



June 30, 2022

Lauren DiSilva

Re: Limited Structural Inspection
6901 Woodmere Drive
Raleigh, NC

Dear Ms. DiSilva:

At your request, a limited structural inspection of the above property was performed on June 28, 2022. The report that follows has been prepared based on that inspection. The inspection was performed by Sam Umstot, EI of Giles Flythe Engineers.

The scope of this project was limited to inspection and evaluation of crawlspace framing and pier support concerns as noted in an excerpt from a home inspector's report provided by the buyer's agent. The report is intended to cover only those premises that may be examined visually without excavation, removing surface materials, and disassembling components.

No tests, measurements, or calculations have been made except as described in this report. We have not investigated for toxic materials or wastes, or examined public records regarding this property. The scope of the inspection does not assure that the property conforms to any regulations, restrictions, or building codes that may be in effect at its location.

DESCRIPTION

The 2-story wood-framed home (with a crawlspace) is constructed on concrete masonry unit (CMU) perimeter foundation walls with CMU block piers supporting the floor girders. The house was built in 1967 according to Wake County Real Estate Tax Records. For purposes of this report, all directions (left, right, rear, etc.) are taken from the viewpoint of an observer standing outside and facing the front door of the home.

Upon our arrival, access to the interior was provided by the homeowner. The items detailed above in the scope were subsequently inspected.

Note that the original builder was not interviewed and no plans for the construction of this home were provided. The information presented in this report is gathered from the conditions visible at the site, as they existed at the time of the inspection. A limited photo log is included with this report.

OBSERVATIONS

Interior:

1. Minor cracks (less than 1/16" wide) were noted in the drywall finish materials in multiple locations throughout the home, predominantly along the left perimeter wall of the original home.
2. Variable floor slope was measured in multiple locations throughout the home. Predominantly, observed floor slope was measured up to 3/4" vertical over 4' horizontal spanning left to right, approximately 15'-8" from the front perimeter wall and approximately 3'-0" to the left perimeter wall (original wall of the home).

Exterior:

3. A stair-step crack (approximately 1/16" wide) was noted in the brick veneer of the front perimeter wall, approximately 10'-0" from the right corner.
4. Gutters and downspouts (with leaders) were noted installed on the home. Grade was noted with relatively neutral slope away from the perimeter wall(s) of the home.

Crawlspace:

5. A damaged/broken pier was noted approximately 5'-8" from the right foundation wall and approximately 13'-9" from the front foundation wall.
6. A notch (approximately 5-1/4" x 8-3/4") was noted in the rightmost span of the central girder, approximately 13'-9" from the front foundation wall.
7. A cut floor joist was noted in the rear span, approximately 19'-0" from the right foundation wall, in the immediate area of a plumbing component. 2x10 blocking was noted to be installed perpendicular in between the two cut sections of the joist, creating a "box-out" framing system in this area. Subfloor in this immediate area appeared to be replaced.
8. A notched floor joist was noted in the rear span, approximately 16'-0" from the left foundation wall, in the immediate area of a plumbing component.
9. A steel jack post support bearing on an 8x16 pier was noted in the front span, approximately 6'-0" from the front foundation wall and approximately 18'-6" from the right foundation wall.
10. Multiple auxiliary 8x16 CMU block piers were noted to support the framing in the front span, approximately 6'-0" from the front foundation wall and in the rear span, approximately 7'-6" from the rear foundation wall.
11. The leftmost portion of the crawlspace was inaccessible and therefore could not be visually inspected. The above observations are based on the most visible portions of the crawlspace.
12. Evidence of moisture intrusion in the form of efflorescence and water staining was noted on the perimeter foundation walls. Multiple moisture readings were taken in the floor framing with an Amprobe MT-10 moisture meter and measured lumber moisture contents of up to 22%. An incomplete vapor barrier resulting in exposed soils was noted throughout the crawlspace.

DISCUSSION

The cracks in the brick veneer noted above are likely due to limited differential foundation settlement. The clay soils in this area are considered "expansive" type soils and will typically expand and contract with fluctuations in the moisture content. This expansion and contraction of load-bearing soil materials can lead to soil consolidation and foundation cracking/movement. If conditions around the foundation remain relatively dry, the likelihood of future significant settlement will be reduced, but we cannot predict the extent of future settlement. The condition of the foundation wall does not appear to be a significant

structural deficiency and improving exterior drainage and monitoring cracks for additional propagation is an acceptable approach at this time.

Positive grade away from the foundation should be created to reduce moisture infiltration under the foundation. Additional soil consolidation and settlement can occur due to water infiltration into soils and subsequent drought conditions which dry out the soils below foundations. Creating positive drainage away from the perimeter foundation wall(s) is vital to the long-term structural integrity of the foundation.

The masonry pier (Observation #5) and girder (Observation #6) noted above were potentially damaged during HVAC component installation and/or repair. The condition of the pier and girder are structural concerns. We have provided recommendations below to address these issues.

The joists noted in Observations #7 and #8 were potentially cut during installation of plumbing components in these areas. The current condition of the joists and associated repairs are structural concerns. We have provided recommendations below to address these issues.

The steel jack post noted to bear on a CMU block pier is not constructed properly and is not considered a permanent support. The condition of this post and pier is a structural concern. We have provided a recommendation below to address this issue.

The floor slope noted above is likely the result of limited deflection in the framing below and the framing configuration of the home. Deflection of supporting members can occur with sustained loads. The floor framing supports the weight of non-load bearing walls, kitchen island, heavy furniture, etc. Deflection of the floor framing will be greater in areas with sustained loads than areas with movable (live) loads. The floor slope noted in Observation #2 is likely due to a transition from a rigid component (foundation wall) to a less rigid component (floor joists). No significant structural concerns were noted in the framing and foundation in the visible areas along the left foundation wall. The auxiliary masonry piers noted in the front and rear spans were likely installed to help alleviate minor deflection or “bounce” in the floor and do not appear to be required for the structural integrity of the home. No structural repairs are required at this time.

The moisture content of the floor framing noted in the home at the time of the inspection is considered elevated for this time of year. Moisture levels of the framing can fluctuate based on weather conditions and seasonal changes in humidity. Prolonged elevated moisture content of the framing can lead to excessive deflection and structural damage. We have provided a recommendation below to help further dry out the crawlspace.

The minor interior drywall cracks noted above are likely the result of a combination of the supporting members contracting/deflecting and limited foundation settlement discussed above. Minor drywall cracking and finish carpentry separations are typically associated with changes in weather, temperature, and humidity causing wood to shrink and swell with the seasons. When moisture is taken away from wood it has a tendency to contract thus resulting in deflection (or sagging). Any walls, windows, or doors bearing on the deflected members will also move. We do not consider contracting and deflecting wood members and the cracking/separation noted in the interior finish materials to be a significant structural concern at this time.

The recommendations presented in this report are based on our experience and understanding of the concerns to provide a reasonable solution based on the conditions that were visible and/or known to us on



the date of inspection. As this report is based on the circumstances at one point in time, conditions may change which may result in additional repair recommendations. Further, the recommendations are the opinion of the Engineer to address significant structural-related concerns and may not rectify cosmetic issues.

RECOMMENDATIONS

If there are any questions or concerns regarding location or method of repair contact the engineer prior to construction.

1. We recommend removing the pier noted in Observation #4 and replacing with a new, mortared 16x16 CMU block pier. Fully the grout the pier or provide a 4" cap block. The existing footing may be utilized if is at minimum 20"x20"x10"-thick. Alternatively, the pier is to bear on a new 20"x20"x10"-thick concrete footing. Provide full width, pressure-treated blocking and/or metal shims between the top of the pier and the above girder to provide full-contact uniform bearing.
2. We recommend removing the rightmost span of the central girder and replacement with a new 3x2-10 girder. Provide flat, pressure-treated blocking and/or metal shims as needed to provide full-contact bearing between the piers and above girder.
3. We recommend installing a pressure-treated 4x4 post at both ends of the cut floor joist noted in Observation #7. The front-end post should be centered at the intersection of the two members. Each post should bear on a 12"x12"x10"-thick concrete footing and be positively attached at the top and bottom. Provide Simpson post caps and bases (or equivalent).
4. We recommend fully sistering the damaged floor joist noted in Observation #8 for the full length (bearing point to bearing point). The new sistered member should match the size of the existing joist and be attached with (3) 10d nails at 16" O.C.
5. We recommend removing the steel jack post support noted in Observation #9 and installing a new, mortared 8x16 CMU block. The existing footing may be utilized if it is a minimum 16"x20"x10"-thick. Alternatively, the pier is to bear on a new 16"x20"x10"-thick concrete footing. Provide flat, full-width pressure-treated blocking and/or metal shims between the top of the pier and the above floor framing to provide full-contact uniform bearing.
6. To help reduce and regulate moisture levels in the crawlspace, we recommend installing a new vapor barrier throughout the crawl space and an appropriately sized dehumidification system per the manufacturer's specifications.
7. Monitor the crack in the brick veneer. If the crack widens significantly (expands by an additional 1/8") or additional significant cracks (greater than 1/4" wide) propagate, then further evaluation by a structural engineer may be needed at that time.
8. We also recommend ensuring that stormwater drains positively away from the home to minimize the risk of future water infiltration. This can be accomplished by ensuring gutters, downspouts, and leaders remain clear of debris and properly functioning to direct the drainage away from the home. Also, creating a positive grade around the perimeter of the home will aid in stormwater evacuation. Water infiltration can cause further undermining of the soil and foundation settlement.

General Notes:

- All new lumber should be SYP No.2 or equivalent. All lumber exposed to concrete/masonry or weather must be pressure treated. All metal components exposed to weather or pressure-treated lumber shall be galvanized.
- Install pressure-treated blocking to provide full uniform bearing of the above floor framing onto the new/existing block piers.
- All new concrete is to have a minimum 28-day compressive strength of 3000 psi.
- New concrete footings are to be installed a minimum 12" below grade (to the bottom of the footing) and in no case less than frost depth.
- Soils below new foundation components to be contractor verified to be a minimum 2000 psf bearing capacity.
- All new metal hangers/ties/clips to be installed per manufacturer specifications.
- All fastening shall conform to R602.3(1) in the 2018 NC Building Code: Residential Code.
- Installation of the above-recommended repairs may require temporary shoring of the in-place structural components. Shoring methods are the responsibility of the contractor.
- With any structural changes, finish material cracks and minor movements are typical and expected. These are associated with settlement and allowable deflection generally observed after construction of an addition, significant remodel, or repair.

CONCLUSION

We trust that this report provides the information you require. Please contact us at 919-465-3801 if you have any questions. Thank you for the opportunity to be of assistance to you.

Sincerely,



Sam Umstot, EI
Project Engineer
Giles Flythe Engineers Inc.
NC Lic. No. C-2871



Harrison N. Luttman, PE
Project Manager
Giles Flythe Engineers Inc.
NC Lic. No. C-2871

Enclosed: Limited Photo Log



Description

General view of the home.



Photo No.
1

Description

Typical crack noted in the drywall finish materials.

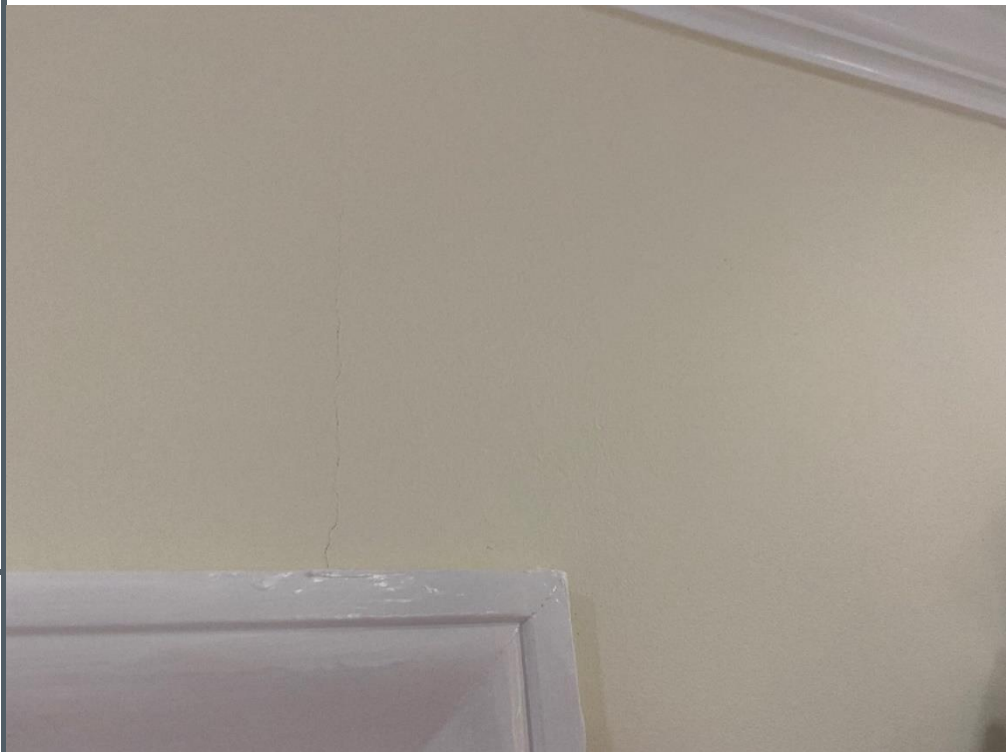


Photo No.
2

Description

General area of floor slope noted adjacent to the addition/original garage side of the home.



Photo No.
3

Description

Crack noted in the brick veneer of the front perimeter wall.



Photo No.
4

Description

Damaged CMU block pier.

Photo No.
5



Description

Notch noted in the rightmost span of the central girder.

Photo No.
6



Description

General area of the cut floor joist and associated 2x10 blocking installed perpendicular to the joist.

Photo No.
7



Description

Additional cut/notched floor joist noted.

Photo No.
8



Description

Jack post support noted to bear on a CMU block pier.

Photo No.
9

