

David Grissom, P.E., PhD

Consulting Engineer

F-1086

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28 October 2013

Curtis Ramsay
909 Castlewood
Friendswood, TX 77546

Ref: 8314 Argentina St.
Jersey Village, TX 77040-1305
Type investigation: Structural - Foundation
Type Construction: One-Story, Brick Veneer, Composition Roof, Detached 2-Car Garage,
Monolithic Slab-on-Grade Foundation - Waffle Design, Slab Exposure Varies from
0 inches to 6 inches, Grade Beam Depth: 17 inches.

Dear Mr. Ramsay,

On this day I investigated the above referenced property to check for foundation differential movement and signs of stress on the structure. The investigation of the structure was visual. No soil sampling or testing of either a destructive or non-destructive nature was employed. I did not examine inaccessible components or obstructed areas not readily visible. I visually examined the exterior and the interior of the structure, observing the squareness of the door and window openings, the fit and function of the doors and locks, and the condition of the brick veneer and Sheetrock for evidence of stress cracking typical of differential foundation movement. I conducted a foundation elevation survey using a precision digital instrument designed for the purpose. These elevations are shown on Drawing A.

According to government published soil surveys, the native surface soils in this geographical area consist of essentially non-plastic loam or lean clays (Addicks Series) which have small tendency to shrink and swell with changes in the moisture content. The structure sits on a fairly flat lot with apparently adequate drainage away from the house. There had been heavy rain the day before the investigation. There was 4.5 inches in the rain gage in the back yard. There was no evidence of standing water anywhere.

Apparent upheaval in the kitchen area is suggestive of sewer leaks under the slab. You are advised to have the sewer system tested for leaks. There are a number of companies who specialize in leak detection. What is needed is the location of the leak and not just the fact that a leak exists. A good leak detection company will trace out the paths of the sewer lines, make a drawing of the floor plan (A copy of Drawing D would be good for this.) with the sewer paths marked, and show the location of all leaks found. The accidental discharge of water under a slab foundation is sometimes an insurable loss. You should turn in a claim to the carrier of your homeowner's insurance. The insurance company sometimes pays for an investigative plumber to test the sewer

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system for leaks.

In the following report left and right are determined by looking at the house from the front.

Summary

The results of my investigation are summarized in the attached drawings.

- Drawing A Shows the foundation elevation readings.
- Drawing B Shows the location of cracks and signs of stress on the structure.
- Drawing C Shows a proposed plan for foundation repair.
- Drawing D This is a clean drawing of the property for future reference.

The elevation survey of Drawing A indicates foundation subsidence in the right half of the house. The signs of stress on the structure, documented on Drawing B, confirm the foundation motion suggested by the elevation survey. There may be others. The differential elevation between extremes now present in this foundation is on the order of 4.6 inches. The differential movement is not well confined to the perimeter and several interior pilings are needed as shown on Drawing C. The extent of the foundation movement is of sufficient magnitude that repair by a competent foundation company is recommended.

Discussion

The cause of the foundation drop is most probably due to soil desiccation by the roots of the mature oak trees near the house. The roots of the two large oak trees near the right front corner are clearly under the foundation and probably extend as far as the livingroom. The subsidence of the master bathroom is probably caused by the large oak trees in the back yard. In the far back of the yard is a very large live oak that is most likely the culprit.

The presence of sewer leaks under the house will usually make matters worse. If the tree roots find the source of moisture, it will increase its root mass in the area to take advantage of the moisture and nutrients. Large trees can take up more water than the leak can provide, resulting in a net desiccation of the soil and concomitant shrinkage. This is the usual cause of subsidence.

On the left side of the house there are no trees. There appears to be a sewer leak under the kitchen producing the apparent upheaval in the area. If no sewer leaks are found, I have no explanation for the anomalously high area in the kitchen. It could have been built that way.

The wing wall at the left front corner is an anomaly. You have the option of installing the piling as shown on Drawing C, or completely removing the wall. It is not connected to the house. If the wall is removed, it may let the roof structure hang and droop excessively. I think the least expensive way to solve that problem is to install the piling as shown.

According to Harris County Appraisal District records this residence was built in 1977. The residence apparently has a plastic pipe sewer system fashioned from ABS. While not subject to corrosion as is cast iron pipe, experience has shown that many homes built in the same time frame as this one have sewer systems that were assembled with no glue in the joints of the plastic pipe. If this is the case the sewer system under this structure has been leaking since initial occupancy. Additionally, within my practice I have found several other causes of sewer leaks in plastic pipe sewer systems. In particular, ABS is well known to be highly prone to sewer leaks. It has two problems, it is difficult to glue joints and after some time in the ground much of it becomes brittle and cracks with the shifting soil. Even today, plumbers will tell you that there is no suitable glue for ABS joints.

Foundation Repair

The plan for foundation repair shown on Drawing C will, in my opinion, stabilize the current problem areas of the foundation permanently. I recommend the use of pressed piles for the repair of foundations in the soils of the area. The pressed pile system usually carries a lifetime transferrable warranty on the foundation. This warranty should satisfy purchasers, insurers, lenders, and government agencies as to the future stability of the structure. When repaired in this manner the foundation should continue to perform its design function for the life of the structure - with the possible future need for additional support in unsupported areas or adjustment of the installed pilings. Unsupported areas of the foundation are susceptible to future movement.

It may be that the foundation contractor of your choice will differ somewhat with the plan of repair proposed on Drawing C. As it is the contractor who provides the warranty, and not myself, then his plan should prevail. This is fine as long as all the foundation problems are addressed. There is usually some flexibility in piling placement and number when repairing a foundation. I will be glad to discuss the matter with the foundation contractor should the question arise.

Concluding Remarks

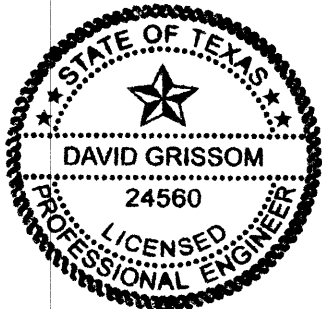
The repair plan proposed on Drawing C is intended to lift the walls back into position and stabilize them. This repair plan is based upon evidence available at the time of the investigation. And is no guarantee that other areas of the foundation will not need underpinning at some future date.

The above report and analysis is the opinion of this Registered Professional Engineer and is not to be construed as a warranty or guarantee of any kind - beyond that issued by a foundation contractor. Foundations, supported or unsupported, are susceptible to future movement. The opinions and conclusions expressed above were arrived at based upon my training and experience and were done according to the best of my ability.

The choice of foundation repair contractor is the sole responsibility of the homeowner. The quality and workmanship of the foundation repair is the responsibility of the foundation repair contractor. The engineer who investigates your home and recommends the repairs cannot and does not assume any responsibility for either the choice of foundation repair contractor, the quality of his workmanship, or the warranty he issues.

This report was prepared solely for the benefit and guidance of the addressee. The author of this report assumes no responsibility whatsoever for the use of this report by any other person. This report is valid as of the date of the investigation of the referenced property. This report excludes conditions and events subsequent to the date of the investigation. The report is limited to the matters expressly stated within the report and no additional information is implied or inferred.

The investigation represented by this report was done in a thorough and professional manner. The proposed repairs represent good engineering practice and generally accepted techniques used in the industry. This is attested to by the imprint of my seal below.



28 October 2013

Sincerely,

A handwritten signature in black ink that reads "David Grissom".

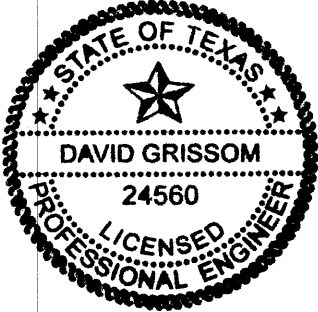
David Grissom
P.E. #24560

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 Jersey Village, TX 77040-1305
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 Key Map: 409M
 10/28/2013

Floor Elevation Survey 28 October 2013

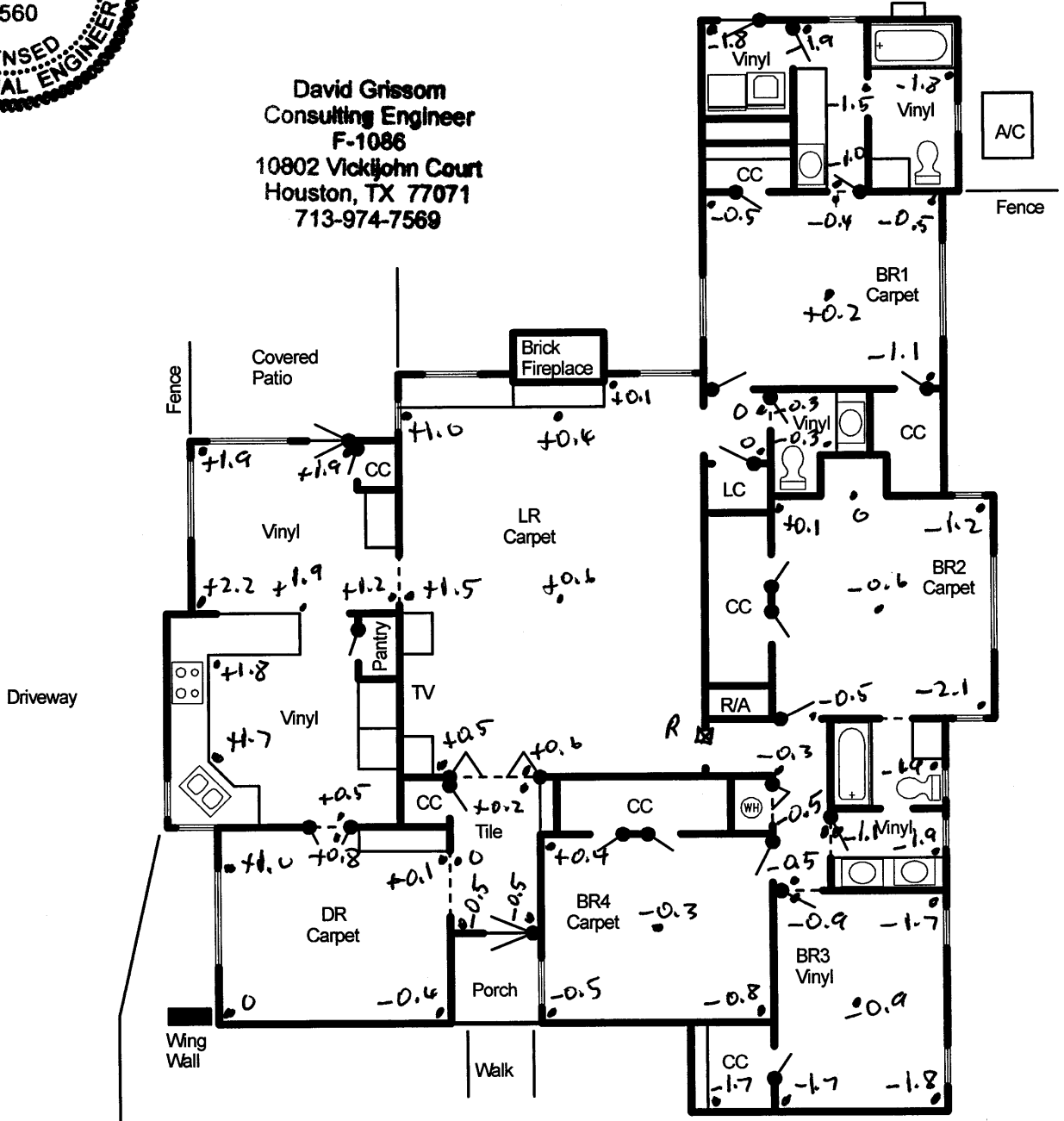
Inches + and - from Reference. $\boxtimes R$
 All Readings are Actual.

Scale: 1" \approx 10'
 1-Story: Brick Veneer Composition Roof
 Monolithic Slab-on-Grade: Waffle Design
 Slab Exposure: 0" - 6"
 Grade Beam Depth: 17"



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1" = 10'

Drawing A

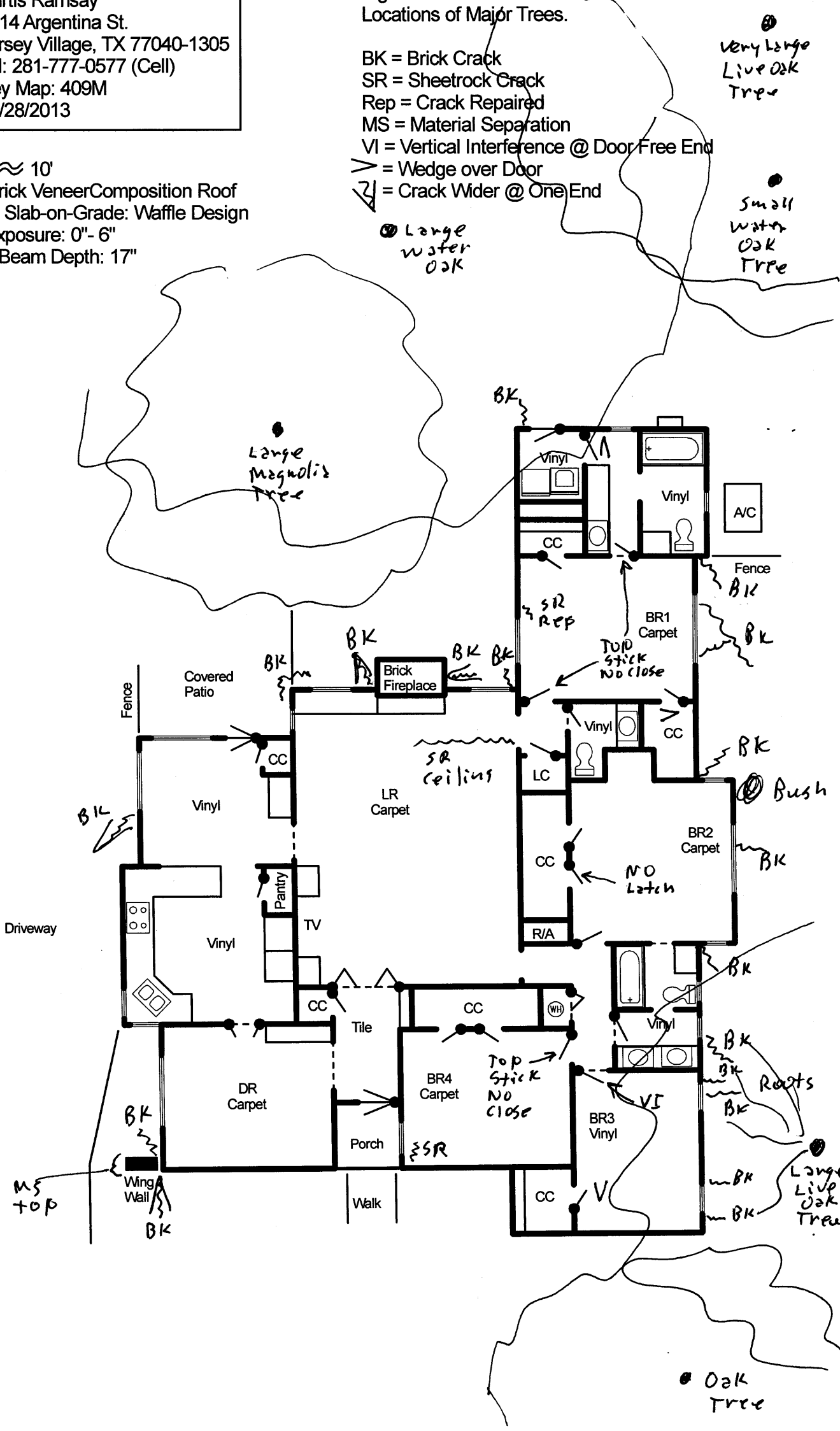
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Signs of Stress on Structure
 Locations of Major Trees.

- BK = Brick Crack
- SR = Sheetrock Crack
- Rep = Crack Repaired
- MS = Material Separation
- VI = Vertical Interference @ Door Free End
- > = Wedge over Door
- ∩ = Crack Wider @ One End

Scale: 1" ≈ 10'

1-Story: Brick Veneer Composition Roof
 Monolithic Slab-on-Grade: Waffle Design
 Slab Exposure: 0" - 6"
 Grade Beam Depth: 17"



1" = 10'

Drawing B

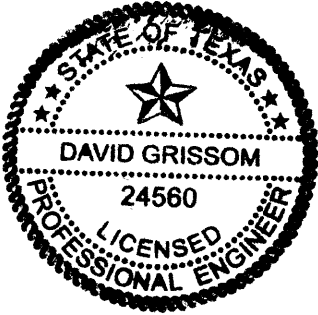
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- X, ⊗ - Proposed Piling Locations to Lift and Stabilize the Areas of Foundation Differential Motion.
 30 Total
- ⊗ - Concrete Breakout or Tunnel.

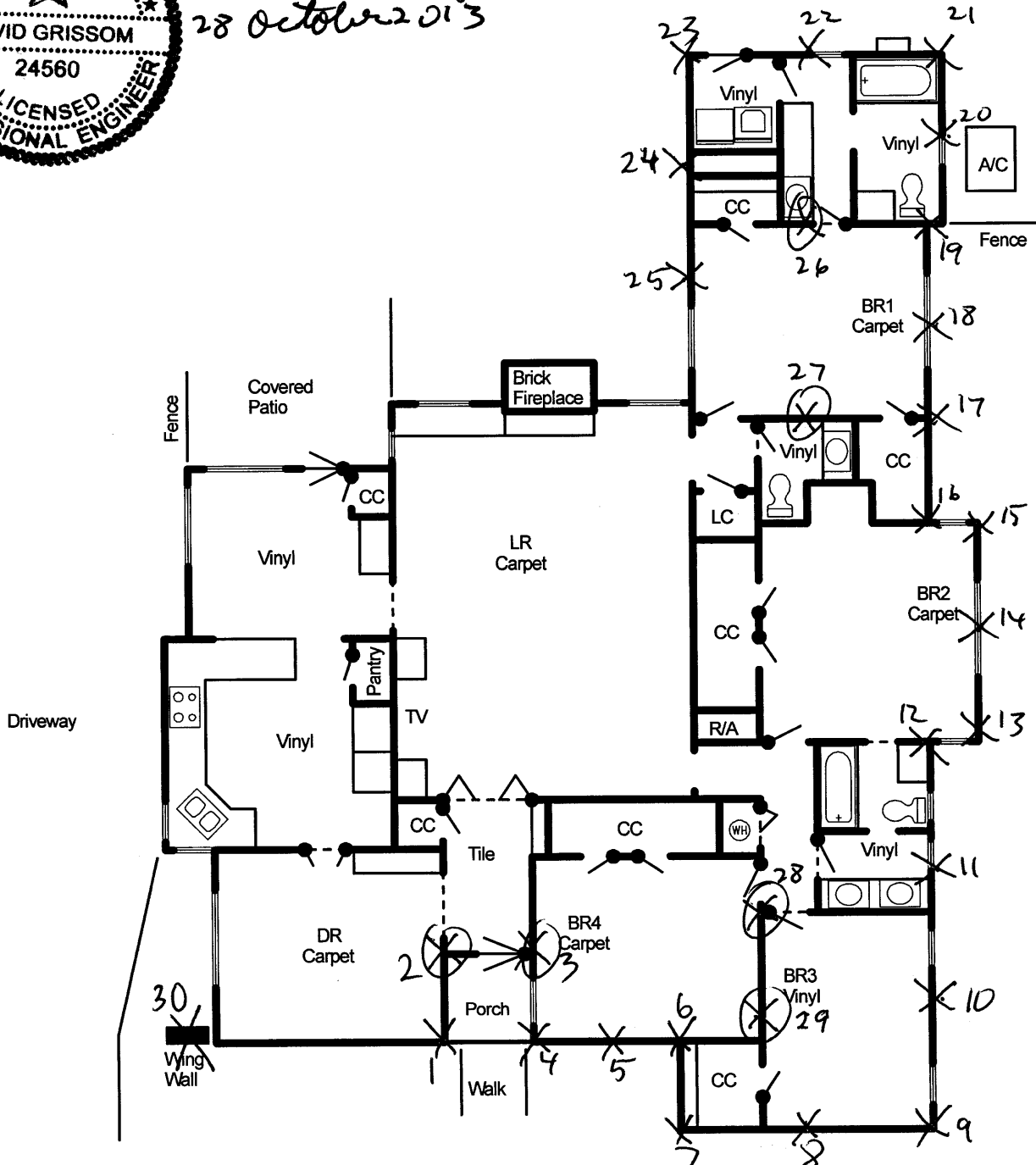
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1-Story: Brick Veneer Composition Roof
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- Structural Steel I-Beam Under Floor
 Where No Grade Beam.



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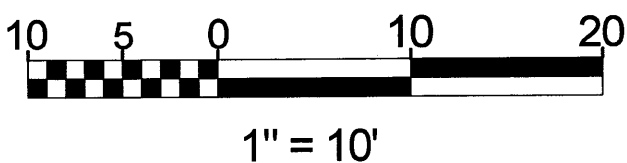
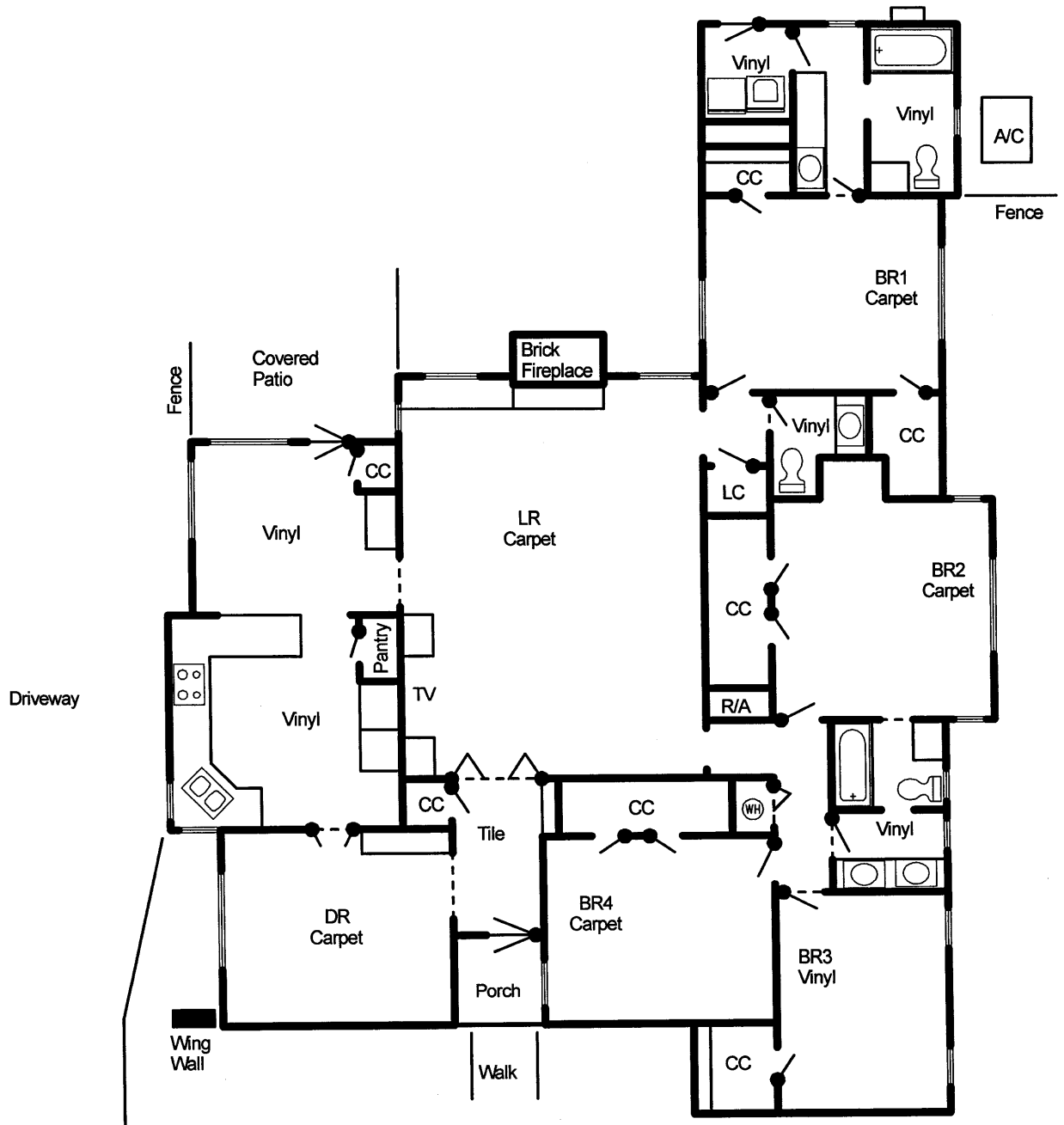


1" = 10'

Drawing C

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Scale: 1" \approx 10'
 1-Story: Brick Veneer Composition Roof
 Monolithic Slab-on-Grade: Waffle Design
 Slab Exposure: 0" - 6"
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Drawing D