

## ENGINEER'S REPORT

28411 Peper Hollow Lane  
Spring, TX 77386

**Prepared for:**  
Brian Crawford

**Prepared by:**



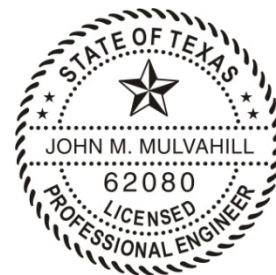
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David L. Yancy II, P.E.



John Mulvahill, P.E.

Inspection No. 2019271N  
Date of Inspection: December 2, 2019

The digital seals appearing on this document were authorized by John M. Mulvahill, P.E. #62080 and David L. Yancy II, P.E. #97855 on December 10, 2019.

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## INTRODUCTION

The report that follows has been prepared from the perspective of what an owner of this property would benefit from knowing. Thus, it discusses many things beyond those that are of immediate concern. Therefore, the report needs to be read in its entirety to understand fully all the information that has been obtained.

The purpose of this inspection and report is to evaluate the current condition of the structural system of this building and to determine what, if any, significant maintenance, repairs, and/or replacement to this system might be expected within the next few years. This inspection was performed by and report written by John Mulvahill, P.E.

Our primary purpose is to provide an understanding of the house and the conditions existing at the time of the inspection. This report is based on an examination of the structural systems in this building. This report is an opinion about the condition of this building. It is based on visual evidence available during a diligent inspection of all reasonably accessible areas. No surface materials were removed, no destructive testing undertaken, or furnishings moved. We do, of course, look for problems, particularly those we would consider major deficiencies. Please keep in mind that we generally define a major deficiency as one that would cost approximately \$1000.00 or more to correct. Any house will have minor items deserving attention. Often these are matters of personal preference. It is not the intent of our inspection to detail every minor defect we might find.

This inspection and report do not include code compliance, mold investigations, environmental investigations, indoor air quality analysis, municipal regulatory compliance, subsurface investigation, verification of prior uses, or records research related to this building. This report is not an exhaustive technical evaluation. Such an evaluation would cost many times more.

Owning any building involves some risk. Even the most comprehensive inspection cannot be expected to reveal every condition you may consider relevant to your ownership. Further, without disassembling the building, not everything can be known. The report is not to be considered a guarantee of condition and no warranty is implied.

As Professional Engineers, it is our responsibility to evaluate available evidence relevant to the structural systems in this building. We are not, however, responsible for conditions that could not be seen or were not within the scope of our service at the time of the inspection. This inspection and report have been conducted in compliance with the standards of practice of Criterium Farrell Yancy Engineers and in a manner consistent with that level of care and skill that is ordinarily exercised by members of the profession practicing under similar conditions at the time the services are performed.

This inspection of the foundation of this building was limited to a “Level B” evaluation as defined by the Texas Board of Professional Engineers through their recognition of the document titled “Guidelines for the Evaluation and Repair of Residential Foundations” as issued by the American Society of Civil Engineers, Version 2, May 1, 2009 as well as the document titled Guidelines for the Evaluation of Foundation Movement for Residential and Other Low-Rise Building”, FPA-SC-13-1 as issued by the Foundation Performance Association, April 11, 2015.

Any home, regardless of code compliance requirements, should satisfy basic engineering principles and good construction practice. We have taken these principles into consideration when evaluating the capacity of the framing and other components where the choice of materials, their capacity, and their installation are relevant to future performance of this home.

We look at the exterior veneer, siding, trim, windows, doors or frames only to see if any signs of differential movement are present and not to render an opinion of the condition of the veneer, siding, trim, windows, doors or frames. Issues concerning the veneer, siding, trim, windows, doors or frames, or any associated rot, caulking, etc., are not included in the scope of a structural inspection and, if we address any of these items in our report, it is only as a courtesy and should not be considered an opinion of these items or all-inclusive list of deficiencies.

Indoor air quality is a growing concern. Mold and mildew, fostered by moisture accumulation, can lead to respiratory discomfort and aggravate allergies and other respiratory conditions. Inspecting for mold is not included in the scope of a structural inspection. Evidence of any moisture-related problems in the home is not always visible. We cannot be responsible for any such conditions that might be discovered later.

Texas law allows only persons who possess a valid "Structural Pest Control Business License" to inspect or make reports with respect to pest infestations including wood destroying insects and other organisms such as fungus (causing wood rot). This report is not a termite inspection and no responsibility is assumed for any damage caused by wood-destroying organisms.

For your reference while reading the report that follows, the following definitions may be helpful:

*Excellent* Component or system is in "as new" condition requiring no rehabilitation and should perform in accordance with expected performance.

*Good* Component or system is sound and performing its function, although it may show signs of normal wear and tear. Some minor rehabilitation work may be required.

*Fair* Component or system falls into one or more of the following categories: a) Evidence of previous repairs not in compliance with commonly accepted practice, b) Workmanship not in compliance with commonly accepted standards, c) Component or system is obsolete, d) Component or system approaching end of expected performance. Repair or replacement is required to prevent further deterioration or to prolong expected life.

*Poor* Component or system has either failed or cannot be relied upon to continue performing its original function as a result of having exceeded its expected performance, excessive deferred maintenance, or state of disrepair. Present condition could contribute to or cause the deterioration of other adjoining elements or systems. Repair or replacement is required.

*Minor distress* Slab – cracks less than 1/16-inch in width and not numerous.  
Masonry - cracks less than 1/8-inch in width and not numerous. Essentially no separations at joints near windows, doors, and differing materials greater than 1/4-inch.

Interior – cracks less than 1/16-inch in width and infrequently encountered.

*Moderate distress*

Slab – cracks greater than 1/16-inch and less than 1/8-inch in width.

Masonry – intermittent cracks less than 1/4-inch in width and separations at joints in the 1/4-inch to 1/2-inch range.

Interior - numerous signs of settlement including drywall cracks up to 1/8-inch.

*Severe distress*

Slab – cracks greater than 1/8-inch.

Masonry – cracks greater than 1/4-inch in width or separations at joints exceeding 1/2-inch.

Interior – cracks greater than 1/8-inch in width and typically numerous.

All ratings are determined by comparison to other buildings of similar age and construction type. Further, some details of workmanship and materials will be examined more closely in higher quality homes where such details of workmanship and materials typically become more relevant.

Please note that we may bold or italicize certain observations for your attention. However, you should not assume that these are the only observations of importance in the report. Please be sure to read our report thoroughly and completely.

Correction of any deficiencies or concerns noted in the report should only be performed by licensed professionals.

This written report is the complete response to your request for an inspection of this property and should be read in full. Any verbal statements made during the inspection are made as a courtesy only and are not considered a part of this report. If you have any questions about this report or our inspection, please call our office immediately for clarification. If there is any area of this property where you have a particular concern based either on this report or your own personal observations, we recommend a more exhaustive technical evaluation.

Statements made in this report should not be considered a plan of repair or a design solution. Responsible parties should consult the appropriate professional engineer for design solutions and options.

## **DESCRIPTION**

This home is a 1-story residence with brick veneer on the exterior walls and an asphalt composition shingle roof surfacing that was apparently built about 2005. The home was occupied at the time of inspection.

Brian Crawford (owner), was present at the time of the inspection.

For purposes of this report, all directions (left, right, rear, etc.) are taken from the viewpoint of an observer standing in front of the building and facing it; or, when discussing a specific item, from the viewpoint of standing in front of that component (doorframe, window, etc.).

## SITE

### General

In many areas of southeast Texas, soils have high contents of expansive clays that swell when wet and shrink when dry<sup>1</sup>. Building foundation and structural damage can result from the shrink-swell pressure exerted by the soil. More or less uniform moisture levels can help preclude cyclic expansion and contraction of the soil with its resulting foundation movement.

### Observations and Recommendations

Topography of the lot is generally level. Drainage of the property and surrounding area appears to be good.

As a general note, all low spots where excess water can accumulate should be filled and sloped so water drains naturally away from the foundation. We mention this because poor drainage is a frequent contributor to foundation differential movement.

There is an underground drain system into which none of the downspouts directly empty. It appears that the system drains to the street and/or storm sewer system. Due to the inherent limitations of a visual inspection, the system was not tested. It should be realized that no excavations or diggings were made as part of this inspection; therefore, no comment can be made on the condition of buried drainpipes. Periodic maintenance on drain systems like this is required to for proper function.

This home is equipped with a gutter and downspout system. While this system was generally operational at the time of inspection, frequent maintenance and periodic repairs should be expected.

### Deficiency:

- **We observed downspouts that discharge water directly at, or near, the base of the perimeter grade beam at the front right, front left, right rear and left rear corners of the home.** This can contribute to differential water content in the perimeter soil resulting in differential movement in the foundation.

Trees were observed within approximately 25 feet of the foundation at the back of home. Trees can contribute to differential movement in a foundation in two ways. The roots of trees consume large quantities of moisture from the soil, causing the soil to dry and shrink much faster than other areas. In some cases, tree roots will undermine the grade beam foundation, lifting and cracking the foundation. We normally do not recommend removal of mature trees (unless observations indicate obvious foundation damage) because the decaying roots may have a more detrimental effect.

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<sup>1</sup> United States Department of Agriculture Soil Conservation Service, "Soil Survey of Harris County", 1976

## STRUCTURE

### General

Our evaluation of this structure is based on many indirect observations. We cannot see most of the framing. We look for cracks, bulges, and other evidence of distress or deterioration to help us evaluate the condition. As with any limited inspection, it is possible that there are structural deficiencies that cannot be known.

### Observations and Recommendations

The following areas were inaccessible or not visible, and this limited the extent of our structural inspection:

- Portions of the attic area at the far perimeters
- Most of the foundation system and slab
- Wall framing (concealed)
- The edge of the slab in some areas

The house has a concrete slab foundation. The type and amount of steel reinforcing in the slab cannot be determined by a visual inspection. However, there was evidence of post-tension cables spaced uniformly throughout the slab. Post-tension cables provide horizontal containment for the concrete slab so that it resists cracking and separation when exposed to differential settlement. Grade beams are located at strategic locations under load bearing portions of the house provide the home's foundation. The grade beams are deeper than the rest of the slab and they contain additional steel reinforcing. This is a standard method of construction.

### Deficiency:

- **The foundation corners were spalled/cracked at the front right, front left, right rear and left rear corners.** This is caused by thermal expansion of the walls and the tight connection between the veneer and concrete surface. The expanding veneer in the hot sun exerts a force sufficient to shear the corner from the foundation. This is common and is not considered a significant structural defect.

At the time of this inspection, we had not been informed of any prior foundation repairs. If there have been any repairs to the foundation, we were not a party to any repair design or the repair process.

We performed a survey of the floor elevations in the home using an electronic level, which the manufacturer states is reliably accurate to within 1/8<sup>th</sup> of an inch over a vertical range of plus or minus twenty feet. The majority of measurements obtained were around the perimeter of the home. Adjustments were made to accommodate for steps, changes in floor coverings, and other built-in variances. As the garage floor is sloped intentionally, some elevation readings are taken on the garage ceiling as an indirect measurement of foundation levelness in this area.

We noted minor elevation variance throughout much of the home. In general, we consider differentials of less than 1 inch in 10 feet to be acceptable. All measured differentials are well within that parameter.

While the amount of movement is within acceptable parameters, we observed drywall joint cracks in the game room and master bedroom and a sticking master bedroom door that, in our opinion, appear to be due to minor foundation movement. The movement appears to be caused by the downspouts discharging runoff directly at the foundation in the right rear and left rear corners. We recommend that extenders be installed on all downspouts that will discharge runoff away from the foundation or connect the downspouts directly to the underground drain system.

Based on visible evidence and measured differentials, we consider the foundation to be structurally sound. With normal care, and attention to maintenance of a stable moisture content in the soil surrounding the foundation, the foundation should continue to be structurally sound for the foreseeable future. Although no structural damage was observed at the time of the inspection, soil conditions in this area are known to be unstable. No warranty against future movement can be made.

Foundations designed and constructed on expansive soils have different maintenance requirements than those that are constructed on non-expansive soils. Inconsistent application of moisture and poor drainage are both primary factors that influence foundation performance and longevity of the structural systems. We do recommend a program of conscientious moisture management of the soil in close proximity to the foundation in an effort to stabilize the moisture content and thus stabilize foundation movement caused by soil expansion and contraction.

The exterior walls of this home appear to be standard wood frame construction. Wall framing generally consists of a sill plate, wall studs, and a top plate (constructed of dimensional lumber). The attic framing is primarily dimensional lumber used as ceiling joists, rafters, ridge boards and purlins. The roof framing is supported by interior and exterior bearing walls and beams. This is a standard method of construction.

Although not visible, no significant deflection of the ceiling joists was observed and they appeared to be firm and generally level. Based on areas accessed, no structural problems were observed in the visible framing members.

As a general note, it should not be assumed that no rot exists in any of the inaccessible areas. Rot can result from moisture accumulating underneath the siding, behind trim, or within the wall cavities should insulation or other obstacles restrict the normal drying process. Therefore, it is possible that you will encounter some rot should you at any time undertake any projects that involve disassembly of the portions of this structure normally inaccessible to visual inspection. This is typical for any home.

The entry stoop is generally in good condition with no structural problems indicated.

## **EXTERIOR**

### **Observations and Recommendations**

The visible exterior brick is a veneer that has been installed over the wood framing. These walls and the veneer appear to be in good condition. No evidence of cracking was observed that would be an indicator of structural problems.



The expansion joints were of consistent width. Expansion joints are used to absorb the thermal expansion of the brick veneer and help prevent cracking in the brick and mortar. Significant gap differences between the top and the bottom of the joint can be an indication of foundation movement (although that was not the case at this house).

**Deficiency:**

- **We observed deteriorated caulking along the brick veneer expansion joints. Over time the sealant has degraded and should be repaired to help keep moisture from infiltrating this section. We recommend that the expansion joints be re-caulked with a flexible caulk to seal the joints.**

As a general note, all openings, cracks, etc., in the exterior veneer or siding, or in any location on the exterior envelope of the building, should be caulked or otherwise sealed to prevent water or moisture from entering the building.

The patios at the side and rear are concrete slab-on-grade and are in good condition. The driveway and walk are also concrete slabs that are generally in good condition.

**Deficiency:**

- **Minor cracking and settlement was noted in the left rear patio slab, typical of a concrete patio in this area.** As these are concrete slabs approximately four inches in depth with limited reinforcement, they are subject to cracking over time. If the cracks become greater than ½ inch in width or have elevation difference across them (greater than ¼ inch), you may want to consider repair so they do not become safety hazards.

## **INTERIOR**

### **General**

As a responsible owner, you are best able to judge the condition of the interior finish of the rooms. In this section of the report, we are concerned with those things that are technically and financially significant. For example, stains which might indicate roof or plumbing leaks, older wall or ceiling material which may require repair/replacement; the use of substandard materials on interior walls or ceilings; or the quality and condition of such items as the doors, windows, and cabinetry are those things which can affect the overall quality and condition of a home.

### **Observations and Recommendations**

Generally, the interior walls and ceilings of this home are finished with drywall and paint. The floors are finished with carpet, tile and wood.

**In addition to general wear and tear, we observed the following deficiencies:**

- **We noted drywall joint cracks in the game room and master bedroom vaulted ceilings. Small hairline cracks were also noted in the drywall at some game room and master bedroom windows. As previously mentioned (see Site section), in our opinion, the cracks are due to minor foundation movements and are considered**

cosmetic in nature. Cosmetic repairs and re-finishing of interior drywall and ceilings should be performed in accordance with industry standards by a qualified professional as a means of monitoring the foundation for future movement.

- We observed drywall nail pops in the master bedroom ceiling. These are considered cosmetic in nature.
- We observed evidence of water damage on the middle bedroom ceiling. This appears to be due to a past overflow of the HVAC condensate pan in the attic and is not considered a structural deficiency.
- We noted the master bedroom door sticks. This also appears to be due to minor foundation movement. We recommend that the door be adjusted to open and close properly.
- We observed that the kitchen pantry door swings closed on its own. This appears to be due to minor foundation elevation differentials in this area. If this is a concern, we recommend that the door be adjusted for proper operation.

As a general note, bathroom caulking should be inspected regularly and kept in good condition since water leaks can lead to other structural deterioration. Particularly important and often overlooked, is the joint between the tub and the floor.

## CONCLUSION

Based on visible and measured evidence, the structural condition of this foundation is average. It is our opinion that there has been only typical settlement occurring in this home's foundation. The measured elevation differentials are within allowable limits for deflection and tilt and the movement does not appear to have resulted in structurally significant damage to the foundation at this time.

It is our opinion that the structural systems in this house are performing as intended and the house is structurally sound. With normal care, and attention to maintenance of a stable moisture content in the soil surrounding the foundation, the slab should continue to be structurally sound for the foreseeable future. However, no warranty against future movement can be made.

This report has been prepared in strict confidence with you as our client. No reproduction or re-use of this report for the benefit of others is permitted without expressed written consent, except as may be required by Texas real estate regulation. Further, except as required by regulation, we will not release this report to anyone without your permission.

If you have any questions about this report or inspection, please feel free to call our engineer for clarification. There is no additional charge for a reasonable number of phone consultations. Should an additional visit to the home be necessary, however, an additional fee will be charged.

Thank you for the opportunity to be of assistance to you.

# 2019271N Structural Crawford

28411 Peper Hollow Lane, Spring, TX, USA 77386

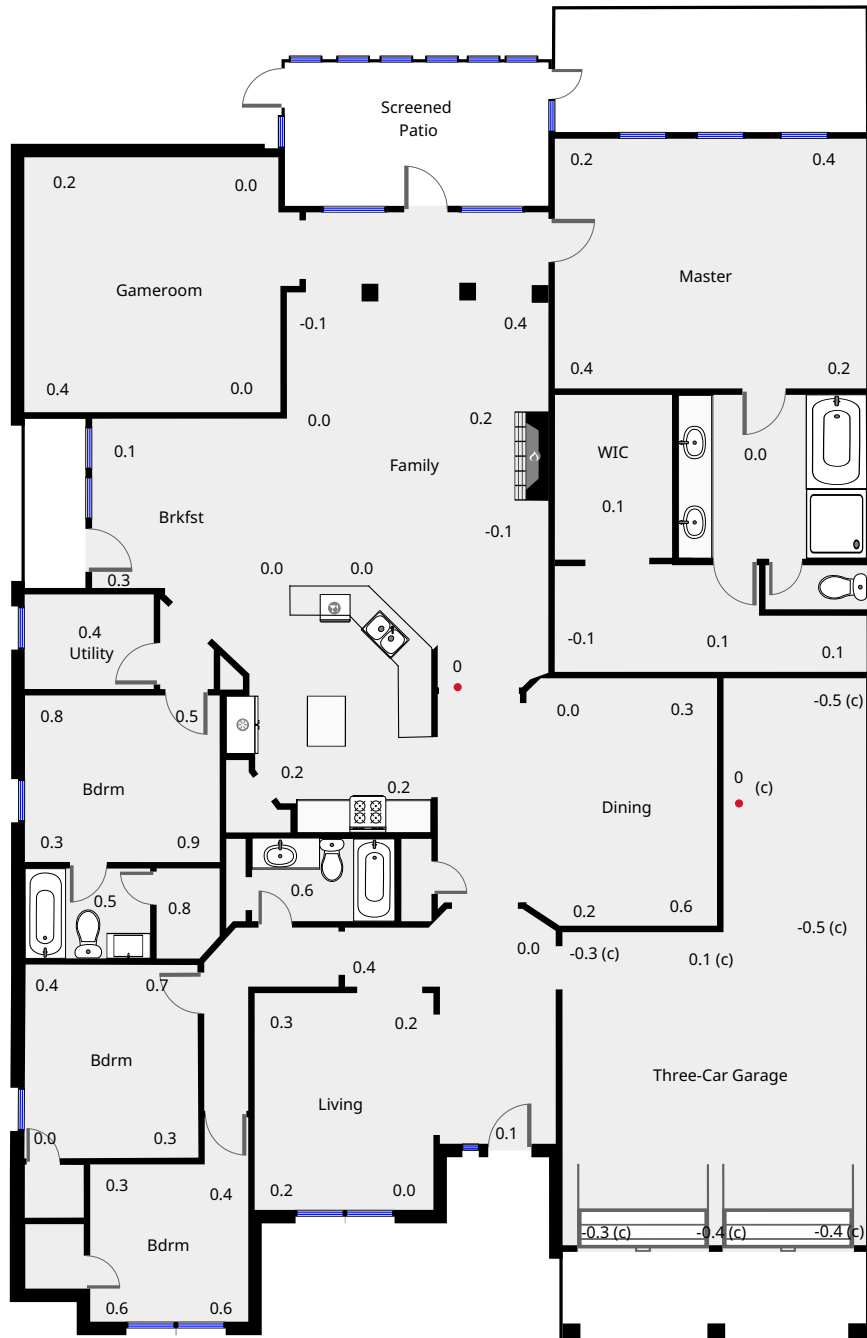
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## 1st Floor Elevations



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**Location:**  
28411 Peper Hollow Ln.  
Spring, TX 77386

**Photo Taken by:**  
John Mulvahill, P.E.

**Date:**  
December 2, 2019



**Description:**  
Front view of  
home

**Photo Number**  
**1**



**Description:**  
Left side view of  
home

**Photo Number**  
**2**

**Location:**  
28411 Peper Hollow Ln.  
Spring, TX 77386

**Photo Taken by:**  
John Mulvahill, P.E.

**Date:**  
December 2, 2019



**Description:**  
Rear view of home

**Photo Number**  
**3**



**Description:**  
Right side view of home

**Photo Number**  
**4**

**Location:**  
28411 Peper Hollow Ln.  
Spring, TX 77386

**Photo Taken by:**  
John Mulvahill, P.E.

**Date:**  
December 2, 2019



**Description:**  
Spall of the  
foundation grade  
beam at the front  
left corner

**Photo Number**  
**5**



**Description:**  
Spall of the  
foundation grade  
beam at the left  
rear (typical)

**Photo Number**  
**6**

**Location:**  
28411 Peper Hollow Ln.  
Spring, TX 77386

**Photo Taken by:**  
John Mulvahill, P.E.

**Date:**  
December 2, 2019



**Description:**  
Brick veneer  
expansion joints  
require caulking to  
seal (typical)

**Photo Number**  
**7**



**Description:**  
Drywall joint  
crack noted in the  
vaulted game  
room ceiling  
(typical)

**Photo Number**  
**8**

**Location:**  
28411 Peper Hollow Ln.  
Spring, TX 77386

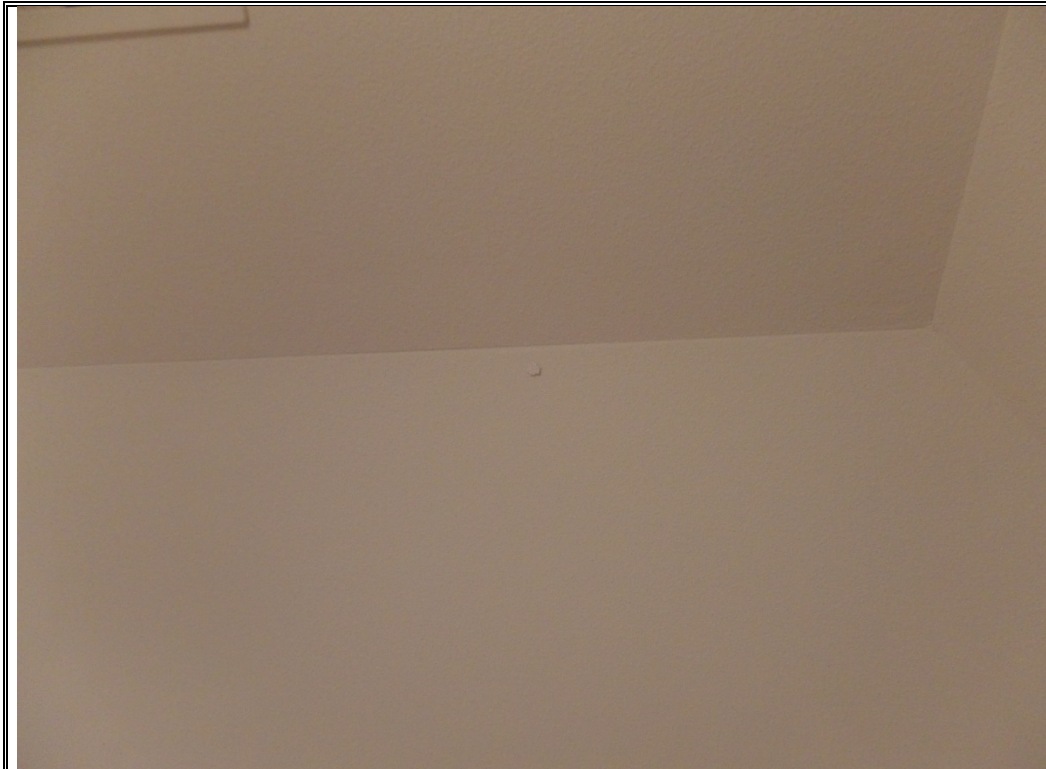
**Photo Taken by:**  
John Mulvahill, P.E.

**Date:**  
December 2, 2019



**Description:**  
Drywall joint  
crack noted in the  
vaulted master  
bedroom ceiling

**Photo Number**  
**9**



**Description:**  
Nail pops in the  
master bedroom  
ceiling (typical)

**Photo Number**  
**10**