**NC Department of Insurance**
**Office of the State Fire Marshal - Engineering Division**
**1202 Mail Service Center, Raleigh, NC 27699-1202**
**919-647-0000**

# Foundation Anchors in Masonry L-Blocks

**Code:** NC Residential Code **Date:** January 9, 2020
**Section:** R403.1.6

**Question:**
Can the anchors required by Section R403.1.6 be placed in the head joints of masonry L-blocks?

**Answer:**
Yes, the anchors can be placed in the head joints of L-blocks (see Figures 1 and 2 below) or in the head joints and the concrete slab (see Figure 3 below). The anchor must be embedded a minimum of 7" in the masonry and the head or "L" of the anchor must extend under the surface of the masonry unit (see Figure 4) below. The anchor must also remain tight in the masonry after the nut is tightened against the sill plate as movement by the anchor may negate its purpose of resisting horizontal loads.

This answer is based in part on empirical design information provided in a letter dated October 21, 2019 from Charles B. Clark, Jr., AIA, PE, LEED AP – Vice President, Engineering Services, the Brick Industry Association to Carl Martin (see attached).

**Note:**
This interpretation is only applicable to 115 and 120 mph wind zones.

**Reference:**
Section R403.1.6 reads in part:

> "Bolts (meaning anchor bolts) shall extend a minimum of 7 inches (178 mm) into concrete or grouted cells of masonry units."

**Keywords:**
foundation wall, wall bracing, anchorage

**Figure 1**

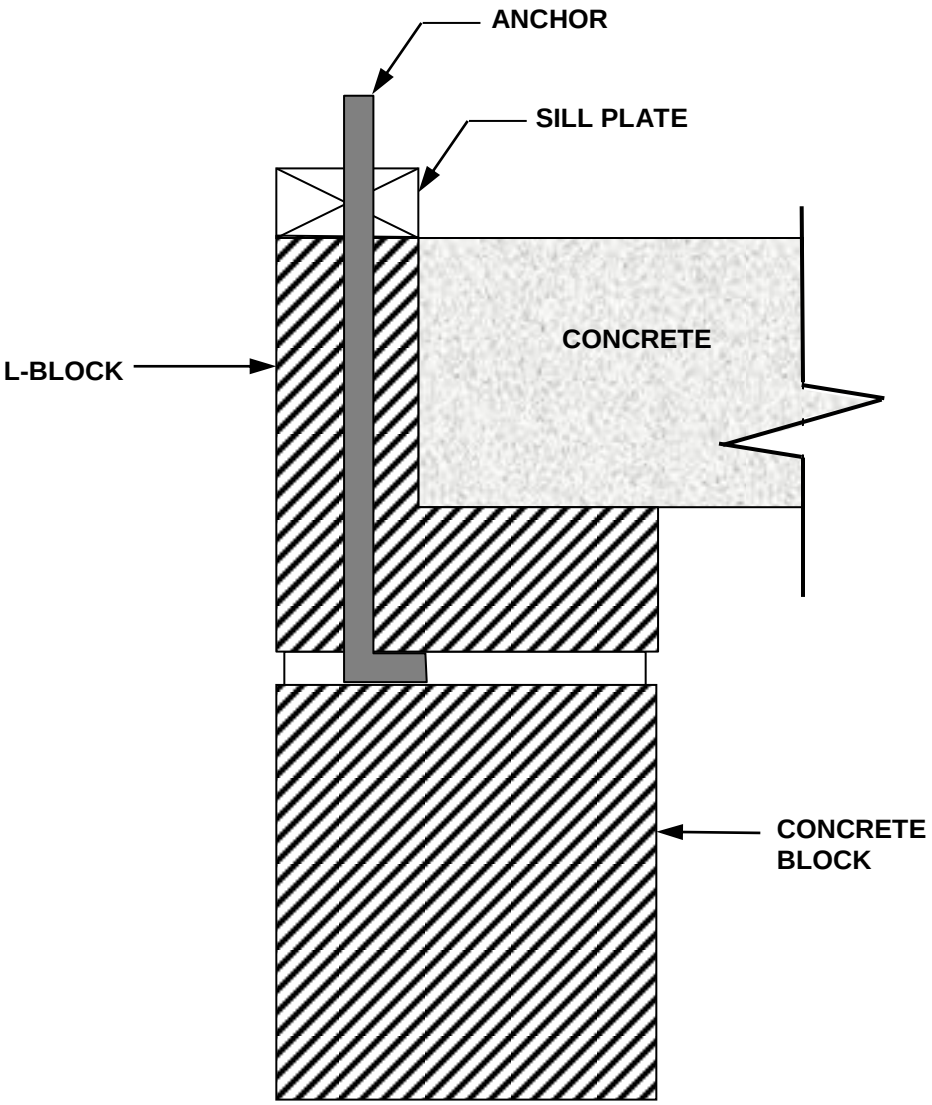


**Figure 2**

**Figure 3**

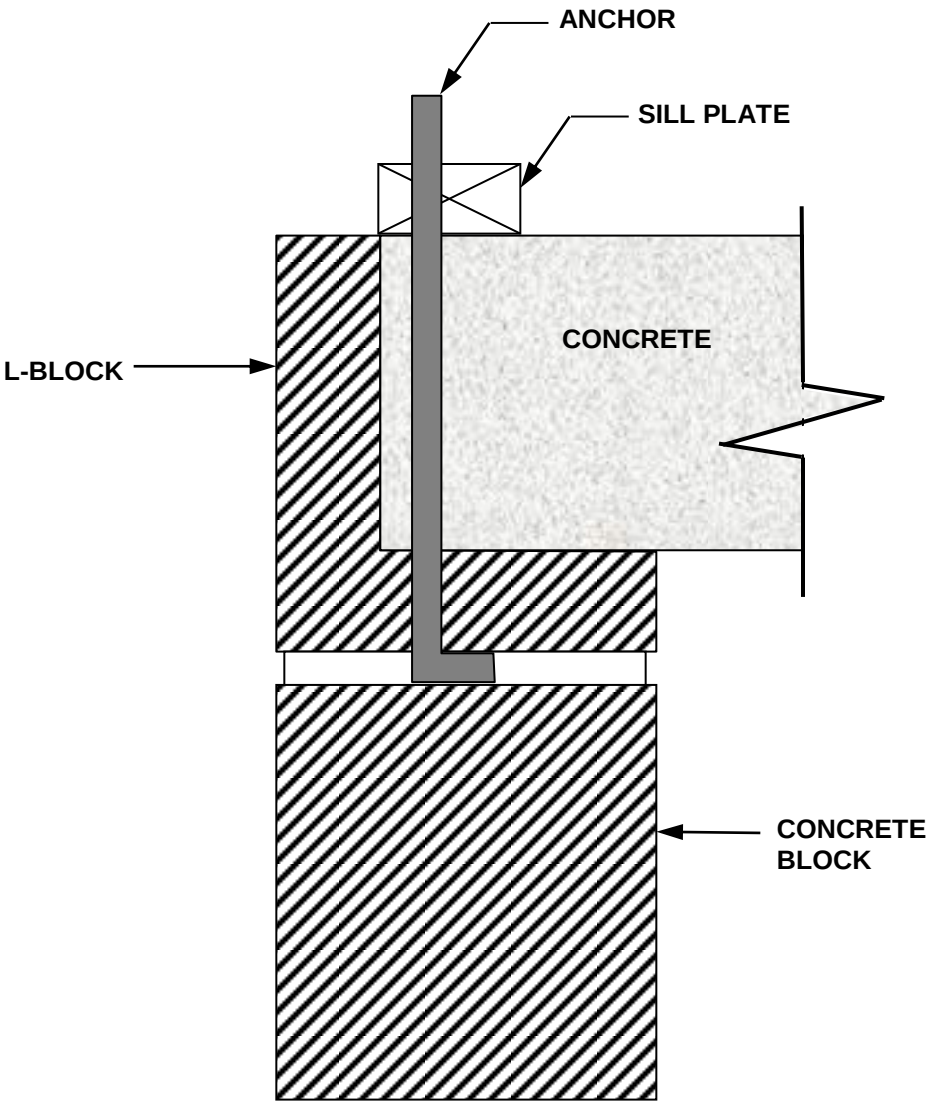
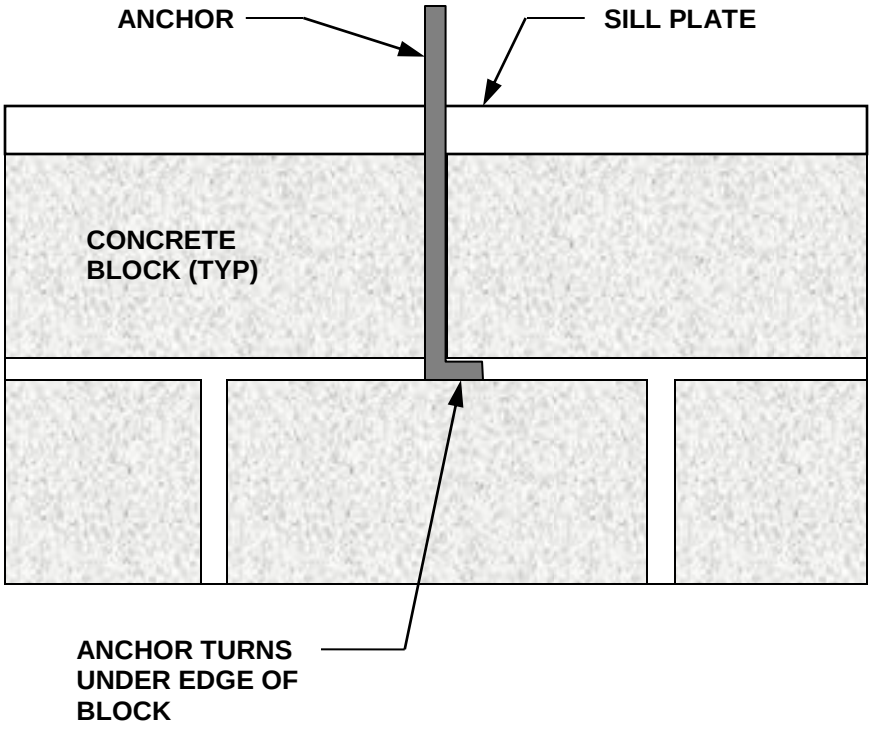


**Figure 4**


ANCHOR
SILL PLATE
CONCRETE
BLOCK (TYP)
ANCHOR TURNS
UNDER EDGE OF
BLOCK

October 21, 2019

Mr. Carl Martin
Building Code Council Secretary
Office of State Fire Marshal
Engineering & Codes
1202 Mail Service Center
Raleigh NC 27699-1202

Sent via email: carl.martin@ncdoi.gov

Re: Anchor Bolts in Brick Masonry Residential Foundations

Mr. Martin:

This letter is in regard to the longstanding practice in North Carolina of placing anchor bolts in brick masonry residential foundations. These foundations are typically constructed using either two wythes of brick masonry or a monolithic concrete slab foundation cast against a single wythe of brick masonry. Anchor bolts are placed into the foundation through the cells or cores of brick units, through the head joints between brick units, or between two wythes of brick masonry. The anchor bolts are embedded into the masonry by slushing mortar meeting ASTM C270 Type M or Type S around the bolts.

It is my understanding that the construction of brick masonry residential foundations as described above has been successfully used on many houses in North Carolina for more than 50 years. To put this in perspective, if one conservatively assumes that only 1 in 5 single-family housing starts were built with this type of foundation during that time period, that would mean that over 400,000 single family houses in North Carolina have a brick masonry residential foundation (Census Bureau).

In my nearly 20 years of experience at the Brick Industry Association, I have not been aware of any instances in which anchor bolts embedded in brick masonry residential foundations have prematurely failed. In short, anchor bolt construction using brick masonry residential foundations have had a long, successful track record of performance in North Carolina.

If you have any further questions, please do not hesitate to contact me.

Cordially,

Charles B. Clark, Jr., AIA, PE, LEED AP
Vice President, Engineering Services
cc: Mike McGee, McGee Brothers