

CONSTRUCTION ADVISORY:

**PROBLEMATIC
CHARACTERISTIC
OF BRICK FAÇADE:
DIAGONAL HEADERS**

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**CRACKED, DELAMINATED, AND
OUT-OF-PLUMB MASONRY
WALLS CAN LEAD TO UNSAFE
CONDITIONS AND RESULT IN
CATASTROPHIC EVENTS**

BACKGROUND

Older masonry walls with the appearance of a running bond (no header courses visible) may have been built using concealed headers also known as diagonal, blind, or herringbone headers, to create a connection between the face brick and the common brick behind it. Popular around the turn of the 19th century, usually in low-rise residential masonry construction, these historic walls typically do not utilize wire ties.

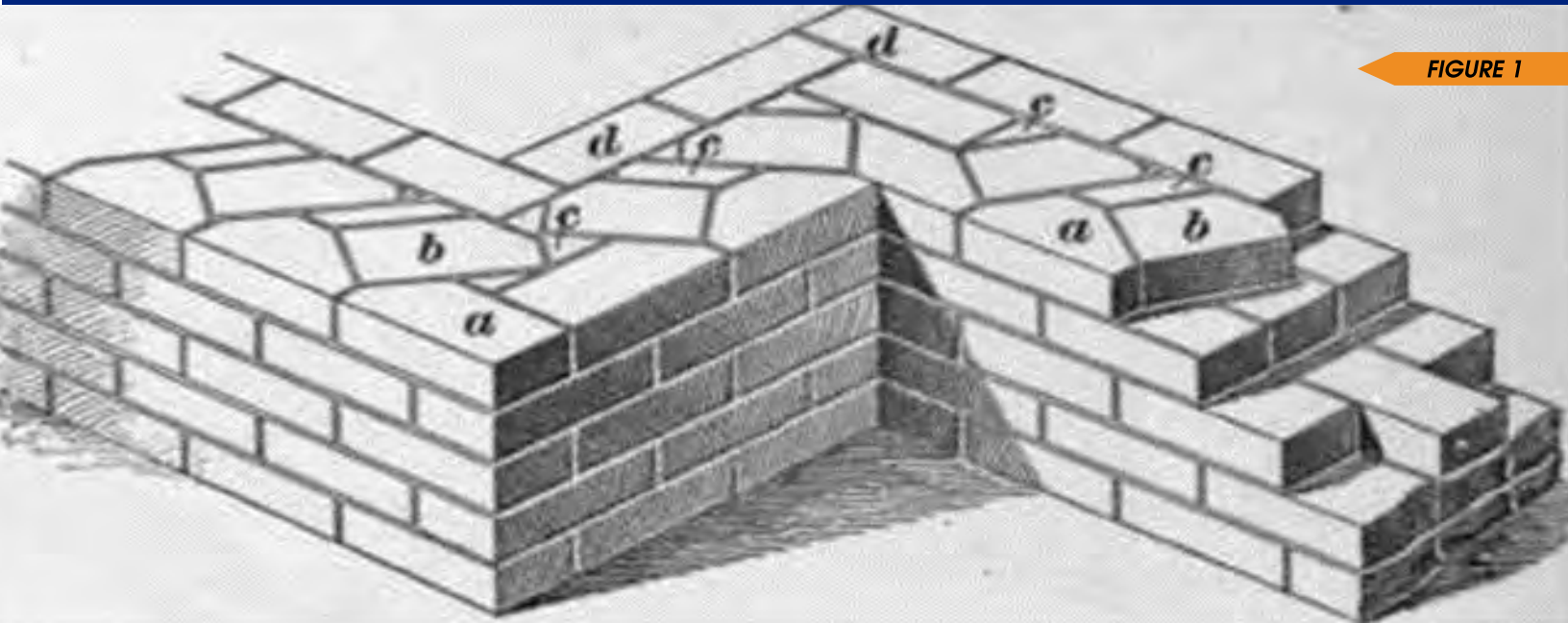


FIGURE 1

Figure 1 shows a 12-inch wall with the face brick bonded to the common brick by what is known as a diagonal, or herringbone, bond. At **a** is shown the front brick cut at the angles; at **b**, the bonding brick laid diagonally; at **c**, the different-shaped bats laid to form the closers of the bond brick; and at **d**, the inside course of stretchers. It is customary to lay an inside course of headers immediately over the course shown in Figure 5.

WHAT IS A DIAGONAL HEADER?

The 1899 New York Building Code requires that "where walls are faced with brick in running bond, every sixth course shall be bonded into the backing by cutting the corners of the face brick, and putting in diagonal headers behind (Fig. 1), or by splitting the face brick in half and backing the same with a continuous row of headers."

This historic construction features a solid, multi-wythe masonry wall in a continuous running bond pattern throughout the façade (Fig. 2), unbroken by header brick course (Fig. 3). Diagonal headers cannot be found in any other type of walls, for example, cavity walls.



FIGURE 2

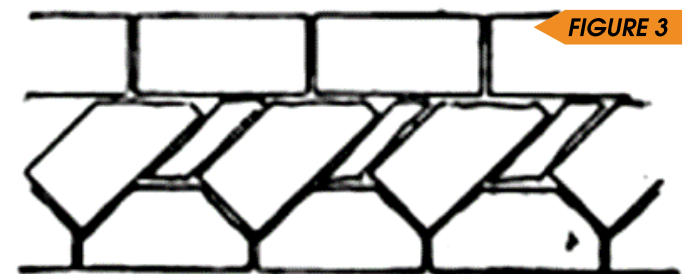
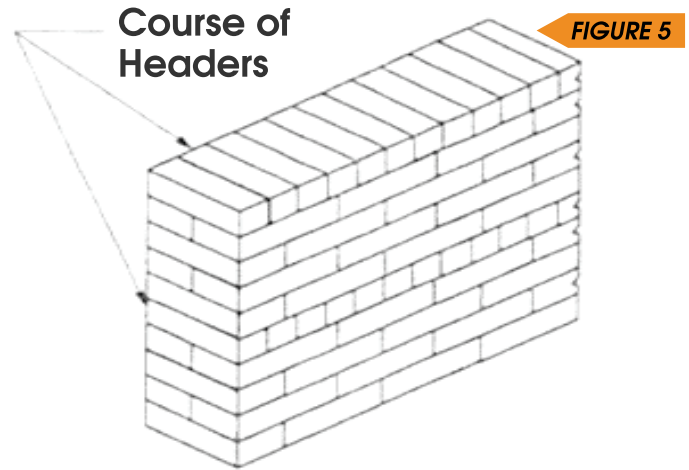
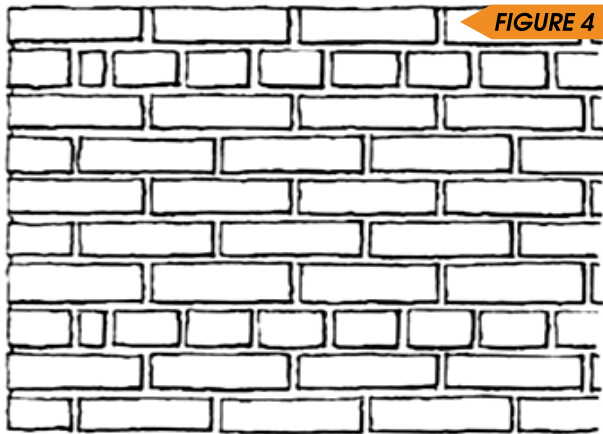


FIGURE 3

Figures 2 & 3 show running bond brick wall front and cross-section view. Brick units installed at an angle with the corner of the units in the face brick clipped off to accommodate the diagonal unit.

An example of a wall type where there are no diagonal headers is a wall constructed in a **common bond** (Fig. 4 & 5). It features a course of headers inserted every five to six rows, indicating that the exterior wythe is tied back to the backup wall with header bricks (bricks laid with their end facing out).



Figures 6 & 7 show bowing of a historic façade wall on typical New York City row houses. Voids are visible in the backup wythes and behind the face brick.

WHAT SHOULD YOU KNOW?

Diagonal or blind headers are usually found in New York City rowhouses and low-rise multiple dwellings. With diagonal or blind headers, the face wythe is bonded to the structural backup wall through a small triangular section set in mortar. Over time, these connections often deteriorated, leading to the face brick delaminating from the structural backup wall (Fig. 6 - 9). Consequently, the face wythe separates, deflects, and bulges outward, potentially leading to partial or full collapse as the connections between wythes fail.



FIGURE 8



FIGURE 9

Figures 8 & 9 show exterior façade brick bulged outward.

WHAT HAPPENED IN THE FIVE BOROUGHES?

The use of diagonal headers in historical construction has become a persistent issue, primarily stemming from the effects of aging. The collapse of face bricks can jeopardize public safety. When the face brick collapses, it poses a potential hazard by creating falling debris, which can lead to injuries or death. Throughout the years, the DOB has responded to numerous instances of diagonal brick header failures, working diligently with homeowners and their engineers to stabilize and/or restore the masonry wall capacity through proper remediation, aiming to prevent further risks.

WHAT SHOULD YOU DO?

Masonry walls cracked, delaminated, and out-of-plumb can lead to unsafe conditions and result in catastrophic events. It is important to have a Registered Design Professional inspect the building façade and arrange for repair immediately under a permit from the New York City Department of Buildings if any of the following is observed:

- loose bricks and other façade parts
- gap appears between the backup wall and façade wall at windows
- brick wall cracks, and bulges outward with visible deflection
- if out-of-plane movement is occurring
- if you suspect that the face brick was installed without proper anchorage/tie

If any of these conditions are discovered please install public protection immediately and repair the unsafe condition under permit.