before finalizing a brick veneer design, because using residential defaults on a commercial job under-designs the anchoring.

| Provision | IRC (Residential) | IBC (Commercial) |
|---|---|---|
| Anchor spacing | 24 in. vertical max / 32 in. horizontal max | 25 in. vertical max / 32 in. horizontal max |

| | | |
|---|---|---|
| High wind (anchor spacing) | Reduce to 2 sq ft per anchor above 30 psf wind pressure | Above 40 psf: maximum anchor spacing must be reduced to 18 inches on center in both directions |
| Seismic (SDC D) | Max. 2 sq ft per anchor in D0/D1/D2; 8d ring shank nail | Meet SDC C, reduce anchor area 75%, support brickwork weight at every floor |
| Seismic (SDC E/F) | Refer to IBC requirements directly | Meet SDC D plus horizontal joint reinforcement mechanically connected to anchors |
| Veneer not laid in running bond | Not addressed | Horizontal joint reinforcement required, spaced up to 48 in. o.c. |
| Hot/cold weather protection | Recommended practice | Mandatory when temperature limits are reached |

Where wind velocity pressure exceeds 55 psf or the building's mean roof height tops 60 feet, the IBC requires the veneer to be **rationally (engineer) designed** rather than relying on these prescriptive tables at all — the same trigger point Ducere watches for on taller commercial elevations.

## 11. Energy Performance and Condensation Control

Brick veneer walls have to meet the energy code just like any other assembly, and the wall's own thermal mass helps: brick stores and slowly releases heat, flattening and delaying peak heating and cooling loads. But batt insulation between studs loses effectiveness wherever a stud crosses it — the stud itself acts as a thermal bridge — which is why continuous exterior insulation, placed within an enlarged air space, consistently outperforms batt-only assemblies.

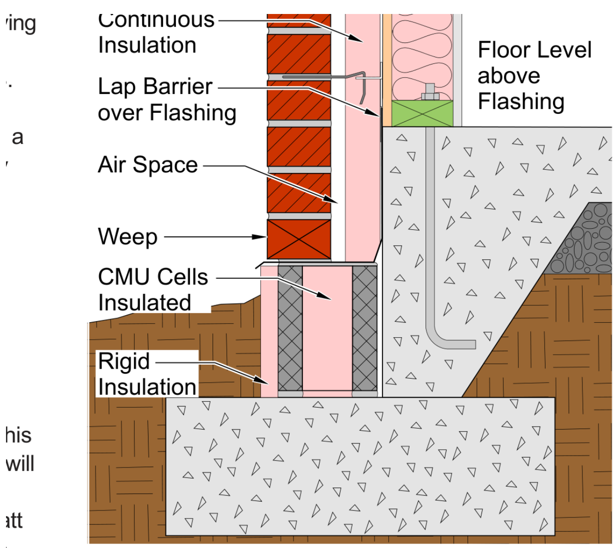



Fig. 6 — Continuous insulation carried down into the foundation area, paired with insulated CMU cells and rigid insulation, so the thermal envelope doesn't have a gap right where the wall meets the ground. **Why it matters: the foundation-to-wall junction is a common spot for heat loss to sneak through even on an otherwise well-insulated wall.**

### Condensation: The Moisture Problem That Isn't a Leak

Not all moisture found inside a wall cavity is a leak — some of it is condensation, which forms wherever humid air inside the wall reaches a surface below the dew point. If that point falls within the air space, the drainage system handles it the same way it handles rain intrusion. **If it falls inside the stud wall against batt insulation, it can saturate the insulation, reduce its R-value, and lead to mold** — a completely different failure mode from a flashing or air-space defect, and one that calls for a different fix.

> **Rule of thumb for our climate:** Georgia sits in a mixed/hot-humid climate zone. In that climate, the vapor retarder generally belongs on the *exterior* side of the assembly — behind the brick, ahead of the sheathing — rather than against the interior drywall the way it's often detailed in colder, heating-dominated climates. That keeps the stud cavity warmer and drier through Georgia's long humid season and reduces the chance of condensation forming inside the wall rather than in the drainage air space where it belongs. Ducere confirms vapor retarder placement against the specific climate zone and wall assembly on every project rather than defaulting to a northern-climate detail.

## 12. Construction Practices That Protect the System

Good details on paper still depend on workmanship in the field. A handful of practices separate a wall that performs for a century from one that starts leaking in year three.

- **Material storage** — brick stays off the ground to avoid staining, cement and lime stay dry, and flashing materials sensitive to UV are never left stacked in direct sun before installation.
- **Brick wetting** — units with a high field-measured rate of water absorption are wetted and allowed to surface-dry before laying, so they don't pull water out of the mortar too fast for a proper bond to form.
- **Full mortar joints** — head and bed joints filled completely, since brick veneer is typically under 4 inches thick and water resistance depends almost entirely on joint fullness. "Clipping" the brick ends to save mortar is a leaky-wall shortcut, not a time-saver worth taking.
- **Joint tooling** — concave, V, or grapevine profiles, tooled when the mortar is thumbprint-hard, compact the mortar against the brick edges and don't leave a ledge where water can sit.
- **Protection of unfinished work** — open masonry gets covered at the end of every workday and during any shutdown, because rain-saturated partial brickwork can take months to fully dry and raises the risk of efflorescence in the finished wall.
- **Hot and cold weather measures** — mandatory once temperatures move outside roughly 40 to 90 degrees Fahrenheit under the IBC, and good practice on any residential job in that range as well.

**The 7 Layers, In Order**

1. **Foundation support** — noncombustible foundation or properly attached steel angle where wood carries the load.

2. **Air space maintained** at a minimum 1 inch, kept clear of mortar droppings and bridging insulation.

3. **Flashing and weeps** at every interruption — foundation, openings, roof lines — with open head joint weeps preferred.

4. **Anchors fastened to the studs** through the sheathing, at code-required spacing, tightened further in high-wind or high-seismic areas.

5. **Lintels sized to the span and story load** above every opening, paired with through-wall flashing.

6. **Materials matched to exposure** — brick grade, mortar type, and anchor coating chosen for the actual climate and wind conditions, not assumed.

7. **Height and weight verified against seismic category** before design is finalized, not assumed from a standard detail.

8. **Commercial (IBC) work re-checked** against its own tighter anchor, wind, and seismic tables — never designed off residential defaults.

9. **Workmanship practices followed in the field** — full mortar joints, correct tooling, and protection of unfinished masonry every single day.

## Beyond Curb Appeal: Fire, Sound, and Longevity

Brick veneer earns its place beyond looks. A properly detailed assembly routinely achieves fire ratings up to 2 hours, sound transmission ratings (STC) as high as 56 with the air space acting as an acoustic buffer, and decades of virtually maintenance-free service once the system behind the brick is built right. **None of that performance shows up if the underlying system — foundation, air space, flashing, anchors, materials — isn't built to spec first.**

Most brick veneer failures trace back to one of a handful of things: a bridged or undersized air space, missing or poorly lapped flashing, anchors that were spaced too far apart or never made it into the studs, or a lintel that wasn't sized for the load above it. Every one of those is invisible once the wall is finished — which is exactly why it has to be verified while the framing is still open, not assumed after the fact.

## Built to Code, Detail by Detail

Planning a brick veneer exterior on your next build? Get the foundation, air space, flashing, anchors, and materials specified correctly from day one.

**Ducere Construction Services, Inc. · (404) 565-0631 · www.koredeakinbami.com**

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Built on the Details.

**Ducere Construction Services, Inc.**

5925 Mulberry Street, Austell, GA 30168

(404) 565-0631 | www.koredeakinbami.com


Reference: Brick Industry Association, Technical Notes on Brick Construction No. 28, "Brick Veneer/Wood Stud Walls" (November 2012). Ducere builds to current Georgia state minimum standard codes; specific height, anchor, material, and wind/seismic requirements are verified per project and jurisdiction.