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Fabiano Cunha
 201 North Aiken St.
 Fuquay Varina, NC 27526



Re: Structural Observation — 1434 Main Street, Lillington, NC 27546

Mr. Cunha,

At your request, on March 18, 2021 we performed a visual structural observation of structural concerns identified by *Pillar to Post Home Inspections* in their report dated 1/12/2021 for the Lillington residence noted above. The structure is a conventionally framed, detached, single family residence with raised first floor framing over a pier/curtain wall foundation system (*see picture 1*).

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

STRUCTURAL CONCERNS IN HOME INSPECTION REPORT

- The original roof structure was constructed with site-built roof trusses. The trusses are sagging but are functioning as intended. Gaps were noted between various top chords at the ridge of the original portion of the home (*see pictures 2 for example*). Additionally, diagonal members were removed from right span of the 2nd-4th trusses from the back gable, and from the left span of the backmost truss (*see picture 3 for example*).
 - Reinforce the upper ends of members where there is a gap between chords at the ridge by installing 3/4” thick OSB gusset plates sandwiched on both sides of the opposing members. The gusset plates should be shaped to the roof pitch at the top, should extend along each member for at least 24”, and should be fastened to the covered members using (2)10d common nails at 4” o.c. with staggered nailing from each face to avoid conflict (*see detail 1*).
 - Securely reinstall the vertical member after the gusset plates have been installed.
 - Where noted to be missing, install 2x4 diagonal members with (3)10d common nails at each end.
- Ceiling joists were minorly out of plumb over the addition that is the left portion of the structure (*see picture 4 for example*).
 - This is not a matter of significant structural concern. No work is required for this item.
- Masonry cracks were noted in the non-structural curtain wall of the original portion of the home (*see picture 5*).
 - These cracks are in the non-structural portion of the wall. Therefore, they are not a matter of structural concern.

- *The cracks may be repointed, or the curtain wall may be removed and replaced at the owner's discretion.*
- The rim beams at the front corners of the original porch were deteriorated.
 - *Remove and replace deteriorated rim beams with treated, full depth 2x #2 Southern Yellow Pine (SYP) material that spans continuously between end supports.*
- Probing revealed the floor joists beneath the middle bedroom that is at the right of the original portion of the home were deteriorated beyond allowable limits (*see picture 6 for example*). Also, measurement by laser level indicated they were sagging as much as approximately 1" at mid-span.
 - *Reinforce each of the deteriorated joists noted above with an additional full depth ply of 2x #2 Southern Yellow Pine (SYP), fastened to the side of the deteriorated joists using (3)10d common nails at each end and at 12" on center staggered top and bottom along the lengths of the joists. Sistered material should span continuously between end supports.*
 - *Add dropped girder beneath the middle of this joist span using a built-up (3)2x8 #2 SYP beam. The new girder should span from the chimney to the back wall of the middle bedroom and should be supported by 8"x16" hollow CMU piers with solid 4" caps spaced approximately 6' on center over 24"x24"x10" thick poured concrete footings set at least 12" into suitable bearing soils. The girder ends may cantilever up to 2' over the end piers.*
 - *Install tight fit, full depth 2x blocking or 1x cross-bridging between joists over the dropped girder to prevent rotation of joists over the new bearing line.*
- Similarly, the joists beneath the kitchen where not supported by the interior masonry wall were deteriorated beyond allowable limits.
 - *Sister each of these deteriorated joists per the specifications above.*
 - *Install a dropped girder per the specifications above to support the midspan of the new joists. The girder should extend from the interior masonry wall to the front kitchen wall.*
- Probing revealed the back two spans of the beam that is between the original home and the addition was deteriorated beyond allowable limits (*see picture 7 for example*).
 - *Remove and replace the above-noted significantly deteriorated portions of the girders using full depth (4)2x #2 SYP material with continuous span between existing masonry girder support piers.*
 - *New 8"x16 CMU piers per the specifications noted above may be utilized at the beam mid-spans to facilitate this repair.*
- The presence of HVAC prevented adequate cross ventilation and prevented observation of the rim beam at the HVAC opening. Fungal activity was noted throughout both crawlspaces (*see picture 8*).
 - *HVAC ducts should be temporarily removed to allow for the direct observation of the framing.*
 - *We recommend consulting with a qualified fungal remediation specialist to test and treat the above-noted growth as deemed necessary.*
 - *The crawlspace should be mechanically ventilated or a Code-approved closed crawlspace system with adequate vapor barrier and mechanical drying measures may be installed.*

- The chimney at the back of the kitchen was visibly leaning over its height (*see picture 9*).
 - *The chimney should be monitored for signs of further movement. If significant movement persists, it should be deconstructed.*

ADDITIONAL OBSERVATIONS

- No pilasters or rim beams were installed on the curtain wall of the left portion of the home (*see picture 10 for example*).
 - *No significant signs of distress were noted due to this construction error. To reinforce the foundation, dropped girders may be installed along the entire length of the front and back curtain walls to support the joist ends within 1'-6" of the curtain walls.*
 - *Girders should be installed per the specifications at the beginning of this report.*
- The pilasters at the front porch of the original home were out of contact with the rim (*see picture 11*).
 - *Install pilasters at 4'-0" o.c. on the left and right walls of the porch. The new pilasters should be 8"x16" solid CMU pilasters that are mortared and anchored to the inside face of the curtain wall using (2) grouted stainless steel brick ties at each pilaster course.*
 - *The curtain wall may be removed and replaced at the owner's discretion.*
- The pilaster at the front of the HVAC opening that is at the right of the home was undermined (*see picture 12*).
 - *This pilaster should be removed and replaced with an 8"x16" CMU pilaster per the specifications above.*
- The pilaster at the front-left corner of the original crawlspace was undermined (*see picture 13*).
 - *This pilaster should be removed and replaced with an 8"x16" CMU pilaster per the specifications above.*
- The middle pier on the girder beneath the original home was failed (*see picture 14*).
 - *At the splice in the girder, install a new 8"x16" hollow CMU pier with solid 8" cap, centered over a 24"x24"x10" thick poured concrete footing set at least 12" into suitable bearing soils. The contractor should take care that the soils at the base of the footing are not undermined by the excavation that is to the right of this location.*
- The pier beneath the front porch was dry-stacked (*see picture 15*).
 - *Remove and replace this pier per the specifications above.*
- Ledger strips throughout the original portion of the home were under-fastened and had slipped (*see picture 16*).
 - *Raise joists to flush with the underside of the floor sheathing where they have currently dropped over inadequate ledger strips at the faces of girders. Refasten ledger strips with (4)10d common nails per joist or remove the failed ledger strips and fasten joists directly to the sides of the girders using Simpson face hangers.*
- In lieu of CMU piers, 3" diameter standard steel pipe columns (Fy=36ksi, typical) may be used. Each column should have a Simpson "CCOQ" saddle plate column cap (or equivalent fabricated bent plate) centered over the column and welded all around the top with a 3/16" fillet weld. Shim the sides of the beam as necessary to close any gaps between the sides of the beam and the cap prior to installing screws. Anchor the base of

the column to a poured concrete footing per the specifications above using (4) ½” diameter “J” bolts with 8” embedment into the footing.

- As an alternative to using a Simpson “CCOQ” saddle plate column cap, a flat ½” thick steel cap plate may be installed that is 12” long and at least as wide as the beam it supports. The plate should be welded using a 3/16” fillet weld all around. Securely fasten the plate to the bottom of the beam using (4) ¼” diameter x 6” long Simpson SDS wood screws installed at the centerlines of the plies above with at least 1½” clearance from the edges of the bearing plate. The beam should then be reinforced from rolling by installing angled 2x6 braces at each post and at 48” o.c. (max) along the length of the beam.
- Provide drainage improvements around the perimeter of the structure such that rainwater runoff is adequately diverted from the perimeter of the home. Drainage improvements are intended to help avoid the need for extensive foundation repair/stabilization work in the future.
 - Current building standards require 6” of fall within the first 10’ from a structure or use of drains and swales. A system of exterior perimeter “French” drains and/or catch basins installed at low points in the grade may be necessary to achieve adequate drainage. Any low spots in the grade adjacent to the home should be filled for positive drainage away from the structure.
 - Extend roof gutter downspouts and any HVAC condensation drains for discharge at least 5’ from the perimeter of the structure onto soils adequately graded away from the home.

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,
 Cody Johnston, PE
 Stonewall Structural Engineering, PLLC
 Lic. #P-0951



03-18-2021

PICTURE ADDENDUM



*Picture 1 – 1434 Main Street,
Lillington, NC*



Picture 2 – Gaps between top chords



Picture 3 – Missing diagonal



*Picture 4 – Minorly twisted/rotated ceiling
joists*



Picture 5 – Example of cracks in curtain wall



Picture 6 – Example of deteriorated joist



Picture 7 – Example of deteriorated beam



Picture 8 – Example of fungal activity



Picture 9 – Chimney visibly leaning



Picture 10 – Example of curtain wall without pilasters



Picture 11 – Rim out of contact with pilasters and curtain wall



Picture 12 – Undermined pilaster at HVAC



Picture 13 – Undermined pilaster



Picture 14 – Failed pier

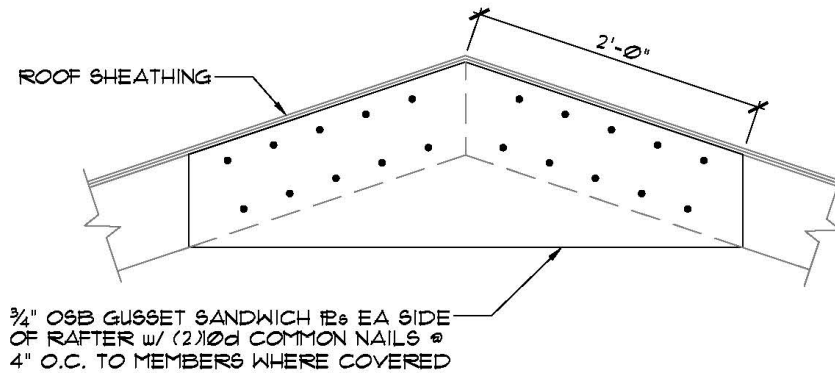


Picture 15 – Dry-stacked pier



Picture 16 – Example of sagging ledger strip

DETAIL ADDENDUM



Detail 1 – Repair for gap at ridge