THE BRICK INDUSTRY ASSOCIATION

Brick Brief

July 2006

SUPPORTING BRICK MASONRY

Introduction

Adequate support of brick masonry is vital for proper and long-term performance of wall assemblies. To ensure proper masonry support, the designer must consider structural, safety and construction tolerance issues. This *Brick Brief* addresses some of the common problems and solutions of brick masonry support.

Bearing Material

Brick masonry must be supported on materials that:

- are permitted by the local building code. For structural masonry these are non-combustible - such as concrete, steel or masonry. Brick veneer can be supported on wood construction.
- have sufficient bearing area to properly transmit the brick masonry weight and any loads to the supporting member or foundation.

Recommended Bearing

The first course of brick should always have at least two-thirds (2/3) the thickness of the brick wythe (unit) bearing directly on its support. This keeps the weight of the brick masonry over the support. This limitation applies to foundations and shelf angles and is consistent with the corbelling requirements of the International Residential Code and International Building Code. Projecting more than one-third (1/3) the thickness of the brick wythe can lead to wall instability, cracking of the brick masonry and failure by collapse.

Occasionally, the differing construction tolerances of various materials and errors in construction make achieving adequate bearing challenging.

Corbels

Corbelled brick courses should use solid units complying with ASTM C 216, *Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)*. Alternatively, brick units complying with ASTM C 652, *Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)* may be used when filled solid with grout or mortar. The maximum projection of one unit should not exceed the smaller of 1/2 the nominal height of the unit or 1/3 the nominal thickness of the unit or wythe. The maximum projection beyond the face of the wall should not exceed 1/2 the wall thickness for solid masonry (multiwythe) walls (see Figure 1) and 1/2 the wythe or veneer thickness for walls with an air space behind the wythe (see Figure 2). Core holes and cells of corbelled brick units should not be left open to exposure from the weather. Core holes and cells of corbelled brick units should be placed so the core holes and cells are not visible, or filled with grout or mortar.

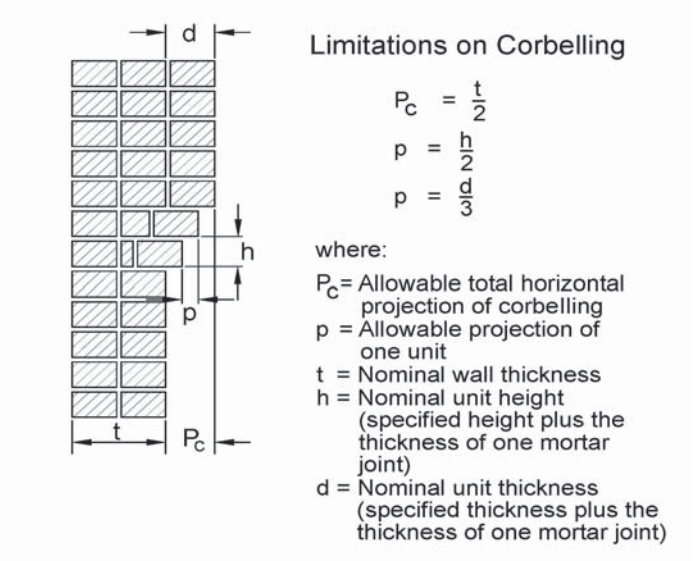

Figure 1
Corbelling in Solid Walls

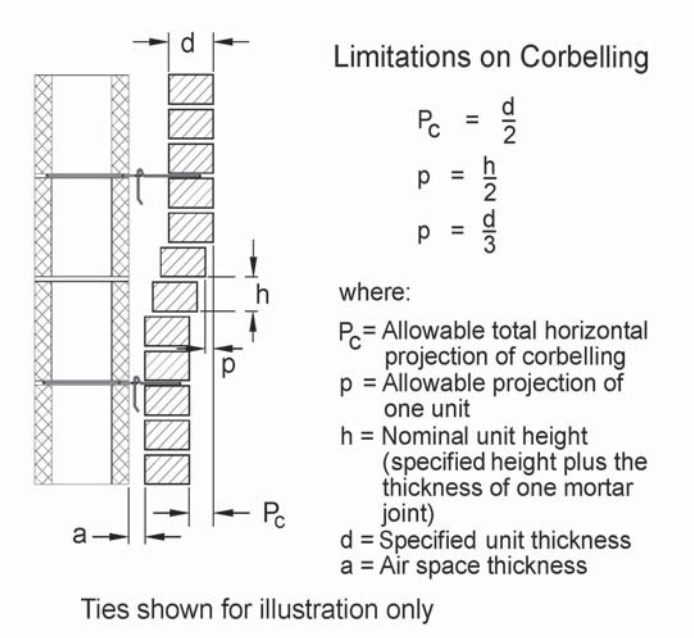

Figure 2
Corbelling in Walls with Air Space

Construction Tolerances

Construction tolerances refer to the permissible dimensional variation of each component of the assembly. The combinations of these variations, while within permissible tolerances, can make it difficult to achieve adequate bearing of the brick masonry.

Permissible tolerances:

- Brick units, Type FBS Rough: 1/8 in. (3.2 mm) for 3 to 4 in. [76 to 102 mm] thickness)
- Brick masonry walls: ± 1/4 inch in 10 ft (6.4 mm in 3.05 m), horizontally or vertically
- Brick masonry walls: ± 1/2 inch in 20 ft (12.7 mm in 6.10 m), location in plan
- Concrete foundation or spandrel beam: ± 1/4 inch in 10 ft (6.4 mm in 3.05 m)
- Concrete foundation or spandrel beam: ± 1/2 inch in 20 ft (12.7 mm in 6.10 m), location in plan
- Shelf angle: 3/8 in. (9.5 mm) out of alignment

Errors in Construction

Errors in construction occur when frames are out-of-plumb, framing elements are misaligned, foundation walls are improperly located, or any other as-built condition adversely affects the bearing of brick masonry. Possible remedies in these cases include:

- Increasing the width of the bearing surface by welding a plate to the shelf angle or bolting an inverted shelf angle to the concrete foundation as shown in Figure 3. Consideration must be given to the effect of the increased eccentricity of the brick masonry on the support.
- Projecting the bearing course of masonry more than one-third ($^1/_3$) the brick's thickness or corbelling the brickwork above the bearing course. An analysis must be made and additional ties must be added to resist the possible overturning. In all circumstances, brick ties should be placed as close to the bearing course as possible without adversely affecting flashing performance.

While these situations should be avoided, in some cases they may be the only means to provide bearing or to avoid wavy looking walls resulting from the bricklayer adjusting the brick position to accommodate field conditions.

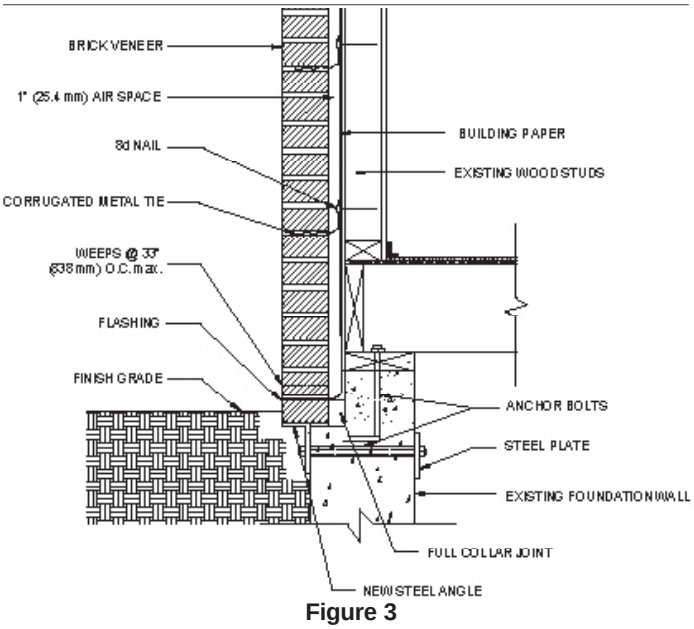

Figure 3

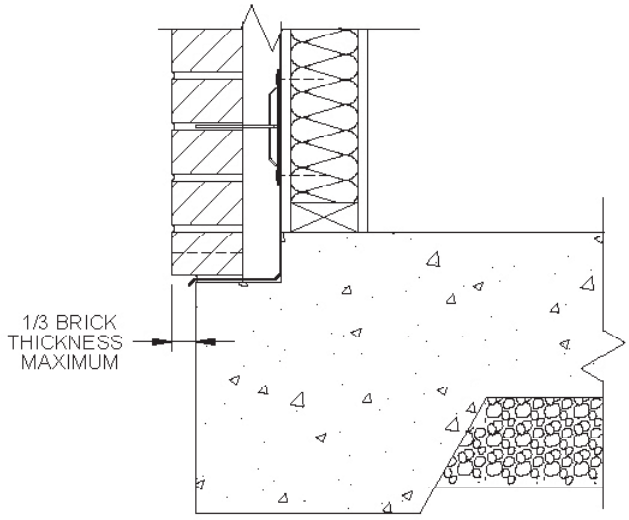

Figure 4

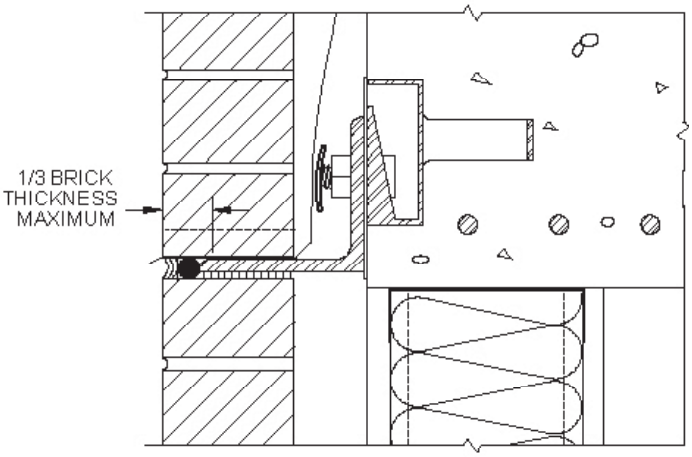

Figure 5

Details

Examples of the proper support of brick masonry are shown in Figures 4 and 5 for brick veneer on a concrete foundation and brick veneer bearing on a shelf angle.

Brick Briefs *are short discussions of a particular topic. The information contained herein is based on the experience of Brick Industry Association technical staff and must be used with good technical judgment. Final decisions on the use of this information must rest with the project designer and owner.*