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Luke Gendron  
Tarheel Basement Systems  
3333 Air Park Rd.  
Fuquay-Varina, NC 27526

Re: Structural Observation — 103 Maplewood Drive, Sanford, NC 27332

Mr. Gendron,

At your request, on June 21<sup>st</sup>, 2023 we performed a visual structural observation of a crack in the basement slab and a crack in the right foundation wall at the Sanford residence noted above. The structure is a conventionally framed, detached, single family residence with raised first floor framing over a partial walk-out basement and partial pier/girder foundation system with perimeter masonry foundation walls (*see picture 1*).

Our observations are listed below. Indicators such as “left,” “right,” “front,” and “back” are referenced as viewing the front of the home.

#### **BASEMENT SLAB CRACK**

- A crack with front-to-back orientation was noted in the basement slab (*see picture 2*).
  - The slab was flush across the above-noted crack (*see picture 3 for example*).
  - The above-noted crack appeared to “feather” in various locations (*see picture 4 for example*).
  - Measurement by laser level indicated that the basement slab was level to within approximately  $\frac{1}{4}$ ”.

#### **FOUNDATION WALL CRACK**

- A crack was noted in the stone veneer on the exterior face of the foundation wall along the right side of the home (*see picture 5*). The crack was located at the intersection of the basement and garage and the section of stone veneer in front of the crack was noted to be offset away from the garage (*see picture 6*).
  - Investigation from within the garage revealed a gap between the garage slab and the right foundation wall (*see picture 7*). Additionally, at the back-right corner of the garage the right foundation wall appeared to have shifted towards the exterior by approximately  $\frac{1}{2}$ ” (*see picture 8*).
  - Measurement by laser level indicated that the foundation wall along the right side of the home was level to within approximately  $\frac{1}{4}$ ”.

Upon completion of our analysis we have concluded the following:

- The above-noted basement slab crack has been the result of normal shrinkage of the concrete. All concrete cracks as it shrinks during curing, and as it expands and contracts during seasonal temperature changes. Crack control joints are installed as intentionally weakened planes in slabs to direct cracking for cosmetic purposes. The minor, cyclical movements of slabs can cause cracking to occur outside of the control joints, and they are not considered to be structural concerns.

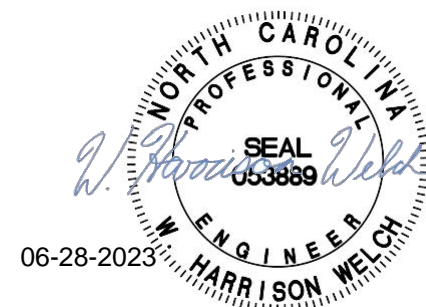
- The above-noted foundation wall crack has been the result of lateral movement of the foundation wall along the right side of the garage due to the loads applied to the wall by the retained fill material.

We recommend the following work be performed by a qualified general contractor (*see detail addendum*):

- Remove an at least 4'-0" wide section of the existing slab along the right side of the garage and excavate to verify at least an 8" wide footing projection is present at the base of the foundation wall. If the existing footing projection is less than 8" wide, install an 18" wide x 8" thick footing extension along the length of the foundation wall. Install a new 8" wide CMU wythe or "header block" over the perimeter footing. The header block is to be fully mortared and anchored to the interior face of the foundation wall with stainless steel helical brick ties (Simpson Heli-Ties or similar product) installed at 32" o.c. horizontal and 8" o.c. vertical (stagger locations). Repour the removed portion of the slab using 4" thick concrete with welded wire fabric at mid-depth over at least 4" of compacted gravel fill.
  - Dowel the new slab to the new header block using 48" long #4 rebar at 18" o.c. with 90° bend and 24" legs embedded into the header block and mid-depth of the new slab. Dowel the new slab to the remainder of the existing slab using 24" long #4 rebar at 18" o.c. drilled 6" into the mid-depth of the existing slab and epoxied with Hilti "HIT-HY 200" or similar product per manufacturer's guidelines.
    - The rebar from the new slab to the header block and the rebar from the new slab to the existing slab are to be staggered.
    - The rebar from the new slab to the existing slab may be omitted if the entire garage slab is to be removed and repoured.
  - If a footing extension is necessary, dowel the new footing pour to the existing with 20" long #4 rebar at 18" on center drilled and epoxied 6" into the mid-depth of the existing footing with Hilti "HIT-HY 200" or similar per epoxy manufacturer's guidelines.
    - Rebar should be installed with at least 3" clearance to all sides of footings.

The above-listed determinations were made in accordance with common engineering principles and the intent of the 2018 edition of the *North Carolina Residential Building Code*. Sequencing, and means and methods of construction are considered to be beyond the scope of this report. Contractor is to provide adequate temporary shoring prior to cutting or removing any structural load-bearing elements. All work is to conform to applicable provisions of current building standards. Please feel free to contact us, should you have any questions or concerns regarding this matter.

Sincerely,  
W. Harrison Welch, PE  
Stonewall Structural Engineering, PLLC  
Lic. #P-0951



**PICTURE ADDENDUM**



*Picture 1 – 103 Maplewood Drive  
Sanford, NC 27332*



*Picture 2 – Basement slab crack*



*Picture 3 – Example of basement slab flush across crack*



*Picture 4 – Example of basement slab crack “feathering”*



*Picture 5 – Crack in stone veneer*



*Picture 6 – Stone veneer offset across crack*



*Picture 7 – Gap between garage slab and foundation wall*



*Picture 8 – Visibly shifted foundation wall at corner of garage*

**DETAIL ADDENDUM**

