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STRUCTURAL ENGINEER

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Dear Rachel:

As you requested, on Thursday 05-08-25 and Friday 05-09-25, I performed site visits to the house at 4832 Brookhaven Drive in Raleigh NC. Thanks for meeting me there on Thursday.

The purpose of my visits was to observe and evaluate the structural condition of 10 structurally-related items that were called out in the paragraphs discussed below (and related photos) on pages 7, 12, 13, & 14 (of 103) in the 04-17-25 home inspection report by *Emerald Home Inspections of NC* as being potential structural concerns.

My observations and recommendations for each of those 10 paragraphs follow. Please file a color copy of pages 7, 12, 13, & 14 of the home inspection report with this structural report, for reference:

A1-3:

Left-hand exterior wall's brick veneer - **1)** There is an approximately 1/16"-wide step-crack at the top of the front portion of the left-hand wall, near the gutter downspout. The crack is local only, and does not extend downward toward the lower portion of the wall. **2)** There is an approximately 3/32"-wide horizontal crack at the top edge of the foundation vent near the center of the wall's length. This indicates that the wall's footing has most likely settled downward by about 3/32" at this location.

Rear wall's brick veneer - **1)** There is an approximately 7/32"-wide horizontal crack in the veneer at the rear left-hand corner of the house near the downspout. The lower 3 courses of brick veneer have moved about 3/8" to the rear at this corner, creating a 3/8" vertical masonry-joint opening at the end of the last brick, near the ground. **2)** There is a 1/16"-wide step-crack at this same relative location just around the corner on the rear wall. (Note that my observations of this same crack in the structural concrete block foundation wall in the crawl space show that the blocks have only a small 1/8" step crack in the joints at this corner, with no apparent movement of the blocks toward the rear. It's possible that the non-structural exterior brick veneer has moved independently of the structural block.). **3)** There is an approximately 1/16"-wide horizontal crack in the brick veneer (at the blue faucet), running between the meter box and the water heater.

4) There is an approximately 1/16"-wide horizontal crack above the basement access door.

5) There is an approximately 1/32"-wide step-crack below the lower left-hand corner of the triple window. This crack is local only, and doesn't progress downward toward the ground. **6)** There is an approximately 1/16"-wide horizontal crack located about 3' off the ground at about 3' to the left of the

triple window. **7)** There is an approximately 1/16"-wide horizontal crack at the rear right-hand corner of the house, extending about 48" to the right (when facing the rear wall from the back yard).

Right-hand wall's brick veneer: I saw nothing notable on the exterior right-hand wall.

Front wall's brick veneer: - **1)** There are several very small vertical cracks in the brick veneer near the front right-hand corner of the house. I saw no notable cracks from that location to the front porch.

Crack Summary:

Though there are a relatively large number of cracks in this house's brick veneer, in my opinion none of them represent a structurally significant amount of foundation movement or wall movement. I do not recommend structural repairs for any of these cracks. (Note that exterior brick veneer is a non-structural component).

I do recommend that **1)** each crack be sealed with a flexible caulk made for sealing masonry cracks, and **2)** that these cracks be monitored about once a month for at least a year, to verify that no additional movement is occurring.

B1-1: My observations of the portion of the inside face of the rear basement wall beside the rear access door show that there are several horizontal and vertical step-cracks in the structural concrete blocks, all less than 1/16" wide. Additionally, my measurements (using a plumb-bob) reveal that the top of the wall has leaned inward by a maximum of about 1/2", most likely due to the inward horizontal pressure from the soil being retained on the outside of the wall.

My experience indicates that this size cracking and this relatively small amount of inward leaning are normal for walls of this type, and are not a structural problem at this time.

I do not recommend structural repairs for this wall. I also do not recommend sealing the inside face of the cracks, except for cosmetic purposes if desired.

I do recommend that these cracks be monitored about once a month for at least a year, to verify that no additional movement is occurring.

B1-2: In my opinion, the cracks visible in the interior concrete blocks in the crawl space (and the veneer cracks at the same locations as discussed in **A1-3** above) do not indicate structural issues at this time. I do not recommend structural repairs for these cracks. Only the exterior portions need to be sealed with a flexible caulk made for sealing masonry cracks.

B3-1.3: My observations of the two triple 2X10 girders in the crawl space show that there are numerous splices of the three main members in between the support piers. These splices are a significant structural error. Each splice that occurs between support piers needs a repair. (Note that the splices of the two 2X4 wooden "ledgers" located on the outside edges of both girders are okay, as long as the ledgers are adequately nailed to the 2X10 main members.)

The locations below are the splices that I observed - note that there may be others that I missed. I recommend that the contractor performing the repairs observe all the girder spans to see if there may be other splices.

1. In the 2nd girder from the CS access door:

A) In the 2nd span from the basement wall, at least two 2X10's are spliced. **B)** In the last (left-hand) span, all three 2X10's are spliced (one was spliced above the masonry pier, so that specific joint can be supported/repared with a new wooden block/shims installed on top of the masonry pier).

2. In the 1st girder from the CS access door:

A) In the last span from the basement wall, all three 2X10's are spliced.

B) In the 2nd span from the basement wall, all three 2X10's are spliced.

C) In the 1st span from the basement wall, I saw no splices, but note that the 1st 36" section is not visible due to ductwork.

In my opinion, the most economical method to repair each of these unacceptably-spliced girder members located between the masonry piers is to add a steel jackpost (screw-jack) centered directly beneath each splice at the center of the affected girders. This could require around 11 jackposts, if I counted correctly.

Jackpost installation directions:

The lower end of each jackpost needs to rest on the center of a treated wooden 2X8 "bearing plate" that rests flat on the center of a single 4"X8"X16" precast solid concrete block, which serves as the footing. The concrete blocks can rest on the surface of the ground - no digging required.

However, the soil beneath each concrete footing needs to be leveled and thoroughly compacted prior to installing the jackposts. Each jackpost needs to be centered beneath the girder (use a plumb-bob), and needs to be installed plumb with no leaning in any direction. The jackposts also need to be centered on the flat 2X8 and the on the concrete footing in both directions, plus or minus 1".

Attach the top plate of each jackpost to the bottom of the girder using two nails or screws. Attach the bottom plate of each jackpost to the flat 2X8 using at least two screws or nails. Tighten each screw-jack until the jackpost is taking load, but do not raise the girders more than 1/8".

B3-1.4: Due to the tight crawl space beneath the bathroom, I was not able to get close enough to the floor repairs to take any dimensions or to see the condition of the sub-flooring. I did see that a number of pieces of 2X blocking have been installed spanning perpendicular between some pairs of floor joists, but I could not see how the ends of blocking were attached to the joists.

I recommend that a licensed contractor who is experienced at this type of floor repairs look at this area and make recommendations as to whether the repairs are adequate per the current NC Residential Building Code.

I will be available to answer any structural questions that the contractor has about the repairs.

B3-1.5: My observations of the floor joists in the area of this existing jackpost (about 3'-6" from the crawl space access door wall, and about 16'-9" from the rear foundation wall) reveal that the floor joist size, span, and spacing all meet the requirements of the current NC Residential Building Code. Consequently, the presence of the jackpost is not necessary to meet the Code requirements for a standard residential floor. In most similar cases that I have observed over the years, jackposts have been installed due to the owner's perception that the floor felt too "bouncy" or flexible, or due to a heavy item being located on the floor above. I recommend that the post be left in place.

B6-1: I could see only one split rafter end due to the difficult accessibility of the roof ridge in the right-hand portion of the attic. The split rafter end that I could see is in a very low-stress location near the end of the rafter. Also, the 4 visible nails that attach the rafter to the ridge are located in a solid unsplit portion of the rafter. I do not recommend structural repairs at this location.

B6-1.2: The end rafter that bears on the reduced-area portion of the ridge carries only about 1/2 of the load of a standard rafter. Consequently, in my opinion the end of this end rafter still has enough bearing area onto the ridge to carry the required compressive load. I do not recommend structural repairs at this location.

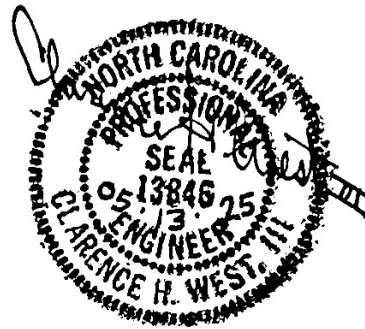
B6-1.3: The splits that I observed in these rafters were too small to indicate a structurally significant loss in load-carrying capacity. I do not recommend structural repairs at this location.

B6-1.4: My observations of the black-stained and partially rotted area of this one rafter and its related roof decking indicates that about a 3'~4' length of the rafter is damaged. (This is the 6th rafter from the left end of the front portion of the attic.)

To repair this damaged area, I recommend that two 48"-long treated wood 2X4's be nailed or screwed ("scabbed," running horizontally) onto the stained portion, one on each side of the damaged rafter, up against the roof decking to help support the roof decking.

Use a pair of nails or screws through the new 2X4's into the rafter at every 10" to 12" along the new 2X4's. Make sure the connectors go into sound wood, not into the rotted portions.

Thanks so much for calling on me to do this work for you. Please call me with any questions that you have about the items in this report.



Sincerely,

Buddy

Buddy West, P.E.