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CIVIL ENGINEERING
STRUCTURAL ENGINEERING
ARCHITECTURAL ENGINEERING

Friday March 25, 2016

Memorandum To: Mr. [redacted]
Subject: Structural Inspection and report
[redacted]

Dear Mr. [redacted]

At your request, I have this date performed an inspection of certain structural aspects of the home at the above address. The first phase of the inspection was limited to the present condition of the first floor flooring, and subflooring, and the second phase, to the construction of the foundations, footings, piers, floor framing and sheetrock cracking. These structural investigations were done along , and in tandem with, a general home inspection which items of findings will be listed in another document.

The first issue to be addressed is the construction of the flooring system itself. Most of the flooring is carpeted. When walking through the house, squeaking of the flooring is extremely noticeable and annoying.

Underlayment and subfloors are, arguably, the most important aspect of any flooring project in residential settings. Proper selection and installation of subfloors and underlayment is crucial to proper wear and stability. It is important to understand the difference between underlayments and subfloors. A subfloor is used for structural support. Underlayment is actually placed on top of the subfloor and is basically a foundation for the carpeting.

In installing a carpeted floor over a crawl space such as in the house inspected for you, the plywood or OSB board should be firmly glued with adhesive to the upper edges of the floor joists. For joist spacing of more than 16 inches up to 19.2 inches on center, the minimum thickness for both plywood and OSB is ¾ inch. For joists spaced more than 19.2 inches on center, the minimum thickness for plywood is 7/8 inch and for OSB, 1 inch. The thickness of the existing plywood (or OSB) is unknown at this point. The next step in construction is to nail or screw the subfloor to the top of each joist with nails or screws spaced no more than 8 inches apart.

There should be a gap left between the edges of the pieces of subflooring of 1/16" so that the individual pieces will not rub against each other.

Whether the above procedures were followed is unknown, but the present squeaking is likely due to the fact that they were ignored, at least in part. Which of the foregoing construction practices was improperly executed will be known only when the materials are exposed.

It should be understood that the following phase of the structural inspection has to do with the condition of the house foundations, footings, piers, floor beams and floor joists and finally- settling and sheetrock cracking on the walls, and is not related to, nor have a causal relationship with the previously discussed springiness or squeakiness of the flooring.

In addition to having squeaking floors, you have identified several places where wall (Sheetrock) cracks have appeared on or around doorways on the first floor. These occur when the wall itself is slightly deformed due to settling of the wooden beams beneath the walls. When this deformation occurs, the stress, wherever it is in the wall, will travel to, concentrate at, and manifest itself at the nearest opening, (in this case doorways and arched openings with no doors.) Since sheetrock is a very brittle material, this can occur with only the slightest shift of the floor framing. It can be caused by settlement of the footings which can be caused by having too much load concentrated at a pier which compresses the soils beneath the footings, and / or from bending of the floor beams. Both are due to construction errors.

Most of the wall cracks are in doorways in walls supported by beams. I examined the floor structure while in the crawlspace beneath the first floor.. When viewed from the underside it is difficult to tell exactly where the walls above you actually are. However I am including a rough sketch of the first floor layout pointing out the locations where I suggest extra support be given to the wooden frame.

I am also suggesting that extra support be given under these locations by using "drop beams" with screw jacks on concrete pad footings. I am including sketches of typical installations.

I am at your disposal for conversations with you to answer any questions that you may have.

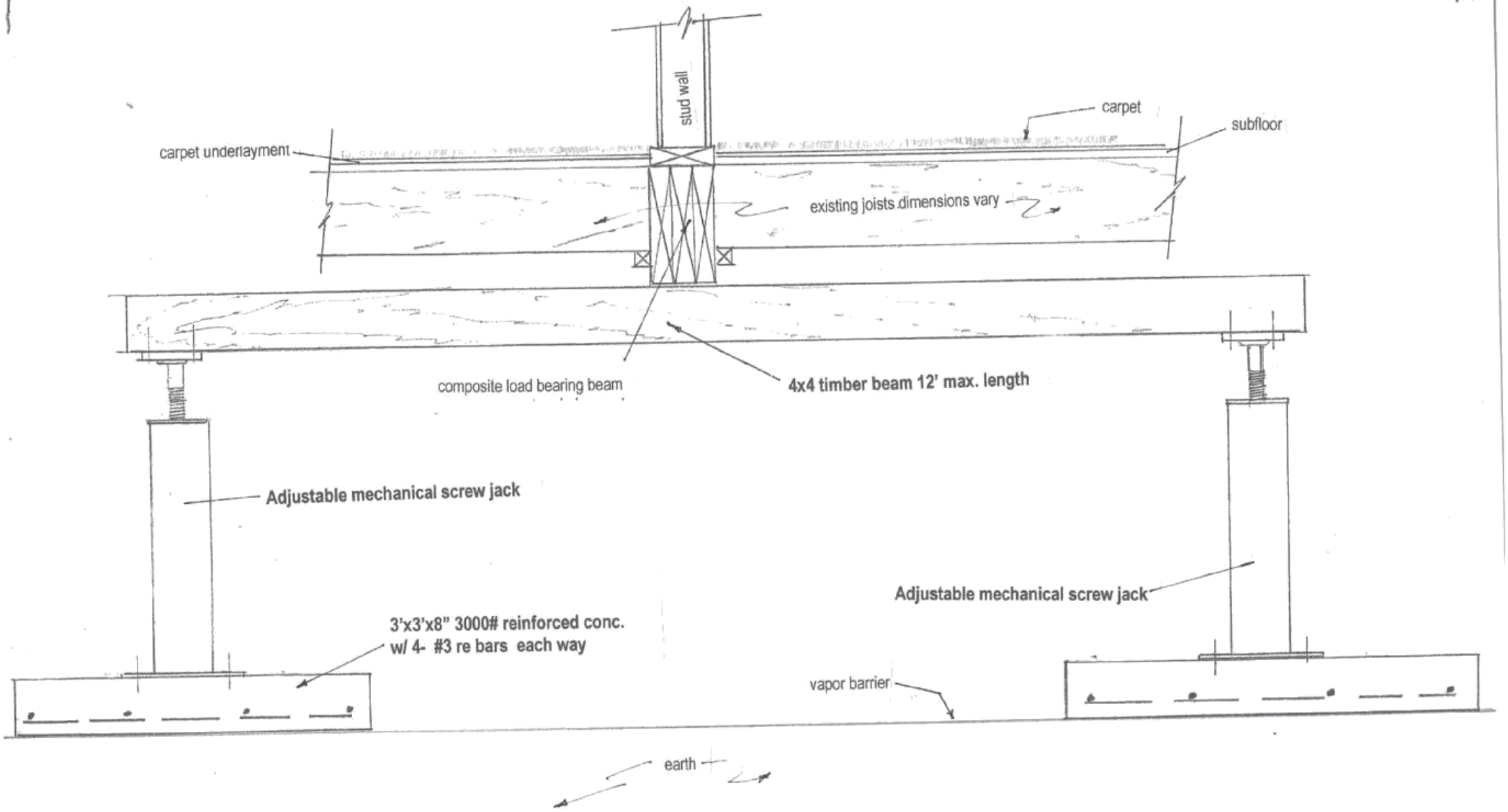
The above statements are made based on my education and experience. I hold a BS degree from the School of Architecture in Building Science, along with a BS degree in Civil/Structural Engineering from the School of Engineering, both from Auburn University. I have been operating my own consulting firm for forty -plus years in the design, supervision, and management of residential, commercial, structural, and utility engineering projects. My Professional Engineering license is #4860, and my home inspector's license is #1066.

Respectfully Submitted,

Joe D. Worley

Joe D. Worley, PE ala reg #4860

Photos and sketch follow

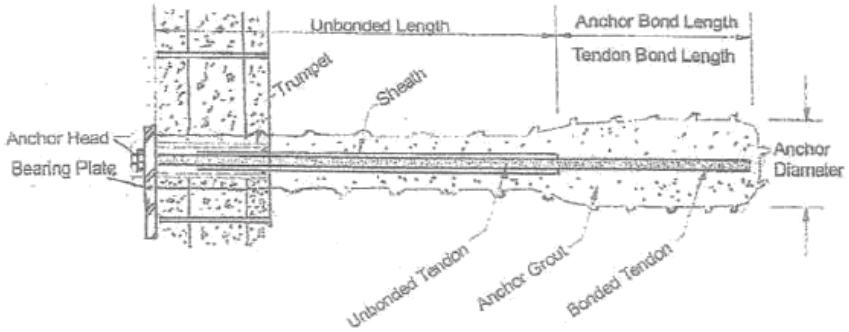


TYPICAL SECTION OF BRACING AND MECHANICAL JACKS BENEATH THE BEAMS AT LOAD BEARING PARTITIONS HAVING VISIBILE SHEETROCK CRACKING

NOT TO SCALE

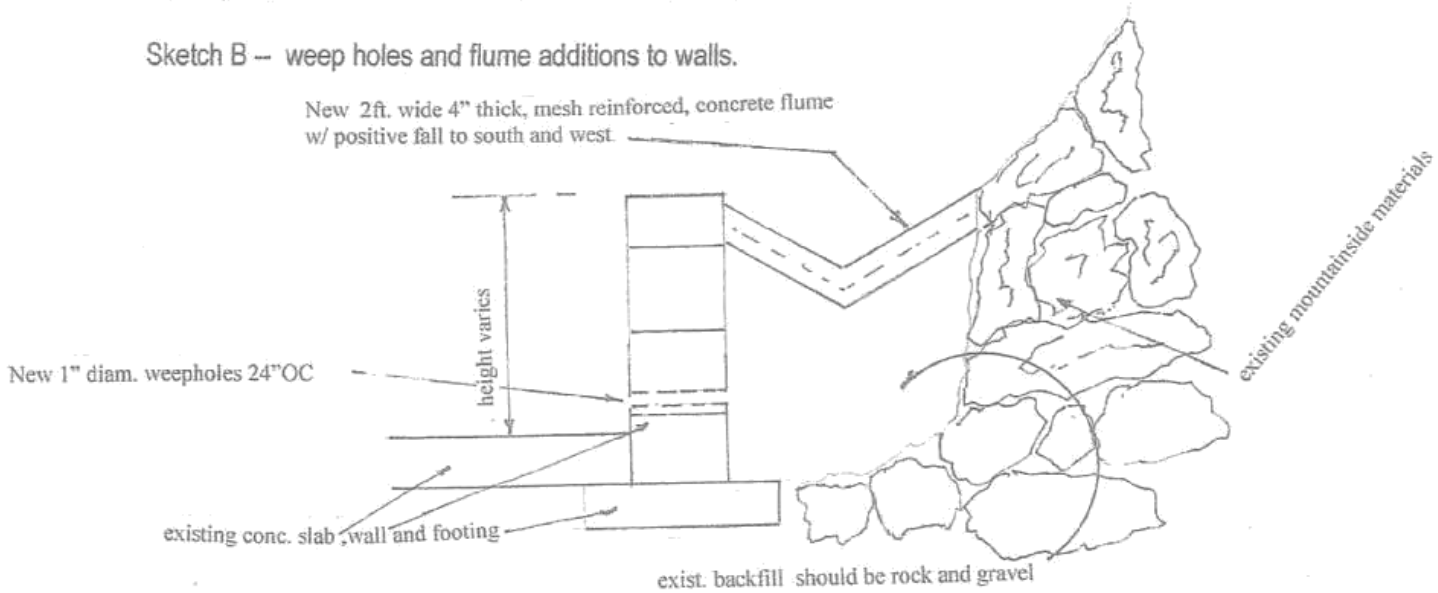
Note :mechanical, plumbing and electrical equipment shall be adjusted to allow structural modifications

Sketch A- I suggest the use of Ground Anchors. A drawing of a typical ground anchor is shown below. To be used in failing South wall



A prestressed grouted ground anchor is a structural element installed in soil or rock that is used to transmit an applied tensile load into the ground. Grouted ground anchors, are also referred to as "tiebacks" and are installed in previously drilled holes filled with wet grout. When the grout has set up for three days, a steel compression plate, washer and nut are well tightened down from the outside. This puts the anchor in tension and compresses the plate against the wall. In this way the wall is press backward toward the earth and stabilized.

Sketch B -- weep holes and flume additions to walls.



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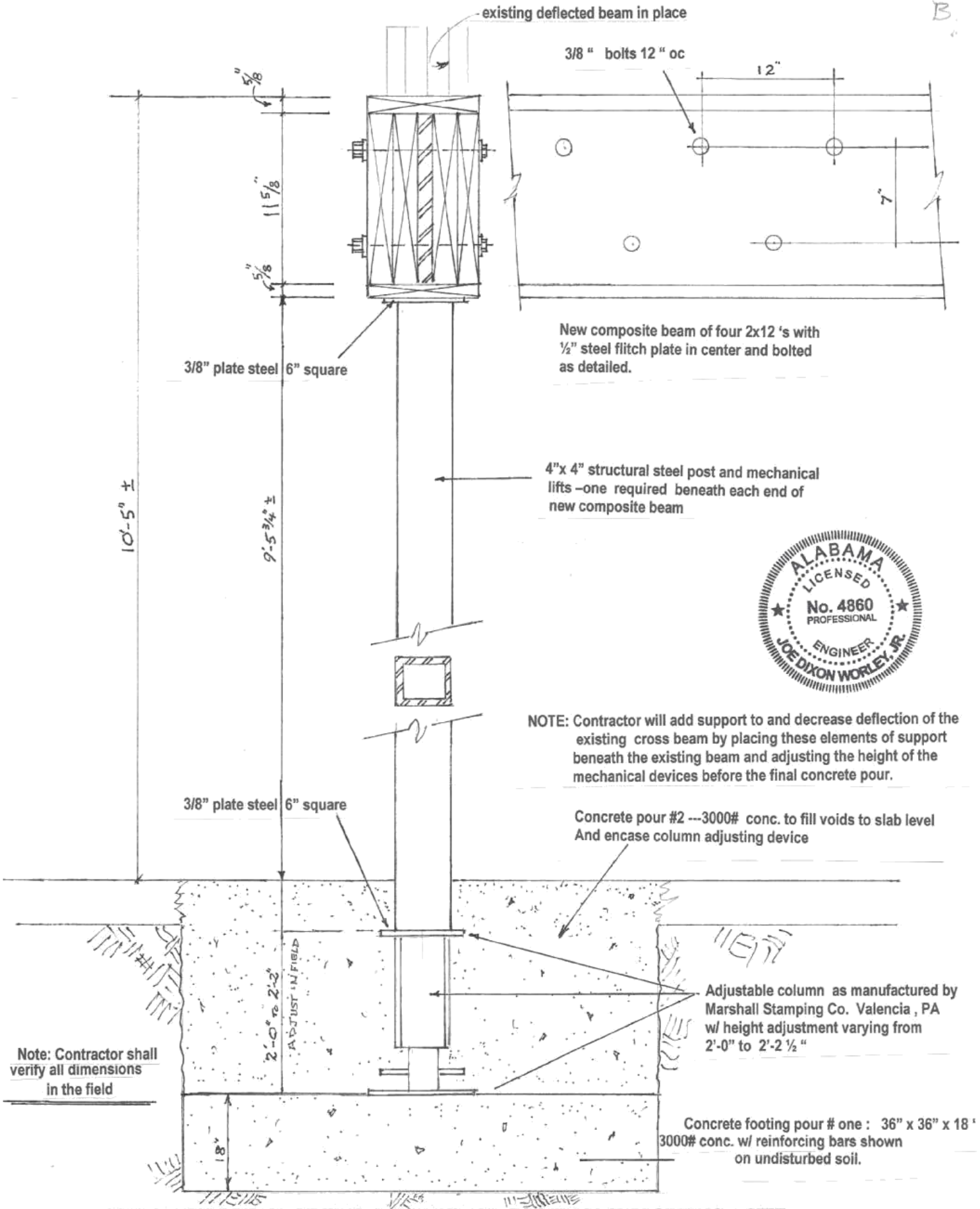
Joe D. Worley

Joe D. Worley, AL. REG. #4860

ALABAMA LICENSED No. 4860 PROFESSIONAL ENGINEER JOE DON WORLEY, JR.



SCHEMATIC DETAIL OF TWO COLUMNS AND FOOTINGS SUPPORTING A SITE-FABRICATED HORIZONTAL COMPOSITE BEAM SPANNING FULL WIDTH OF GARAGE AT 109 FAIRINGTON RD. HUNTSVILLE AL.