



Texas Inspector
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Garland, TX 75044
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<http://www.texasinspector.com>

PHOTO
REDACTED AS
PER TREC
STANDARDS OF
PRACTICE

PROPERTY INSPECTION REPORT

Prepared For: Ms. Client
(Name of Client)

Concerning: 1234 Final Lane
(Address or Other Identification of Inspected Property)

By: Aaron D. Miller, ACI, CEI, CMI, CRI, MTI, RCI
Certified Master Inspector,
ICC Residential Combination Inspector R-5,
ICC Residential Building Inspector B-1,
ICC Residential Electrical Inspector E-1,
ICC Residential Mechanical Inspector M-1,
ICC Residential Plumbing Inspector P-1,
HUD 203K Consultant D0981
PTI Level 1 PT Installer 320054833
TREC Professional Inspector 4336
TDA SPCS 11379/40247 Certified Applicator
TRCC Registered Builder 16229
TRCC Dispute Resolution Inspector 1350
ASHI Certified Inspector 203652

TPREIA Master Inspector
INACHI Certified Professional Inspector
City of Garland, TX Building and Fire Codes
Board

(Name and License Number of Inspector)

(Date)

N/A

(Name, License Number and Signature of Sponsoring Inspector, if required)

This property inspection report may include an inspection agreement (contract), addenda, and other information related to property conditions. If any item or comment is unclear, you should ask the inspector to clarify the findings. It is important that you carefully read ALL of this information.

This inspection is subject to the rules ("Rules") of the Texas Real Estate Commission ("TREC"), which can be found at www.trec.state.tx.us.

The TREC Standards of Practice (Sections 535.227-535.231 of the Rules) are the minimum standards for inspections by TREC-licensed inspectors. An inspection addresses only those components and conditions that are present, visible, and accessible at the time of the inspection. While there may be other parts, components or systems present, only those items specifically noted as being inspected were inspected. The inspector is not required to move furnishings or stored items. The inspection report may address issues that are code-based or may refer to a particular code; however, this is NOT a code compliance inspection and does NOT verify compliance with manufacturer's installation instructions. The inspection does NOT imply insurability or warrantability of the structure or its components. Although some safety issues may be addressed in this report, this inspection is NOT a safety/code inspection, and the inspector is NOT required to identify all potential hazards.

In this report, the inspector will note which systems and components were Inspected (I), Not Inspected (NI), Not Present (NP), and/or Deficient (D). General deficiencies include inoperability, material distress, water penetration, damage, deterioration, missing parts, and unsuitable installation. Comments may be provided by the inspector whether or not an item is deemed deficient. The inspector is not required to prioritize or emphasize the importance of one deficiency over another.

Some items reported as Deficient may be considered life-safety upgrades to the property. For more information, refer to Texas Real Estate Consumer Notice Concerning Recognized Hazards, form OP-I.

This property inspection is not an exhaustive inspection of the structure, systems, or components. The inspection may not reveal all deficiencies. A real estate inspection helps to reduce some of the risk involved in purchasing a home, but it cannot eliminate these risks, nor can the inspection anticipate future events or changes in performance due to changes in use or occupancy. It is recommended that you obtain as much information as is available about this property, including any seller's disclosures, previous inspection reports, engineering reports, building/remodeling permits, and reports performed for or by relocation companies, municipal inspection departments, lenders, insurers, and appraisers. You should also attempt to determine whether repairs, renovation, remodeling, additions, or other such activities have taken place at this property. It is not the inspector's responsibility to confirm that information obtained from these sources is complete or accurate or that this inspection is consistent with the opinions expressed in previous or future reports.

Items identified in the report do not obligate any party to make repairs or take other action, nor is the purchaser required to request that the seller take any action. When a deficiency is reported, it is the client's responsibility to obtain further evaluations and/or cost estimates from qualified service professionals. Any such follow-up should take place prior to the expiration of any time limitations such as option periods. Evaluations by qualified tradesmen may lead to the discovery of additional deficiencies which may involve additional repair costs. Failure to address deficiencies or comments noted in this report may lead to further damage of the structure or systems and add to the original repair costs. The inspector is not required to provide follow-up services to verify that proper repairs have been made.

Property conditions change with time and use. For example, mechanical devices can fail at any time, plumbing gaskets and seals may crack if the appliance or plumbing fixture is not used often, roof leaks can occur at any time regardless of the apparent condition of the roof, and the performance of the structure and the systems may change due to changes in use or occupancy, effects of weather, etc. These changes or repairs made to the structure after the inspection may render information contained herein obsolete or invalid. This report is provided for the specific benefit of

the client named above and is based on observations at the time of the inspection. If you did not hire the inspector yourself, reliance on this report may provide incomplete or outdated information. Repairs, professional opinions or additional inspection reports may affect the meaning of the information in this report. It is recommended that you hire a licensed inspector to perform an inspection to meet your specific needs and to provide you with current information concerning this property.

ADDITIONAL INFORMATION PROVIDED BY INSPECTOR

"Under current law, TREC's (the Texas Real Estate Commission's) jurisdiction extends to any inspection of real property performed in anticipation of a purchase or sale of real estate. This includes any inspection in connection with the anticipated purchase of real estate from a builder, including phase inspections (but not the inspection of a structure being constructed on land already owned by the homeowner-to-be). Likewise, any inspection performed for an owner in anticipation of selling falls under TREC's jurisdiction, regardless of whether there is a specific buyer in mind at the time of the inspection." – Devon Bijansky, Deputy General Counsel, Texas Real Estate Commission.

Additional attachments provided by Aaron's Home Inspections that make this inspection report complete are listed but not limited to the following: Property Inspection Agreement, Embedded Links to Additional Information of Systems, Addenda Attached but not Paginated, et al.

The digital pictures in this report are a random sampling of the conditions or damages in a representative number of areas chosen and should not be considered to show all of the conditions, damages or deficiencies observed. There will be some conditions, damages or deficiencies not represented with digital imaging.

The use of "special tools" is at the discretion of the inspector in order to form opinions as he sees fit in certain instances.

Any suggestions, and recommendations we may provide within our report regarding hazardous and or unsatisfactory condition should immediately be brought to the attention of a qualified licensed contractor or specialist to provide you with a full in-depth evaluation to determine if additional areas of concern exist within the building's components, or systems, and furnish a written cost estimate for corrective work or replacement that may be suggested within our report. It is strongly recommended that a competent, bonded, and insured State- or City-Licensed Contractor perform all corrective work.

You are strongly urged to obtain a C.L.U.E. report on this home in an attempt to discover what, if any, insurance damage claims have been filed on this property, prior to closing escrow on this property. See:
<https://personalreports.lexisnexis.com/>

You are strongly urged to ascertain if any hail damages may have been incurred by this property in the past by referring to:

<http://weathersource.com/zip-code-historical-weather>
<http://www.nws.noaa.gov/climate/>

You are strongly urged to locate, acquire, read and thoroughly understand all documentation pertinent to the construction, remodeling, maintenance and repair of this property including, but not limited to: design drawings, engineering documents, geo-technical testing documents, building inspection permits, surveys, appraisals, maintenance schedules, mechanical appliance and systems owner's manuals, history of wood-destroying insect activity and treatment reports, et al., prior to the end of any time periods associated with the sale or purchase of this property.

You are strongly urged to verify that all of the items indicated as in need of repair in this report have been properly repaired prior to the end of any time periods associated with the sale or purchase of this property. Additionally, you are strongly urged to have the current owner of the property complete a new and updated Seller's Disclosure of Property Condition form: <http://www.trec.state.tx.us/pdf/contracts/OP-H.pdf>, immediately once the property has been vacated.

The Texas residential real estate resale contract states that the home is being purchased in as-is condition. While it is true that many, if not all, home buyers may negotiate sales prices based upon the condition of the home, ascertaining repair and remodeling costs of the properties inspected lies outside the scope of a general home inspection. In order to

obtain the most accurate and realistic repair costs you are strongly urged to consult with a licensed tradesperson or general contractor in the area in which the home is located. Other possible sources for repair costs can be found using publications such as the current version of RSMeans Contractor's Pricing Guide: Residential Repair & Remodeling. Alternately, you can find a wealth of information regarding repair and remodeling costs at websites like <http://www.homewyse.com/>.

Visual inspections are considered the start of a due diligence process by the buyer and not the final or end of due diligence. Prior to closing escrow, you are strongly urged to require the seller of this property to update the seller's disclosure form once the property has been completely vacated to reflect any issues that may have occurred since the date of this inspection or that were obscured by furnishings, stored items, etc.

IMPORTANT INFORMATION REGARDING THE FOLLOWING SYSTEMS AND MATERIALS CONDITION DESIGNATIONS REQUIRED BY THE TEXAS REAL ESTATE COMMISSION

The definition of Deficient provided by the TREC is as follows: "Deficient - Reported as having one or more deficiencies." Additionally, "Deficiency" is: A condition that, in the inspectors reasonable opinion, adversely and materially affects the performance of a system or component or constitutes a hazard to life, limb, or property as specified by these standards of practice. General deficiencies include but are not limited to inoperability, material distress, water penetration, damage, deterioration, missing parts, and unsuitable installation."

Therefore, the definition of "deficiency" by the TREC is a statutory definition (as published in the Texas Register) and any other definition of "deficient" or "deficiency" would be moot to the inspector in regard to semantics. The previous "In Need of Repair" designation of parts, components and systems historically used up to Feb. 1, 2009, has been replaced by "Deficient" (or "Deficiencies") through statutory change BUT DO NOT EXCLUDE OR DIRECT ANY INTERPRETATION, INTENT OR ACTION OF ANY BUYER EXPECTATIONS OR BUYER DUE DILIGENCE.

According to the TREC, the term "deficiency" better describes the broad category of issues in which repair, replacement, or an upgrade is recommended. The "D" ("Deficiency") box on the inspection report should be used just like the ("R") ("Not Functioning or In Need of Repair") box that has been used in the past. It is not the intent of this inspector to interpret or define the terms "deficient" or "deficiency" outside the statutory definition and requirement. If you have a question you are strongly urged to consult with a real estate attorney regarding the definition(s) of "deficient" and "deficiency" as soon as possible during your option period. The responsibility to make a decision as to further analysis, repair, replace or update any item, material or system based upon the Inspector's reasonable opinion or designation of "Deficient" is solely yours. According to the TREC, "the ultimate decision what to do with the reported information, such as making recommended repairs or to simply "live with" a reported deficiency, is a decision to be made by the person for whom the report is prepared". The principle of "caveat emptor" (let the buyer beware) should not be circumvented. (The idea that buyers take responsibility for the condition of the items they purchase and should examine them before purchase. This is especially true for items that are not covered under a strict warranty. See, e.g., SEC v. Zandford, 535 U.S. 813 (2002)). Therefore, visual inspections following the state inspection standards are considered the beginning of a due diligence process by the client and not considered the final or end of due diligence. Sole reliance on this limited visual inspection to purchase property is neither recommended nor prudent. A comprehensive inspection with qualified specialists is available and explained in the first contact.

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I	NI	NP	D	Inspection Item
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I. STRUCTURAL SYSTEMS

A. Foundations

Type of Foundation(s): Unbonded Prestressed Post-Tensioned Monolithic Slab On Grade
Comments:

Note: Specific Limitations. There is no single formal universally accepted standard for residential building foundation performance. Even if there were, an opinion of the performance of any foundation would necessarily require several pieces of information that are typically not available to the inspector, e.g. a new construction elevation baseline survey on the date that the foundation construction was originally substantially completed, et al. Simply put: an opinion on the performance of a foundation cannot feasibly be based upon a one-time visual inspection of the structure. One cannot extrapolate long-term trends from a short-term sample of facts. This is a report of first impression of what was visible and recognized by the inspector on the date and time of this inspection. The foundation performance opinion stated below neither in any way addresses future foundation movement or settlement, nor does it certify floors to be level. Should you have present or future concerns regarding the foundation's condition, you are strongly advised to consult with a licensed Professional Structural Engineer for further evaluation.

Though the TREC requires inspectors to identify the exact type of foundation of the building being inspected, this is often not practically feasible, e.g. in the case of parged post-tensioned slabs-on-ground, post-tensioned structurally supported slabs, and proprietary engineered systems such as suspended foundations, et al. The type of foundation reported will be reported based solely on the visual cues available and the inspector's experience in the field. No warranty is expressed or implied regarding the accuracy of this assessment.

For additional information on foundations go to:

<http://www.texasinspector.com/Foundation Book for Buyers.pdf>
<http://www.texasinspector.com/Foundation%20Design%20Guidelines%20TXASCE.pdf>
<http://www.texasinspector.com/Foundation%20Repair%20Guidelines%20TXASCE.pdf>
<http://www.texasinspector.com/Foundations in Expansive Clay Soils.pdf>
<http://pdf.plano.gov/dhs/hazmit/hazmit12.pdf>
http://www.aaronsinspections.com/documents/Soil_Issues.pdf
http://www.texasinspector.com/Living_with_Expansive_Soils.pdf

Method of Inspection: The Inspector performed a visual inspection of interior and exterior walls and visible grade beams. There are many limits inherent in this visual inspection as the Inspector does not move private property, furniture or lift carpeting and padding to look for cracks, and does not use any specialized measuring devices (e.g. elevation surveying equipment) to establish relative elevations. These practices are beyond the bounds of the standards of practice. The condition of concealed or covered floors is specifically excluded from the inspection standards and report.

In the presence or absence of any visible defects, the Inspector may not recommend that you consult with a structural engineer or a foundation contractor, but this should not deter you from seeking the opinion of any such expert prior to continuance under your personal responsibility of due diligence. This is a report of first impression of what was visible and accessible by the inspector on the date and time of this inspection. The foundation performance opinion stated below neither in any way addresses future foundation movement or settlement, nor does it certify floors to be level. Should you have present or future concerns regarding the foundation's condition, you are strongly advised to consult with a licensed Professional Structural Engineer for further evaluation.

Type of Inspection: Visual Inspection of the Accessible Exterior

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I	NI	NP	D
Inspection Item			

Grounds for Departure: N/A

The foundation appears to be in satisfactory condition, in my opinion.

FOUNDATION

In my opinion, the foundation appears to be in satisfactory condition based on a limited visible observation today. No apparently significant structural problems were observed. Typical flaws were observed as discussed below.

Typical restraint-to-shrinkage (RTS) cracks were noted in the slab foundation. All concrete exhibits cracking. It is a characteristic of the material that it cracks. This is typically not a structural defect.

Shrinkage is a primary cause of cracking. As concrete hardens and dries it shrinks. This is due to the loss, through evaporation, of excess mixing water. Thus, in most cases, the wetter or souppier the concrete mix, the greater the shrinkage will be. Concrete slabs can shrink as much as 1/2 inch per 100 feet. This shrinkage causes forces in the concrete which literally pull the slab apart. Cracks are the end result of these forces.

Concrete does not require much water to achieve maximum strength. In fact, a wide majority of concrete used in residential work, in many cases, has too much water. This water is added to make the concrete easier to install. It is a labor saving device. This excess water can not only promote cracking, it can severely weaken the concrete.

SPECIFIC LIMITATIONS: The condition of the edge of the slab foundation could not be ascertained in areas where the adjacent decks, patios, porches, sidewalks, soil level, stored items, slab edge parging or vegetation obscured it.

NOTE: Be aware that home inspectors in Texas are presently required by the Texas Real Estate Commission to render an opinion on the performance of foundations. This requirement is both incredibly unreasonable and impossible to meet. The performance of any foundation requires a beginning point of reference with which to compare the current state of the foundation. In the absence of a complete foundation elevation survey at the time of the foundation's construction, an opinion on the performance of a foundation is specious at best.
**WE DO NOT RECOMMEND THAT YOU RELY SOLELY UPON THE OPINION STATED
HEREIN REGARDING FOUNDATION PERFORMANCE.**

FOUNDATION DESIGN INFORMATION

The Texas Engineering Practice Act requires all Texas homes built on expansive soil to have engineered slabs. The ability of the foundation to withstand the forces of expansive soils where expansive soils are present can neither be determined nor opined by a limited visual inspection. That determination is an act and process of engineering which is beyond the scope of this inspection and the state inspection standards of practice. If you have a question, concern or suspected failure contact the certifying designer/engineer of record.

No signs of pre-treatment for subterranean termites were observed. IRC 320 requires that all residential building sites in the Dallas/Fort Worth area be pretreated for subterranean termites. The Texas Department of Agriculture's Structural Pest Control Service requires that this pretreatment be made by a licensed professional certified pesticide applicator and that the applicator must complete a Subterranean Termite Preconstruction Disclosure Form for each site in question.

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If the builder has opted for soil treatment, insure that you receive a copy of this form with a diagram of the site treated and a complete disclosure of the type and amount of termiticide used. Your builder may opt for spraying the framing with a borate solution. Similar documentation will be required for this treatment which should be obtained from the builder at the pre-drywall phase of construction.

DOCUMENTATION FOR NEW HOME

You are strongly urged to obtain a copy of all required documentation regarding the construction of this new home from your builder and/or the municipality prior to the end of any time periods associated with the purchase of this home. These documents include, but are not limited to:

- 1) Geotechnical engineering reports and associated laboratory testing results to include, but not limited to, soil testing (e.g. standard penetration test reports, boring logs, et al.) and fill soil designations.
- 2) Design firm engineering documents to include engineering drawings, engineer's notes, inspection reports, et al.
- 3) Post-tensioning materials documents, e.g. shipping invoices, et al.
- 4) Post-tensioning jack calibration forms for the equipment used on this site.
- 5) Post-tensioning tendon stressing logs.
- 6) Concrete plant, shipment and placement records.
- 7) Concrete slump test records.
- 8) Concrete core sample testing records.
- 9) Engineering drawings and approval letters for all retaining walls.
- 10) Framing and MEP drawings.
- 11) Manuals for all mechanical equipment.
- 12) Manuals for all appliances.
- 13) Installation instructions for all proprietary building materials used.
- 14) Initial foundation elevation survey, if available. If not, you are urged to have a licensed professional structural engineer perform said elevation survey.
- 15) Proof of termite treatment on Texas Department of Agriculture-promulgated form.
- 16) HERS rater documentation.
- 17) All permits and inspection tags/reports from the municipality.
- 18) All reports from special inspectors.
- 19) Surveyor's documentation to include flood plain information.
- 20) Plumbing static pressure test results for the supply and DWV piping.

If your builder opts not to supply you with some or any of the above documents request them from the municipality. If the municipality declines to supply you with the documents request them again under the Texas Freedom of Information Act. See <http://www.foift.org/pialetter.html> for a sample request letter. If necessary, hire an attorney to assist you in obtaining these essential documents.

B. Grading & Drainage Comments:

GRADING

The grading on the north and south sides of the foundation must be improved to promote the flow of storm water away from the house.

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I	NI	NP	D
Inspection Item			

Grading specifications are spelled out clearly in International Residential Code (IRC) R401.3, "Surface drainage shall be diverted to a storm sewer or other approved point of collection so as to not create a hazard. Lots shall be graded so as to drain surface water away from foundation walls. The grade away from foundation walls shall fall a minimum of 6 inches (152 mm) within the first 10 feet (3048)". **FAILURE TO MAKE THESE IMPROVEMENTS VOIDS YOUR FOUNDATION WARRANTY!** If your builder denies this, send me a copy of your warranty and I will illustrate to you where it says so.



Grading not code compliant.



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I	NI	NP	D	Inspection Item
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Grading not
code
compliant.



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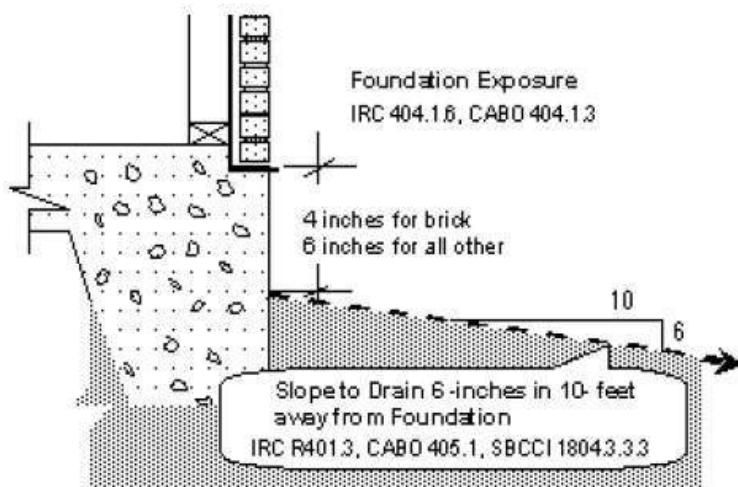
I	NI	NP	D	Inspection Item
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R 401.3 is not the only place in the code requiring this drainage provision. R506.1, and R 403.1.8 instruct builders slab-on-grade residential buildings on expansive clay soils to adhere to an even stricter commercial building code, that of the International Building Code 1805.8.2, "Slab-on-ground foundations. Slab-on-ground, mat or raft foundations on expansive soils shall be designed and constructed in accordance with WRI/CRSI Design of Slab-on-Ground Foundations or PTI Design and Construction of Post-Tensioned Slabs-On-Ground." PTI Design is the Post-Tensioning Institute of which this inspector is both a member and a Level 1 Certificate holder. The home you are buying is built on an unbonded post-tensioned slab-on-grade foundation and must adhere to these specifications. The Post-Tensioning Institute's

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Construction and Maintenance Procedures Manual for Post-Tensioned Slab-On-Grade Construction, echoes this requirement.



Additionally, the engineer responsible for the foundation design specifies in the shop drawings and general notes therein what the grading should be in relation to this particular foundation. Industry standards again underscore the need for these improvements:

Yards shall have grades and swales that provide for proper drainage away from the home in accordance with the Code or other governmental regulations. If the grades or swales fail to meet the industry standards, the builder shall take such action as is necessary to bring the variance within the standard.

NOTE: The municipality's plat drainage requirements can exceed those set forth by the IRC, i.e. require more than a 6" drop in elevation in the first 10' out from the perimeter of the foundation, but cannot be less stringent.

See: <http://www.texasinspector.com/Drainage%20Improvement%20Primer.pdf>

DRAINAGE

The lot is lower than adjacent lots to the south. Grading improvements should be undertaken where possible. The general topography of the area is such that it will be difficult to control storm water entirely. During heavy rains or snow melts, the accumulation of storm water on the lot may be unavoidable.

The swale on the east side of the lot is improperly sloped and will not perform as intended and required. Swales must slope a minimum of $\frac{1}{4}$ " per foot as per IRC 401.3: Swales shall be sloped a minimum of 2 percent when located within 10 feet (3048 mm) of the building foundation. This swale measures 123 feet in length from the southeast corner of the house to the northeast corner. In that distance it drops 11", when it is required to drop 30.75".

See: <http://www.texasinspector.com/Drainage%20Improvement%20Primer.pdf>
<https://www.youtube.com/watch?v=anRdSVc-2X8>

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NI=Not Inspected

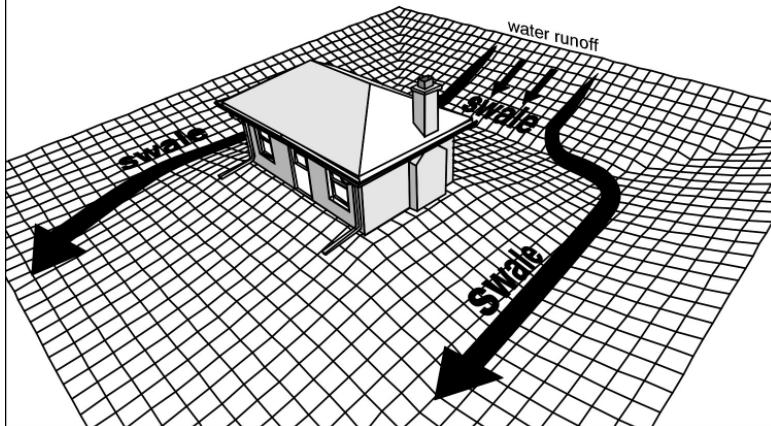
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Swales

when the overall lot drainage is toward the house, swales can be used to direct surface water away from the foundation

**SOIL**

The soil level on both sides of the front porch is too high in relation to the foundation elevation. IRC R404.1.6 requires a minimum of 4" clearance from grade to the bottom row of bricks or stone and 6" minimum clearance from grade to the bottom row of any other exterior cladding.

R404.1.6 Height above finished grade. Concrete and masonry foundation walls shall extend above the finished grade adjacent to the foundation at all points a minimum of 4 inches (102 mm) where masonry veneer is used and a minimum of 6 inches (152 mm) elsewhere. The minimum distance above adjacent grade to which the foundation must be extended provides termite protection and minimizes the chance of decay resulting from moisture migrating to the wood framing. A reduced foundation extension is permitted when masonry veneer is used.

Water is destructive. It can flow through fissures in the soil, rise under hydrostatic pressure or capillary action, and even find a path through solid surfaces, and few structures may be immune to its power. Grading and drainage are probably the most significant aspects of a property, simply because of the direct and indirect damage that moisture can have on structures. More damage has probably resulted from moisture and expansive soils than from most natural disasters, and for this reason we are particularly diligent when we evaluate site conditions. In fact, we compare all sites to an ideal.

In short, the ideal foundation placed on expansive and contractive earth will have soils that slope away from the house [ref: R401.3 and the typical on grade foundation design], and the interior floors will be at least 4-6 inches higher than the exterior grade [ref: R404.1.6]. Also, the residence will have gutters and downspouts that discharge into area drains with catch basins that carry water away to hard surfaces. If a property does not meet this ideal, we will not endorse it, even though there may be no readily visible evidence of moisture intrusion, and recommend that you consult with a qualified grading and drainage contractor or geotechnical engineer.

Additionally, grading and drainage cannot be adequately inspected under a visual inspection unless done so in a hard rain. We have discovered evidence of moisture intrusion inside homes when it was raining that would not have been apparent otherwise. Grading and drainage that does not measure up to this ideal condition is more likely to affect foundation

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performance, exacerbate water ponding and allow moisture intrusion into any hairline cracks that may be present in the foundation. Also, in conjunction with the cellulose materials found in most modern homes, moisture can facilitate the growth of biological organisms that can compromise building materials and produce microorganism like substances that can have an adverse affect on health; and encourage wood-destroying insects.

The sellers or occupants will obviously have a more intimate knowledge and experience of the site than we could possibly hope to have during our one time visit so it is recommended that you review the seller disclosure or ask for disclosure under your personal responsibility of due diligence.

TREC LIMITATIONS: The inspector is not required to inspect flatwork or detention/ retention pond (expect as related to slope and drainage); determine area hydrology or the presence or underground water; or determine the efficiency or operation of underground or surface drainage systems.

C. Roof Covering Materials

Type(s) of Roof Covering: Asphalt Composition Roofing Material – Tab Shingles Over Roof Sheathing

Standing-Seam Roofing Material

Viewed From: Viewed From Ladder At Eave

Grounds for Departure: Upper Roof Edge Inaccessible with 17' Ladder

Comments:

Note: Specific Limitations. The Inspector is not required to and does not physically walk on roof surfaces in excess of a 6/12 slope, roofs inaccessible by a 17 ft. ladder, covered with moisture, moss, debris or frost, loose aggregate, or of any type not intended to be walked upon (e.g. slate, clay tile, concrete tile, aluminum, wood shingles, wood shakes, et al. The Inspector is not required to determine or report the age or life expectancy of any roof coverings. Roofs that cannot be accessed directly by the inspector may have defects that are not visible from the ground or roof's edge. The roof covering opinion stated below in no way addresses the property's insurability. This report neither addresses future roof leaks nor does it certify that the roof is leak-free. It is unreasonable to expect that it can be ascertained if a roof leaks under any weather conditions based upon a limited visual inspection during a one-time site visit. You are strongly advised to consult with a shingle or roof covering manufacturer-certified roofing contractor for further in-depth evaluations during every conceivable weather condition prior to the end of any time periods associated with the sale or purchase of this property.

You are strongly urged to have an adjustor from your homeowner's insurance carrier inspect and verify that this roof meets their current underwriting criteria prior to the end of any time periods associated with the sale or purchase of this property.

GUTTERS/DOWNSPOUTS

The downspouts are recommended to discharge water at least five (5) feet from the house as per the Texas Section of the American Society of Civil Engineers. See:

<http://www.texasinspector.com/Foundation%20Design%20Guidelines%20TXASCE.pdf>

The downspout at the west side of the patio roof should not be indirect contact with the siding as per the siding manufacturer. This requires repair as per IRC 102.4.

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TREC LIMITATIONS: The inspector is not required to determine the remaining life expectancy of the roof covering; inspect the roof from the roof level if, in the inspector's reasonable judgment, the inspector cannot safely reach or stay on the roof, or significant damage to the roof covering materials may result from walking on the roof; determine the number of layers of roof covering material; identify latent hail damage; or provide an exhaustive list of locations of water penetrations or previous repairs.

D. Roof Structure & Attic

Viewed From: Entered Attic and Performed a Visual Inspection of the Accessible Portions of the Attic

Grounds for Departure: N/A

Approximate Average Depth of Insulation: 14 inches

Approximate Average Thickness of Vertical Insulation: Vertical insulation in houses is commonly installed within the covered walls and not visible during a visual inspection.

Comments:

Attic Ventilation Type: Roof Vents Static

Ridge Vents

Soffit Vents

Insulation Types: Blown-In Fiberglass

RIDGE BRACES

The ridge and hip, and/or valley rafters being supported by "palm braces" are not in compliance with IRC 801.2 Requirements. Roof and ceiling construction shall be capable of accommodating all loads imposed according to Section R301 and of transmitting the resulting loads to the supporting structural elements.



Engineer approval letter required for palm braces.



Additionally, this installation is not in compliance with IRC R802.3 Framing details. Rafters shall be framed to ridge board or to each other with a gusset plate as a tie. Ridge board shall

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I	NI	NP	D
Inspection Item			

be at least 1-inch (25 mm) nominal thickness and not less in depth than the cut end of the rafter. At all valleys and hips there shall be a valley or hip rafter not less than 2-inch (51 mm) nominal thickness and not less in depth than the cut end of the rafter. Hip and valley rafters shall be supported at the ridge by a brace to a bearing partition or be designed to carry and distribute the specific load at that point. Where the roof pitch is less than three units vertical in 12 units horizontal (25-percent slope), structural members that support rafters and ceiling joists, such as ridge beams, hips and valleys, shall be designed as beams.

“Palm bracing” is an unapproved framing shortcut used by production builder framing subcontractors that is not referenced or defined in the International Residential Code or any of its Referenced Standards (R102.4 Referenced codes and standards. The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.), such as the 2012 Wood Frame Construction Manual (WFCM) for One- and Two-Family Dwellings, developed by the American Wood Council’s (AWC) Wood Design Standards Committee. In short, this amounts to totally improvised framing by improperly-trained and poorly managed tradesmen.

Palm brace use is also not of an engineered design (R301.1.3 Engineered design. When a building of otherwise conventional construction contains structural elements exceeding the limits of Section R301 or otherwise not conforming to this code, these elements shall be designed in accordance with accepted engineering practice). This installation cannot be expected to perform its intended function. If the builder and/or owner cannot produce an approval letter, containing the **design firm engineer's** signature and stamp, from the design firm's engineer this must be reconstructed as per standards approved by the International Code Council.

ATTIC INSULATION / VENTILATION

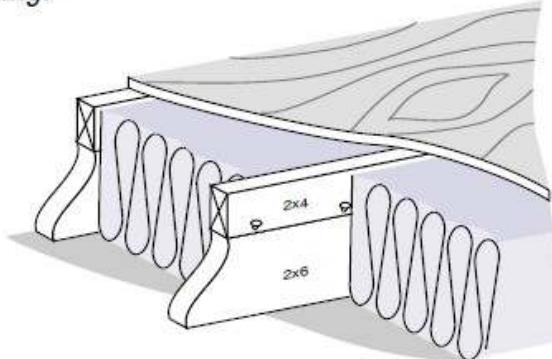
An energy code compliance certificate was not observed at this property as required by IRC N1101.9 and IECC 401.3: Certificate. A permanent certificate shall be posted on or in the electrical distribution panel. The certificate shall be completed by the builder or registered design professional. The certificate shall list the predominant R-values of insulation installed in or on ceiling/roof, walls, foundation (slab, basement wall, crawl space wall and/or floor) and ducts outside conditioned spaces; U-factors for fenestration; and the solar heat gain coefficient (SHGC) of fenestration. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the type and efficiency of heating, cooling and service water heating equipment.

The attic is insulated with approximately 14" of blown-in fiberglass insulation material. This material cannot be installed under the existing attic service floor. The insulation batts that have been installed beneath this floor do not have the same R-value as the blown-in insulation, thus reducing the overall R-value of the attic. This must be improved as per IECC 1102.2.3

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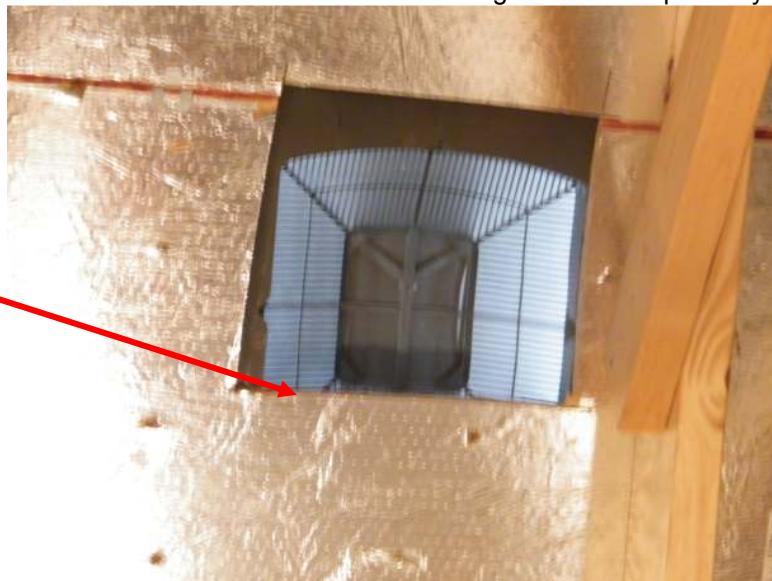
INCREASE ATTIC INSULATION LEVELS UNDER DECKING

For many products, an insulation depth of 10 to 14 inches is needed to achieve an R-30 to R-38 insulation value. Thus, a 2x4 or 2x6 extension needs to be added to a 2x6 joist to provide sufficient depth before installing decking.



The roof decking has not been cut out to completely accommodate the sizing of the roof vents installed. This obstructs the flow of air through the attic required by IRC R806.2.

Roof deck cut out undersized.



The attic stairs in the 2nd floor hallway must be insulated and gasketed as per N1102.2.3 Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment which prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is

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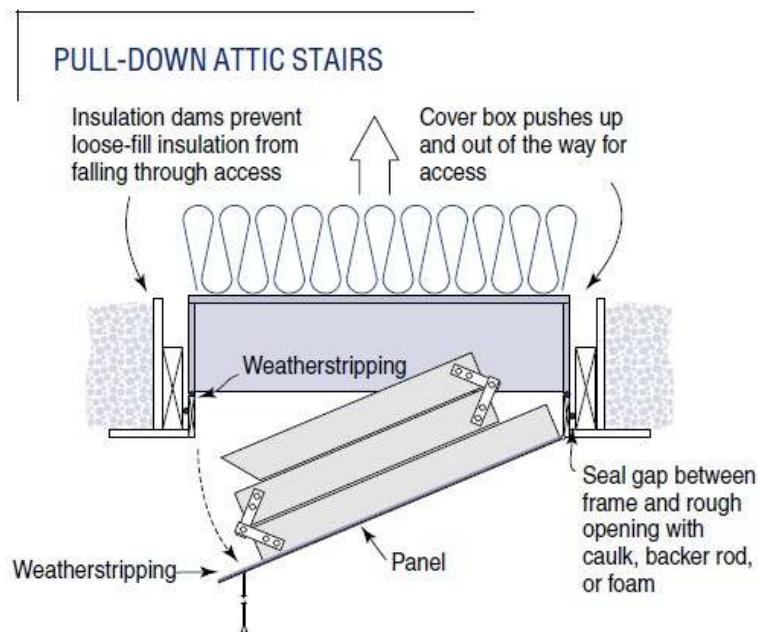
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D=Deficiency

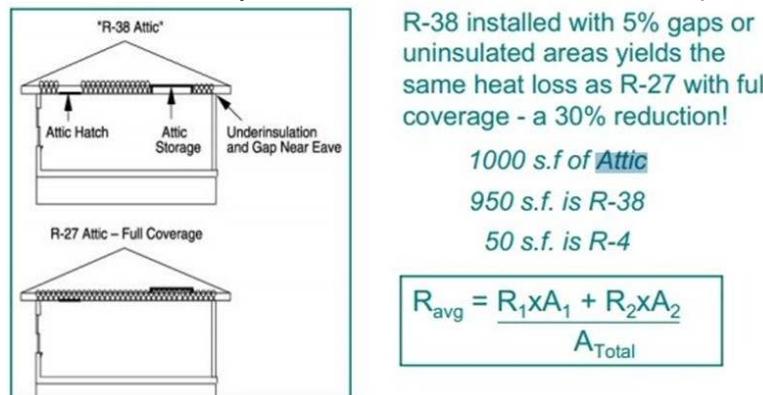
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Inspection Item

opened and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.



Recent research by the U.S. Department of Energy shows that the lack of insulation in these places effectively decreases the R-value of the entire attic by as much as 30%. So this attic R-value is now effectively R-26, which is below the standard required by the 2009 IECC.



See: <http://www.energyvanguard.com/blog-building-science-HERS-BPI/bid/34932/Attic-Stairs-A-Mind-Blowing-Hole-in-Your-Building-Envelope>

The placement of ridge vents and static roof vents near the ridge defeats the purpose of having soffit vents and drastically decreases the ventilation in the attic. The reason is simple. The attic is ventilated by means of a convection current where cooler air enters through the soffit vents and exhausts through the upper vents. The upper vents will draw air from the closest source. In this case the ridge vents will draw air from the upper static vents and not from the lower soffit vents. Additionally, if there is more net-free opening in the combined static vents than in the combined ridge vents air can actually be drawn into the ridge vents. During a rain storm this will cause leaks.

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Ridge vents
should not be
placed adjacent
to static roof
vents.



The optimal situation is where the temperature in the attic is not more than 10° higher than that of the ambient exterior air. In this attic the temperature is > 20° higher. This is further proof that the attic is improperly vented.

You are strongly urged to have either the ridge or upper static roof vents removed whichever has the smaller net-free opening area. In this case the ridge vents should be removed.

SPECIFIC LIMITATIONS: Some portions of the attic were inaccessible. These areas were not inspected. All systems and materials located in these inaccessible areas are excluded from this report.

TREC LIMITATIONS: The inspector is not required to:

- (1) Operate powered ventilators.
- (2) Provide an exhaustive list of locations of water penetrations.

E. Walls (Interior & Exterior) Comments:

Note: Specific Limitations. The Inspector is not required to determine the condition of interior wall coverings except as they pertain to structural performance or moisture penetration; identify obvious damaged wall coverings or determine the conditions of paints, stains or other surface coatings whether interior or exterior; determine the condition of built-in cabinets or shelves; inspect for the presence of safety glass where the glazing is not clearly labeled as such; or determine the presence, extent or type of vapor barriers or insulation in any walls. Furnishings, personal items and stored items are not moved by the Inspector during the inspection. If areas are inaccessible or obstructed you are strongly urged to have the house professionally re-inspected once the furnishings and/or stored items have been removed and prior to closing escrow.

Exterior Wall Claddings: Brick Veneer

Stone Veneer

I=Inspected	NI=Not Inspected	NP=Not Present	D=Deficiency
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Portland Cement Stucco

Fiber-cement Siding

Wood Trim

Interior Wall Claddings: Drywall

EXTERIOR WALLS

The lintel at the east side of the east garage door does not bear sufficiently on the brick veneer. All lintels over openings in the brick veneer are required by IRC R703.7.3 to have a minimum of four inches 4" bearing on either side of the openings.



Insufficient
lintel
bearing.

All utility penetrations of the exterior walls require sealing with a high quality low modulus sealant.



Sealant
required.

All failed caulking or voids in caulking at window and doorframes, siding and trim, and junctions of dissimilar materials (penetrations, transitions, and terminations) must be improved in order to prevent moisture penetration. This is not a suggestion, but rather a requirement of

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Inspection Item			

the building code adopted by the municipality. It is also not a minor issue, but rather one that is of utmost importance. The major function of a building is to isolate its inhabitants from the elements. This means that it must be sealed so as to prevent moisture (which causes mold and rot) and vermin (rats, mice, insects, spiders, snakes, et al.) intrusion. This is the purpose of caulking or sealing all joints and penetrations.

The exact locations of the missing or failed sealants are not stated in this report due to the logistical infeasibility of accurately describing them. It is the builder's or owner's responsibility to ensure that the exterior is properly sealed and his responsibility to locate each and every location where sealants are not code compliant, not the inspector's.

Joints, penetrations, and all other such openings in the building envelope must be sealed, caulked, gasketed, weatherstripped or covered with moisture vapor-impermeable house-wrap in order to create the water-resistant barrier required by IRC R703.1 General. Exterior walls shall provide the building with a weather-resistant exterior wall envelope. The exterior wall envelope shall include flashing as described in Section R703.8. The exterior wall envelope shall be designed and constructed in a manner that prevents the accumulation of water within the wall assembly by providing a water-resistant barrier behind the exterior veneer as required by Section R703.2. and a means of draining water that enters the assembly to the exterior. Protection against condensation in the exterior wall assembly shall be provided in accordance with Chapter 11 of this code.

In poorly designed barrier and drainage systems, sealant joints are relied upon as the primary means to resist water infiltration. Any breach of the sealant joints can trigger leakage to the interior at interruptions in the wall assembly. In most cases, the field of the wall will probably perform very well, but the interruptions in the wall assembly are where water-leakage trouble is usually found.

Penetrations. Besides an entrance/exit, most buildings have additional doors, windows, etc. that create holes or openings in the exterior cladding system. Infiltration through the joint between the wall opening and the element that is set inside it will occur if not properly detailed. As water flows over the outside surface of the wall, there needs to be a means for letting this water continue to flow down when it comes to the top or side of a penetration through the wall.

For barrier systems, this is usually the only consideration. For drainage systems, water flowing down and coming in contact with the penetrating element must be considered. Additionally, any water that has entered into the drainage cavity must be able to flow past or around penetrations without migrating through the weather-resistive barrier and flashings. The interface of the penetrating element through the entire depth of the wall has to be protected to keep water from infiltrating further into the wall assembly.

Transitions. Transitions are an interruption in the exterior wall system or a horizontal change in the wall (like an intersecting parapet wall with a taller wall, a ledge, or a soffit). They also include intersecting building elements. These conditions must also be addressed in the design and construction of the exterior wall system to keep water flowing down the wall and draining out of the system.

Terminations. Terminations are the locations where the system ends at the top, bottom, or side. Water should not be allowed to enter an assembly at its top or sides. If it is a drainage system, it should be allowed to drain at its base. If two or more types of wall systems adjoin, control of water infiltration and/or drainage must be integrated or handled independently.

I=Inspected	NI=Not Inspected	NP=Not Present	D=Deficiency
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Inspection Item			

Additionally, this is an energy code requirement: IECC 402.4. Air leakage – The building thermal envelope shall be durably sealed to limit air infiltration. The sealing methods between dissimilar materials shall include installation of air barriers, flashed, caulked, gasketed, or weather-stripped.

Sealing the building properly reduces air movement into and out of the building. Uncontrolled air movement negatively impacts the heating and cooling systems, resulting in higher initial and on-going maintenance costs.

SIDING/TRIM

Kick-out flashing is required above the west side of the patio and in every location where the roof eave terminates in the field of a knee wall. This requires repair as per both the siding manufacturer and IRC R703.8:

R703.8 Flashing.

Approved corrosion-resistive flashing shall be provided in the exterior wall envelope in such a manner as to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. The flashing shall extend to the surface of the exterior wall finish and shall be installed to prevent water from reentering the exterior wall envelope.

Approved corrosion-resistant flashings shall be installed at all of the following locations:

6. At wall and roof intersections.



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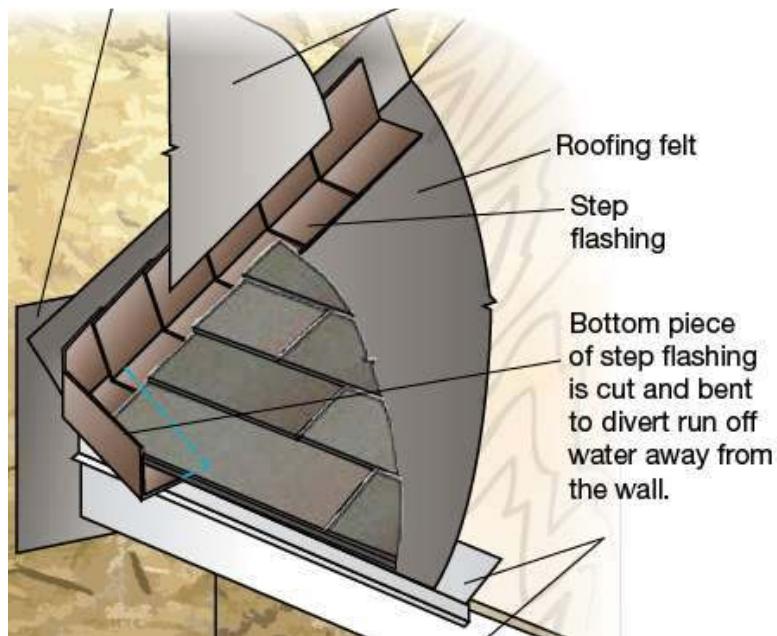
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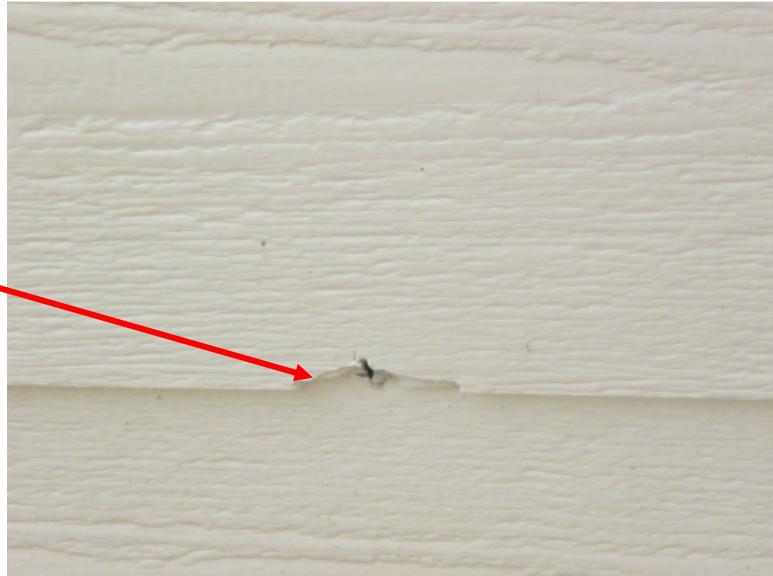
Openings in the eave returns (areas where the soffit meets an adjoining roof surface) shall not be large enough to allow entry by pests as per industry standards. Eave returns, truss blocks, attic vents and roof vent openings shall not allow rodents, birds, and other similar pests into home or attic space. If an eave return, truss block, attic vent or roof vent opening that allows rodents, birds, and other similar pests into home or attic space, the builder shall take such action as is necessary to bring the variance within the standard state in this section. The industry standard is 5-6-1 of the NAHB Residential Construction Performance Guidelines, upon which most builder warranties are based.



Vermin
entry point
not allowed.

The siding is damaged to the west of the patio and in need of replacement.

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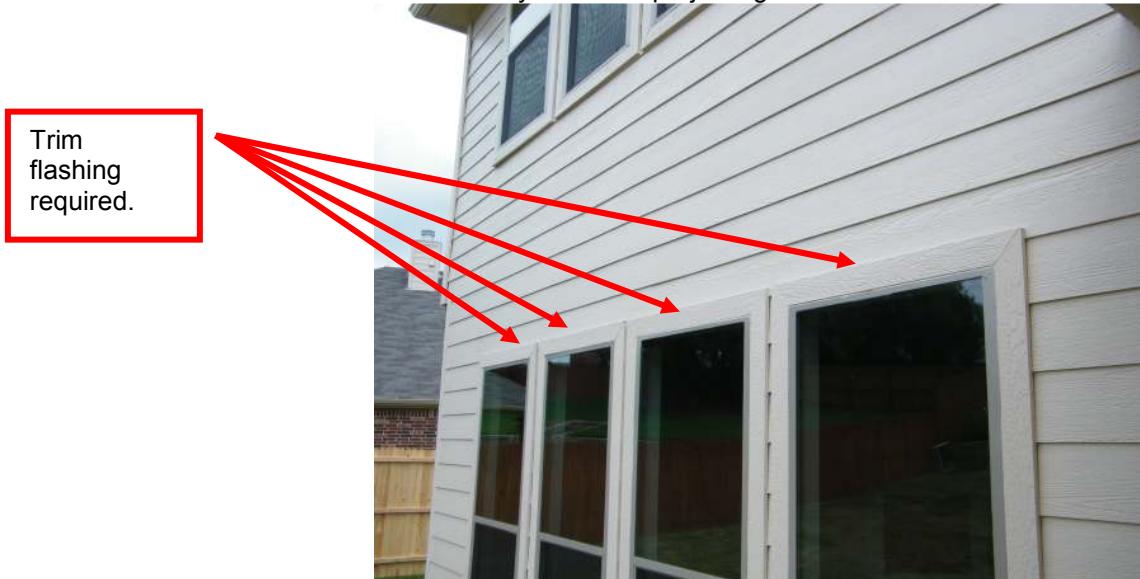


The soffit to the immediate east of the front porch is damaged and requires replacement.

Flashing is required atop all window and door trim.

IRC R703.8 Flashing. Approved corrosion-resistant flashing shall be provided in the exterior wall envelope in such a manner as to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. The flashing shall extend to the surface of the exterior wall finish and shall be installed to prevent water from reentering the exterior wall envelope. Approved corrosion resistant flashings shall be installed at all of the following locations:

4. Continuously above all projecting wood trim.



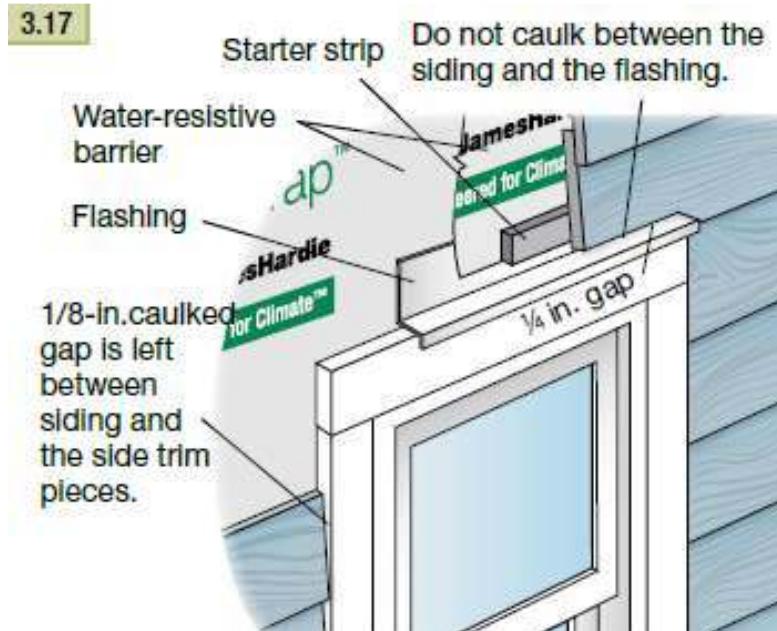
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BRICKS

Blocked weep holes (openings in the mortar joints, typically found at foundation level) in the brick veneer wall structure must be cleared at the front porch and other locations where they are either closed or only partially opened as per International Residential, sections R703.7.5 and R703.7.6 and numerous other industry standards. The minimum size of weep hole that must be provided is a 3/16" round hole.



Weep holes and flashing material are required above and below all windows and above all doors with lintel-supported brick or stone veneer. International Residential Code sections R703.7.5 and R703.7.6 requires this detail not only on the first course of masonry above finish grade, but also at the tops and bottoms of windows and doors and above knee wall flashings where the brick is supported by a roof structure.

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D=Deficiency

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Inspection Item



Weep holes
required @
33" o.c.



I=Inspected	NI=Not Inspected	NP=Not Present	D=Deficiency
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Inspection Item			



Weep Holes and a Clear Air Space

Wind striking a masonry wall causes a positive pressure on the wetted stone surface. If one can equalize the pressure on either side of the masonry veneer, the force is substantially reduced, hence there is a reduction in the amount of water entering into the wall system. This “pressure equalization” is accomplished by using a combination of weep holes and having a clear air space directly behind the unit masonry. This cavity needs to act as a chamber; therefore it must incorporate some form of air barrier and also be compartmentalized to obtain optimum pressure equalization. The air barrier can range from simply being the interior backup wall surface (though this can still be quite air permeable) to something achieving better performance using independent membranes adhered to the backup wall.

The air space must be unobstructed. Effort must be made to keep the space clear of mortar when the unit masonry is being laid. A mortar-filled space allows direct routes for water to enter into the backup wall and into the interior of the building, as well as impeding water flow out of the weep holes.

The weep holes also provide a means of drainage for any water that does get past the unit masonry veneer. These are located at the veneer supports, such as at shelf angles or at foundation walls.

STUCCO

No header flashings are installed above the window openings in the stucco cladding as required by IRC 703.8, ASTM E-2112, and the Portland Cement Association's Plaster/Stucco Manual.

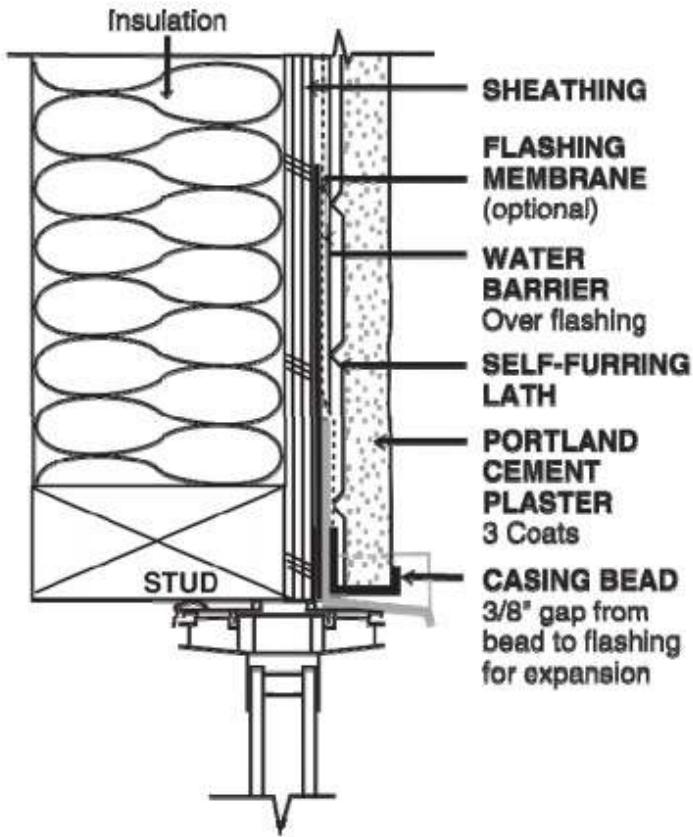
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TREC LIMITATIONS: The inspector is not required to do the following:

- (1) determine the condition of wall coverings unless such conditions affect structural performance or indicate water penetration;
- (2) report obvious damage to wall coverings;
- (3) determine the condition of paints, stains and other surface coatings;
- (4) determine condition of cabinets.
- (5) determine the presence of, or extent or type of, insulation or vapor barriers in exterior walls.

F. Ceilings & Floors Comments:

Note: Specific Limitations. The Inspector is not required to determine the condition of interior ceiling or floor coverings except as they pertain to structural performance or moisture penetration; identify obvious damaged ceiling or floor coverings or determine the conditions of paints, stains, vinyls, ceramics, woods, carpets, marbles, stones or other surface coatings whether interior or exterior; or determine the presence of or damage from animal urine or other substances to ceilings or floors.

Ceiling Claddings: Drywall

Floor Coverings: Carpet

Tile

Wood

I=Inspected

NI=Not Inspected

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D=Deficiency

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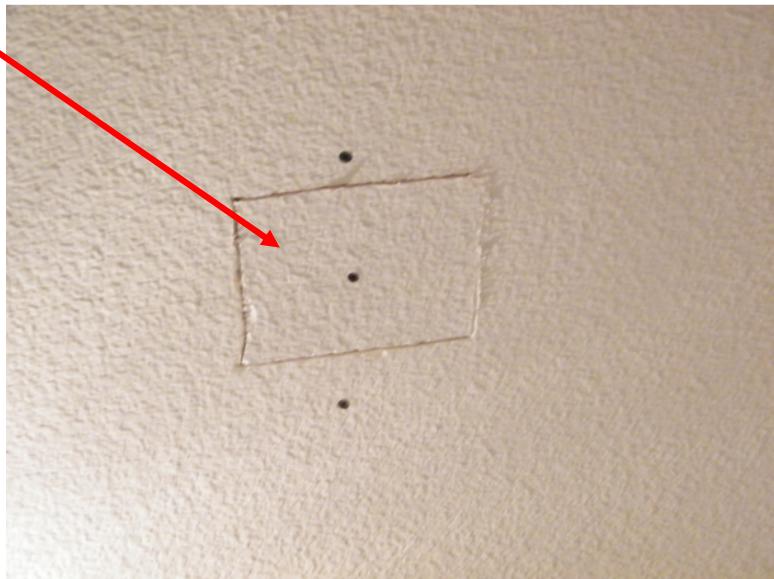
Inspection Item

CEILINGS AND FLOORS

Damage to the interior finish was observed in the laundry room and should be repaired.



Drywall
repair
required.



SPECIFIC LIMITATIONS: Some tiles in the tile floors of this house may exhibit a hollow sound when being walked upon or tapped. Floor tile is typically bonded to the concrete slab surface with what is called thin-set cement or mortar. This material does an excellent job of binding the tile to the slab surface if it is applied properly. The key is for both the slab concrete slab surface and the underside of the tile to be clean and free of any contaminants. During the course of normal construction operations, the slab surface will get material on it that prevents a good, permanent bond. If it is not thoroughly cleaned the tile may eventually come loose.

Occasionally, a floor will sound hollow even when the tile is well bonded. This can occur when a mortar bed method is used and the mortar has delaminated from the supporting layer or when the subfloor itself is not sufficiently thick or well attached. Other systems that

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intentionally separate the tile layer from the substrate (such as the mortar bed with a cleavage membrane (slip sheet, or isolation membrane) system like the Tile Council of America Handbook detail F111 should be closely examined to ascertain if hollow sounds necessarily imply that the tile is not bonded.

While a tile floor with hollow spots is not ideal, it does not necessarily mean that floor failure is imminent. On the contrary, over concrete if there is no significant deflection in the floor; grout and gravity will help keep the floor in place (as long as there are sufficient movement joints in the tile and minimal shear forces). Over wood, floor failure is more likely - movement in the subfloor could cause grout to break away from the tile, compounding the instability of the flooring.

Some contractors have tried to inject epoxy to re-bond tile without reinstalling it. While this may work in a small area, it is not practical over a large area. Further, any repair that does not address the cause of the failure may not last very long.

In summary, this problem is almost always a bonding failure issue and not a foundation movement issue. Visual inspections cannot predict adequacy of hard tile bonding to foundations. It is beyond the scope of this inspection to forensically test each individual tile in any given house for hollow sounds or to determine the causes for these hollow sounds. If you are concerned about hollow sounding tile you are strongly urged to consult with a certified ceramic tile specialist prior to the end of any time periods associated with the sale of this property.

NOTE: WOOD FLOOR INSTALLATION IN AREAS WITH WATER SUPPLIES, E.G. KITCHEN AND BATHROOMS, WHILE PERHAPS IN FASHION, IS A VERY POOR CHOICE.

TREC LIMITATIONS: The inspector is not required to report cosmetic damage or the condition of floor, wall, or ceiling coverings; paints, stains, or other surface coatings; cabinets; or countertops, or provide an exhaustive list of locations of water penetrations.

G. Doors (Interior & Exterior) Comments:

INTERIOR DOORS

All missing doorstops require replacement, e.g. at the coat closet.

EXTERIOR DOORS

It cannot be verified if the exterior door at the balcony has a plan flashing installed as required by IRC 703.1.1.

See: <http://www.jlconline.com/stucco/q-a--making-a-balcony-door-watertight.aspx>

The corner seal pads are missing from the strike and/or hinge jamb bottoms of the four exterior doors. These require replacement to complete the door weather stripping.

I=Inspected

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Inspection Item



Light visible
due to no
seal pad.



Corner Pad



Black or white polypropylene pile, with pressure sensitive adhesive backing. Pads are 1 1/4" wide x 2" high. Apply to corner of jamb on hinge side to seal against air and light infiltration.

All missing doorstops require replacement, e.g. at the front door.

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Inspection Item			

GARAGE DOORS

The west garage overhead door is required by Underwriter's Laboratories 325, the Consumer Products Safety Commission and, most importantly, by the garage door manufacturer to have a minimum of one (1) interior lift handle. This requires repair as per IRC 309.6: R309.6 Automatic garage door openers. Automatic garage door openers, if provided, shall be listed in accordance with UL 325.

SPECIFIC LIMITATION: No listing label was observed on the door between the main house and the garage. If it was there, it has either been removed or painted over. This door is required to be listed as a 20-minute fire-rated door. The door between the garage and the interior of the house must be rated to resist fire as per IRC R309.1: R309.1 Opening protection. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 13/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 13/8 inches (35 mm) thick, or 20-minute fire-rated doors. Though this door may indeed be fire-rated as required, this inspector is unable to verify this rating. You are strongly urged to have this door tested by a representative of the Fire Marshal's office prior to closing escrow on this home.

TREC LIMITATIONS: The inspector is not required to report the condition or presence of awnings, shutters, security devices, or systems; determine the cosmetic condition of paints, stains, or other surface coatings; or operate a lock if the key is not available.

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H. Windows Comments:

Note: Specific Limitations. The Inspector is not required to inspect or comment on the presence or condition of storm windows, awnings, shutters, or other security devices or systems. Only readily accessible windows are checked for operation during this inspection. "Failed thermal pane seals" (in actuality, failed desiccant inserts) in insulated glass windows are not always readily visually detectable. The visible moisture between panes in a "failed seal" situation may be apparent or not due to variations in atmospheric conditions. Windows are reported as they are observed at the time of the inspection only. No attempt to quantify the number of defective windows is made. No warranty is implied. If you have present or future concerns regarding the integrity of "thermal pane seals", it is strongly suggested that you consult with a Professional Fenestration Specialist for further evaluation. See the addendum at the end of this report regarding this issue.

The AAMA- certified windows cannot be determined at this stage of construction to be flashed and installed in accordance with the manufacturer's installation instructions and AAMA 2400 or ASTM E211-012 to prevent water penetration.

Note: Windows that are closer than 18 inches to the floor pose a safety hazard, especially upstairs windows that are low to the floor. We strongly recommend that all windows in these areas be upgraded to double paned windows that are constructed with tempered safety glass.

Window Types: Single Hung

Fixed Pane

Glazing Types: Double Glazed

WINDOWS

The window panes in the dining room are broken and require replacement.

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<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

TREC LIMITATIONS: The inspector is not required to report the condition or presence of awnings, shutters, security devices, or systems; determine the cosmetic condition of paints, stains, or other surface coatings; or operate a lock if the key is not available.

I. Stairways (Interior & Exterior) Comments:

STAIRWAYS

The stairway appears to be in satisfactory condition.

TREC LIMITATIONS: The inspector is not required to exhaustively measure every stairway component.

J. Fireplace/Chimney Comments:

Note: Specific Limitations. The Inspector is not required to inspect or comment on the adequacy of the draft or performance of a chimney, or chimney structures located more than eight (8) feet above any accessible roofline. Freestanding wood burning stoves are beyond the scope of this inspection. Should you have present or future concerns regarding fireplace draft performance, inaccessible chimney structures or freestanding wood burning stoves, consult with a Professional Chimney Sweep for further evaluation.

Fireplace Types: Steel Firebox

Chimney Types: Metal Below Siding

WARNING: Burning wood fires in your house is hazardous on more levels than one. Aside from the obvious fire issue, inhalation of woodsmoke is tantamount to inhalation of cigarette smoke. Not a smoker? Use gas logs.

See: <http://www.texasinspector.com/documents/Woodsmoke.pdf>

FIREPLACE

The fireplace and chimney appear to be in satisfactory condition.

TREC LIMITATIONS: The inspector is not required to determine the adequacy of the draft or perform a chimney smoke test. The inspector is not required to inspect wood-burning stoves.

K. Porches, Balconies, Decks, and Carports Comments:

Note: Specific Limitations. The Inspector is not required to inspect or report on detached structures or waterfront structures and equipment (i.e. boathouses or boat docks).

FLATWORK

The accessible and visible flatwork appears to be satisfactory.

BALCONY

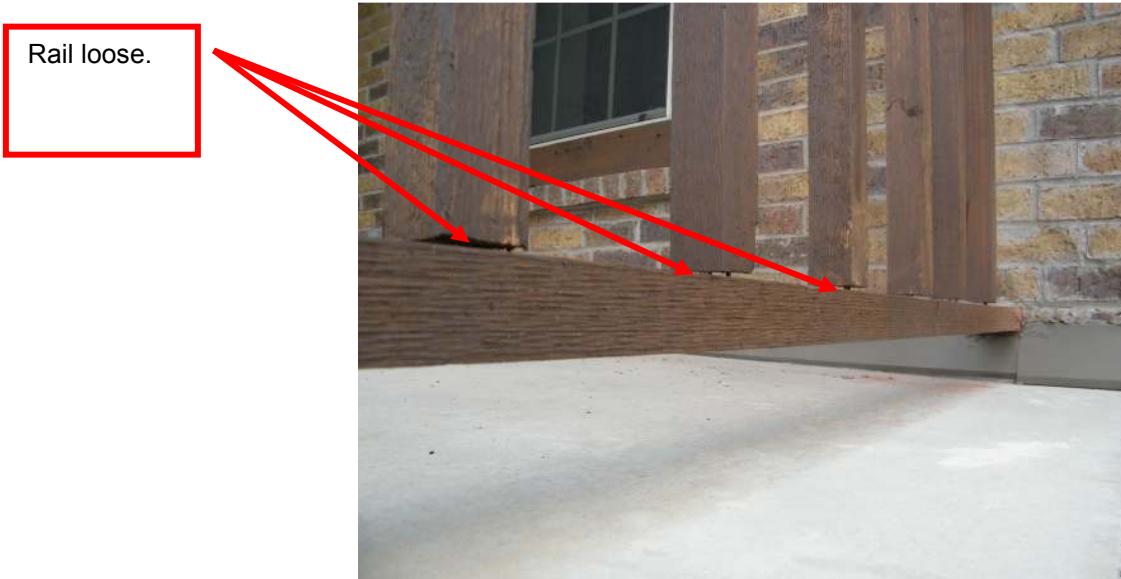
The balcony pan flashing has not been installed as required as per IRC R703.8 (5) Flashing. Approved corrosion-resistive flashing shall be provided in the exterior wall envelope in such a manner as to prevent entry of water into the wall cavity or penetration of water to the building structural framing components. The flashing shall extend to the surface of the exterior wall finish and shall be installed to prevent water from reentering the exterior wall envelope. Approved corrosion-resistant flashings shall be installed at all of the following locations: 5.

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Where exterior porches, decks or stairs attach to a wall or floor assembly of wood-frame construction.



HANDRAILS AND GUARDS



The bottom rail of the west balcony guard (handrail) is loose and requires improvement.

The openings in the balcony railing are large enough to allow an object larger than four inches to fall through. It is required that this condition be repaired for improved safety as per IRC 316.2.

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NP=Not Present

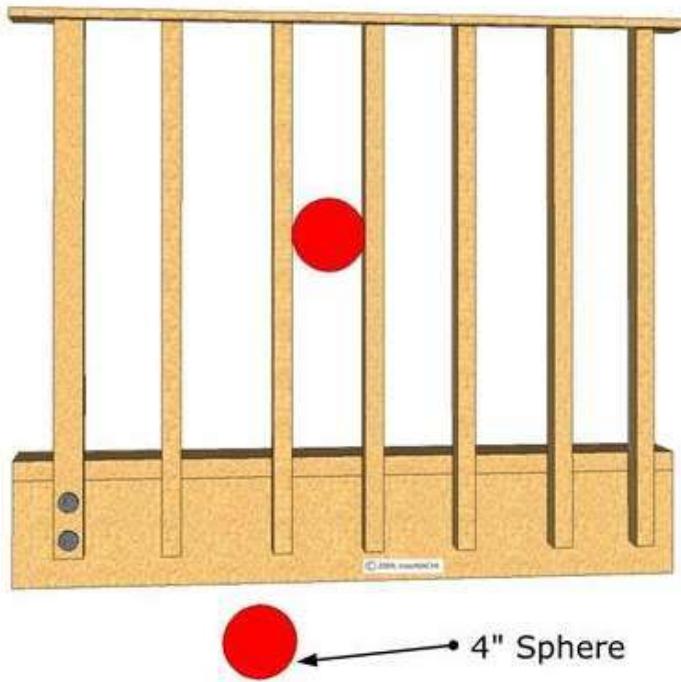
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Baluster
openings not
code
compliant.



RAILING



SPECIFIC LIMITATIONS: Fences: Ownership of any fence is unknown and specifically excluded from the state inspection standards. Texas does not have a boundary fence law so fences in need of repair or replacement are not required to be repaired or replaced by anyone

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I	NI	NP	D
Inspection Item			

other than the owner. Boundary fence laws allow both parties on each side of the fence to benefit from the fence and both would normally be required to pay for its upkeep and installation costs. Deed restrictions might have requirements on fences but unless ownership is known there is no law or requirement concerning the maintenance or repair. One may expect that a property survey designate on what property a fence is located so it is recommended that the property survey be consulted in case of repair or replacement is warranted by the client.

TREC LIMITATIONS: The inspector is not required to exhaustively measure the porch, balcony, deck, or attach carport components; or enter any area where the headroom is less than 18 inches or the access opening is less than 24 inches wide and 18 inches high.

II. ELECTRICAL SYSTEMS

A. Service Entrance and Panels Comments:

Note: Specific Limitations. The Inspector is not required to determine the service capacity amperage or voltage or the capacity of the electrical system relative to present or future use or requirements; conduct voltage drop calculations; determine the accuracy of breaker labeling; or determine the insurability of the property. The Inspector does not test any electrical or lighting systems not directly mounted on or attached to the house.

Type of Service: Underground

Size of Service: 120/240 Volt Main Service

Type of Grounding: Copper (Where Observed)

Ufer Connection (Where Observed)

Main Distribution Panelboard Location: Garage Interior Wall

Panel Rating: Main Service Rating 200 Amps

Grounds for Departure: N/A

Disconnect Type: Breakers

SERVICE/ENTRANCE

The electrical entrance and panels appear to be in satisfactory condition.

SPECIFIC LIMITATIONS: Visual inspections do not test for resistance to ground of 25 ohms or less. You are strongly urged to obtain a notarized affidavit containing his license number from a licensed electrical contractor verifying that the grounding of this electrical system has been done in strict accordance with NEC 250.56 - Resistance of rod, pipe and plate electrodes. A single electrode consisting of a rod, pipe or plate that does not have a resistance to ground of 25 ohms or less shall be augmented by one additional electrode of any of the types specified by 250.52(A)(2) through (A)(7). Where multiple rod, pipe or plate electrodes are installed to meet the requirements of this section, they shall be not less than 6 feet (1829 mm) apart.

TREC LIMITATIONS: The inspector is not required to determine present or future sufficiency of service capacity amperage, voltage, or the capacity of the electrical system; test arc-fault circuit interrupter devices when the property is occupied or damage to personal property may result, in the inspector's reasonable judgment; report the lack of arc-fault circuit interrupter protection when the circuits are in conduit; conduct voltage drop calculations; determine the accuracy of overcurrent devices labeling; remove covers where hazardous as judged by the inspector; verify the effectiveness of overcurrent devices; or operate overcurrent devices.

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B. Branch Circuits, Connected Devices, and Fixtures

Type of Wiring: Copper (Where Observed)

Comments:

DISTRIBUTION WIRING

The exterior communications cabling outlets and junction box at the east side of the patio must be listed and labeled for use in damp or wet locations in order to protect the wire connections as per NEC 314.15(A): 314.15 Damp or Wet Locations.

In damp or wet locations, boxes, conduit bodies, and fittings shall be placed or equipped so as to prevent moisture from entering or accumulating within the box, conduit body, or fitting. Boxes, conduit bodies, and fittings installed in wet locations shall be listed for use in wet locations.

NEC Article 100 defines the term weatherproof as "constructed or protected so that exposure to the weather does not interfere with successful operation." Rainproof, raintight, or watertight equipment can fulfill the requirements of this definition where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.

Must be listed and labeled for damp or wet use.



Additionally, the interior listed blank junction box cover plates being used are not UV resistant plastic and are not intended for use in damp or wet locations.

Telephone, cable TV and radio, and broadband communication cables must be installed in a neat and workmanlike manner and must be protected from physical damage during normal use of the building as per NEC 100.3(B), 800.18, 800.24 and ANSI/NECA/BISCI 568-2001.

SPECIFIC LIMITATIONS: It is generally infeasible for the inspector to ascertain the presence or appropriateness of ceiling fan mounting boxes or brackets. You are strongly urged to have a manufacturer's representative and a licensed master electrician inspect and assess these installations.

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TREC LIMITATIONS: The inspector is not required to determine present or future sufficiency of service capacity amperage, voltage, or the capacity of the electrical system; test arc-fault circuit interrupter devices when the property is occupied or damage to personal property may result, in the inspector's reasonable judgment; report the lack of arc-fault circuit interrupter protection when the circuits are in conduit; conduct voltage drop calculations; determine the accuracy of overcurrent devices labeling; remove covers where hazardous as judged by the inspector; verify the effectiveness of overcurrent devices; or operate overcurrent devices.

III. HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS

A. Heating Equipment

Type of System: Central Forced Air Furnace

Energy Source: Electricity

Comments:

Note: Specific Limitations. The system fan, burner and heat exchanger were not readily accessible for inspection without disassembly of the unit. Because we do not disassemble equipment the condition of the system interior is unknown. If the system does not have a documented history of regular (annual) cleaning and maintenance since its installation, servicing by a licensed professional HVAC technician is required. Heat pumps are not operated at an ambient temperature of 60 degrees F. or more and are never operated in emergency mode. WARNING: This inspection will likely not meet the underwriting requirements of a home warranty (residential service contract) company. Many of these companies have been known to decline coverage due to subjective and often specious code compliance and maintenance arguments. You are strongly advised to ask your "home warranty" (residential service contract) provider to assure that the system meets their underwriting requirements prior to contracting for their services or closing escrow on the property. Failure to do so may result in future claim denial.

FURNACE

The furnace appears to be in satisfactory condition.

TREC LIMITATIONS: The inspector is not required to do the following:

- (1) inspect accessories such as humidifiers, air purifiers, motorized dampers, heat reclaimers, electronic air filters or wood-burning stoves;
- (2) determine the efficiency or adequacy of a system;
- (3) program digital-type thermostats or controls; or
- (4) operate radiant heaters, steam heat systems or unvented gas-fired heating appliances.

B. Cooling Equipment

Type of System: Central Forced Air Compressed Gas Split System

Comments:

Note: Specific Limitations. The system fan and evaporator coil was not readily accessible for inspection without disassembly of the unit. Because we do not disassemble equipment the condition of the system interior is unknown. If the system does not have a documented history of regular cleaning and maintenance since its installation, servicing by a licensed professional HVAC technician is required. Previous repairs to the system may have resulted in mismatching of the condenser and evaporator units. You are strongly advised to have an HVAC technician inspect this system and verify that it has been installed in strict accordance

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*with the manufacturer's installation instructions and the Air Conditioning Contractors of America (ACCA) Manuals D, J, and S, prior to closing escrow on this home. **WARNING:** This inspection will likely not meet the underwriting requirements of a home warranty (residential service contract) company. Many of these companies have been known to decline coverage due to subjective and often specious code compliance and maintenance arguments. You are strongly advised to ask your "home warranty" (residential service contract) provider to assure that the system meets their underwriting requirements prior to contracting for their services or closing escrow on the property. Failure to do so may result in future claim denial.*

AIR CONDITIONER UNIT – 21.2° F. ΔT

The air conditioning system appears to be satisfactory.

SPECIFIC LIMITATIONS: The state standards require a limited cursory visual inspection of HVAC systems but do not sanction any specific diagnostic testing or research as would be required or expected to be done by a qualified licensed HVAC contractor (e.g.: specific equipment model amperage and electrical testing or BTU/tonnage sizing; refrigerant level check for proper charge, restrictions or leaks; proper sizing or compatibility of equipment, or efficiency). Sole reliance on differential temperature readings is neither recommended nor prudent. It is illegal in Texas for anyone other than a licensed HVAC contractor to connect diagnostic gages to refrigerant lines for diagnostic testing. Improper refrigerant levels may indicate a leak, directly affect compressor pressures, affect serviceable life/early failure, electrical amperage and electrical usage. Hence, any discrepancy or deficiency should be further evaluated by a qualified and licensed HVAC contractor prior to the expiration of any time limitations associated with the purchase of this home. We do not recommend that anyone rely on a home inspection of the HVAC system as a sole basis of purchase.

TREC LIMITATIONS: The inspector is not required to do the following:

- (1) inspect for the pressure of the system coolant or determine the presence of leaks;
- (2) program digital-type thermostats or controls; or
- (3) operate setback features on thermostats or controls.

C. Duct System, Chases, and Vents *Comments:*

SUPPLY AIR DUCTWORK

The accessible ducts and vents appear to be satisfactory.

SPECIFIC LIMITATIONS: Not all ducts or gas appliance vents were accessible or visible during this inspection. Ducts and gas appliance vents in inaccessible areas of the attic, those concealed by insulation or stored items, and those enclosed in chases, walls, et al. were not inspected. You are strongly urged to have a licensed HVAC technician or engineer conduct a thorough duct pressure test to insure that all ducts are properly sealed and functional prior to purchasing the home.

TREC LIMITATIONS: The inspector is not required to do the following:

- (1) determine the efficiency, adequacy or capacity of the systems;
- (2) determine the uniformity of the supply of conditioned air to the various parts of the structure;
- (3) determine the types of materials contained in insulation, wrapping of pipes, ducts, jackets, boilers and wiring;

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- (4) operate venting systems unless ambient temperatures or other circumstances, in the reasonable opinion of the inspector, are conducive to safe operation without damage to the equipment; or
- (5) operate a unit outside its normal operating range as reasonably determined by the inspector.

IV. PLUMBING SYSTEM

A. Water Supply System and Fixtures

Location of water meter: Front Sidewalk or Curb (Meter)

Location of main water supply valve: Front Flower Bed

Static water pressure reading: 75 psi

Type of Supply Piping Where Visible: PEX (Where Observed)

Gas Meter Location: Not Installed

Type of Gas Piping: N/A

Type of Gas: N/A

Comments:

Note: Specific limitations. A visual inspection by a home inspector does not address slab leaks as per the Texas Administrative Code, Title 22, Part 33, Chapter 535, Subchapter R, Rule 535.227(b)(3)(A)(iv) *General Limitations*. This inspector is not required to inspect anything buried, hidden, latent, or concealed. These are plumbing leaks which occur either in or under the concrete foundation. Slab leaks can only be discovered and ascertained by a licensed plumber using specialized tools and skills. Because they are a common problem in the North Central Texas area you are strongly urged to have the supply and drain piping of this house leak tested by a licensed master plumber prior to the end of any time periods associated with the sale or purchase of this home.

Slab leaks can occur in your home's potable water line or in your outgoing sanitary sewer line; both of which may be embedded in or under the foundation of the building. Leaks in either set of lines can cause large amounts of damage to the foundation and each has its own list of causes, some are shared. Slab leaks in the potable water line can potentially be more destructive because the supply water is under pressure. It runs through or under the concrete slab, then to the water heater where copper pipes split off and carry water to all the hot and cold water fixtures in your house.

There are four main causes of slab leaks in a houses incoming water lines. Chemistry is the first, either the chemical interaction between copper water pipes or the water running though them (copper pipe is very susceptible to pinhole leaks caused by the chemical composition of your water), or electrolysis from the copper pipe coming into contact with soil. The second is that due to the foundation shifting (because of poor design or installation, or a change in the moisture of the expansive clay soil) and pull your pipes apart. The third is water pressure that is too high (the diameter of the pipes installed may be too small) will corrode copper pipe. Leaks will also form at points where the pipes bend or change direction. The fourth cause may just be poor craftsmanship or workmanship: inferior plumbing supplies or materials (e.g. pipes, soldering) or a plumber that rushes or isn't experienced. It could also be a kinked line (a piece of pipe with an imperfection) or nicked by another (non-plumbing) workman, such as those that pour the concrete.

Unlike those in incoming water lines which will continuously leak because of the continuous flow and pressure, slab leaks in sanitary sewer lines only leak when a toilet is flushed, someone takes a shower or bath, or faucet is turned on. There are four main causes of slab leaks in sanitary sewer lines. The first is a crack or break in the cast iron, galvanized steel, or

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PVC sewer pipes, caused by shifting of the foundation. The second is, in the case of cast iron or galvanized steel pipes, parts of the pipe may be exposed to soil, sand, or gravel which are porous to water -this can lead to rusting. The third cause is the chemicals, solvents, and cleaning solutions that are poured down the drain which interact and corrode the metal pipes. The fourth cause is poor craftsmanship or workmanship, inferior plumbing supplies or materials, or a plumber that rushes or isn't experienced.

Your homeowners insurance is not likely to cover slab leaks. This sort of coverage varies from company to company. Even if they do, they will not usually cover all of the expenses to make the necessary repairs.

There are essentially two methods for making these kinds of repairs. The traditional method involves finding the leaks and then cutting or breaking out the concrete slab in order to make the repairs and afterwards repairing the concrete. This is a tremendously invasive and expensive procedure that, depending on the number of leaks involved and the size of the house, can cost anywhere from \$20K - \$50K.

The latest method on the scene involves lining the piping with food grade epoxy. This is a nearly non-invasive procedure. The cost is also less than the traditional methods, but will still be in the \$10K - \$15K range.

In addition to the expense and inconvenience of the actual leak repairs, slab leaks are a leading cause of foundation damage.

SUPPLY PLUMBING

The accessible water supply system and fixtures appear to be satisfactory.

TREC LIMITATIONS: The inspector is not required to do the following:

- (1) operate any main, branch or shut-off valves;
- (2) inspect any system that has been shut down or otherwise secured;
- (3) inspect any components that are not visible or accessible;
- (4) inspect any exterior plumbing components such as water mains, private sewer systems, water wells, sprinkler systems or swimming pools;
- (5) inspect fire sprinkler systems;
- (6) inspect the quality or the volume of well water;
- (7) determine the potability of any water supply;
- (8) inspect water-conditioning equipment, such as softeners or filter systems;
- (9) inspect solar water heating systems;
- (10) determine the effectiveness of anti-siphon devices on appropriate fixtures or systems;
- (11) operate free-standing appliances;
- (12) inspect private water supply systems, swimming pools, or pressure tanks;
- (13) inspect the gas supply system for leaks;

B. Drains, Wastes, and Vents Comments:

Type of Sewer System: Public Sewer System (Assumed but not verified)

Type of Sewer (DWV) Piping: PVC (Where Observed)

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DRAIN/WASTE / VENT (DWV)

Drain, waste and vent system satisfactory.

NOTE: It is a common occurrence that painters and other contractors use the sink, bathtub, toilet, shower pan drains, et al. for disposal of paint, texture, and other materials not intended to be introduced into the DWV system of a house. For this reason you are strongly urged to have the DWV system thoroughly inspected by a licensed professional plumber using a drain inspection camera to insure that no blockages or piping damage has occurred during construction or remodeling. You are strongly urged to have this inspection completed prior to closing escrow on this home.

TREC LIMITATIONS: The inspector is not required to operate any main, branch, or shut-off valves; operate or inspect sump pumps or waste ejector pumps; inspect any system that has been winterized, shut down, or otherwise secured; circulating pumps, free-standing appliances, solar water heating systems, water conditioning equipment, filter systems, water mains, private water supply systems, water wells, pressure tanks, sprinkler systems, swimming pools, or fire sprinkler systems; the inaccessible gas supply system for leaks; for sewer clean-outs; or for the presence or operation of private sewage disposal systems; determine quality, potability, or volume of the water supply; or effectiveness of back flow or anti-siphon devices; or verify the functionality of clothes washing drains or floor drains.

C. Water Heating Equipment

Energy Source: Electricity

Capacity: 50 Gallons

Comments:

TPR VALVES

The temperature and pressure relief valve discharge tubing is not allowed to bend more than four (4) times prior to its terminus. The additional bends present must be removed. This is the valve manufacturer's requirement, as well as a requirement of every major water heater manufacturer in the world. Additionally, this is required by IRC R102.4 Referenced codes and standards. The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

Exception: Where enforcement of a code provision would violate the conditions of the listing of the equipment or appliance, the conditions of the listing and manufacturer's instructions shall apply.

See more at: <http://www.aaronsinspections.com/documents/WattsTPRLabelandLetter.pdf>
<http://www.watts.com/pages/support/tp.asp?catId=64>

All exterior PVC and CPVC drain lines are required by code to be painted with an acrylic latex paint for UV ray protection as per the manufacturers and TRCC performance standard 304.22(a)(11): A water heater shall be installed and secured according to the manufacturer's specifications and the Code. If a water heater fails to meet the standards stated in this paragraph, the builder shall take such action as is necessary to bring the variance within the standard.

LOCATION/PROTECTION

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The water heater requires protection from impact by automobiles as per IRC M1307.3.1. The addition of stanchions or bollards is required.

M1307.3.1 Protection from impact. Appliances located in a garage or carport shall be protected from impact by automobiles.

If bollards or stanchions are not installed then the unit must be raised 6'-0" above the garage floor as per IRC G2408.3 (305.5) Private garages. Appliances located in private garages shall be installed with a minimum clearance of 6 feet (1829 mm) above the floor.

Exception: The requirements of this section shall not apply where the appliances are protected from motor vehicle impact and installed in accordance with Section G2408.2. Appliances located in a private garage or carport must be protected from vehicle impact. This section is applicable to appliances located in an area where motor vehicles can be operated and includes appliances under which a vehicle can pass and those located anywhere in a vehicle's path where impact is possible. The 6-foot (1829 mm) minimum height requirement is intended to provide adequate clearance above the typical automobile. With the popularity of conversion vans and recreational vehicles, which can be much higher than other automobiles, the 6-foot (1829 mm) minimum installation height above the floor may not provide adequate clearance; additional height might be necessary. The garage door height can be used as a guide in determining the maximum vehicle height.

TREC LIMITATIONS: The inspector is not required to verify the effectiveness of the temperature and pressure relief valve, discharge piping, or pan drain pipes; operate the temperature and pressure relief valve if the operation of the valve may, in the inspector's reasonable judgment, cause damage to persons or property; or determine the efficiency or adequacy of the unit.

D. Hydro-Massage Therapy Equipment Comments:

There is no hydro-massage therapy equipment present.

V. APPLIANCES

Note: Specific Limitations. It is both generally infeasible and not required by the TREC for the inspector to be qualified to inspect appliances to manufacturers' installation or performance standards.

A Dishwasher Comments:

DISHWASHER

The dishwasher appears to be in satisfactory condition.

B. Food Waste Disposer Comments:

FOOD WASTE DISPOSER

The food waste disposer appears to be in satisfactory condition.

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C. Range Exhaust Vent Comments:

Type of Unit: Recirculating Unvented

RANGE HOOD

The range hood appears to be in satisfactory condition.

D. Ranges, Cooktops, and Ovens Comments:

ELECTRIC RANGE

The thermostat for the electric range oven was found to be inaccurate and requires improvement. The temperature variance between the oven control setting and the measured reading was observed to be greater than 25° F. as measured by a hand-held IR thermometer.

TREC LIMITATIONS: The inspector is not required to inspect self-cleaning functions.

E. Microwave Oven Comments:

MICROWAVE OVEN

The microwave cooking equipment appears to be in satisfactory condition.

TREC LIMITATIONS: The inspector is not required to test for radiation

F. Trash Compactor Comments:

There is no trash compactor present.

G. Mechanical Exhaust Vents and Bathroom Heaters Comments:

BATHROOM EXHAUST FANS

The bathroom exhaust fans appear to be in satisfactory condition.

H. Garage Door Operator(s) Comments:

GARAGE DOOR OPERATOR

The garage door operator appears to be in satisfactory condition.

SPECIFIC LIMITATIONS: Some garage vehicle door automatic operators (automatic openers) are equipped with downward force resistance-sensing auto-reversing capabilities and some may also incorporate upward force resistance-sensing auto-reversing capabilities as well. When downward force and/or upward force resistance-sensing auto-reversing capabilities are provided, they can reduce the potential for both personal injury and damage to personal property.

However, due to the potential for personal injury and for damage to garage door components,

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automatic operator components, and to both real and personal property, any evaluation of garage vehicle door automatic operators for any resistance-sensing auto-reversing capabilities is specifically excluded in this inspection and report. If photoelectric obstruction-sensing auto-reversing devices are present, they will be evaluated for their height above the garage floor and to determine whether they will reverse the downward movement of the garage door upon sensing an obstruction.

The United States Consumer Product Safety Commission (CPSC) recommends that any automatic operator which does not have resistance-sensing auto-reversing capabilities be disconnected from its power supply and replaced immediately with a new unit which conforms to or exceeds current requirements for automatic operator; therefore, it is recommended that measures be taken as soon as possible to determine if such capabilities are incorporated into automatic operators.

This information may be determined by the presence of visible adjustment controls for resistance sensing auto-reversing capabilities on the automatic operator unit, by obtaining the manufacturer's literature for the operator, or by contacting the manufacturer, the manufacturer's distributor, or a qualified garage door automatic operator service technician. If it is determined that resistance-sensing auto-reversing capability is incorporated into an automatic operator, it is recommended that a qualified garage door automatic operator service technician be retained to evaluate the automatic operator for proper adjustment and function of such resistance-sensing auto-reversing functions.

Additional information regarding garage vehicle door automatic operators can be found on the CPSC website at: www.cpsc.gov/cpscpub/pubs/523.html

I. Doorbell and Chimes Comments:

DOORBELL

The doorbell appears to be in satisfactory condition.

J. Dryer Vents Comments:

DRYER VENT (DUCT)

No dryer duct length signage was observed as required by IRC M1502.4.5 Length identification. Where the exhaust duct is concealed within the building construction, the equivalent length of the exhaust duct shall be identified on a permanent label or tag. The label or tag shall be located within 6 feet (1829 mm) of the exhaust duct connection.

VI. OPTIONAL SYSTEMS

A. Lawn and Garden Sprinkler Systems

Comments:

Type of Inspection: Visual and Operation of Irrigation System via Manual Controls

Grounds for Departure: Backflow Device was not Inspected for Proper Installation or Operation. In accordance with state law, Texas Water Code Chapter 37, Title 30 Texas Administrative Code, Chapter 30 and Chapter 290, a person who repairs or tests the

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installation or operation of backflow prevention assemblies must hold a license issued by the TCEQ. This inspector holds no such license.

LAWN SPRINKLER SYSTEM

The irrigation system was being worked on by the irrigation contractor at the time of theis inspection, was inoperable and requires repair.

The water spray from the irrigation system must be re-directed away from the structure and/or any fencing, decks, etc., to decrease the possibility of damage as per the City of Dallas Municipal Ordinances 24745 and 26518.

Spray coverage for the irrigation system was not verified as part of this inspection. Coverage should be monitored for the system and adjusted accordingly to ensure even watering of the landscaping.

TREC LIMITATIONS: The inspector is not required to inspect the automatic function of the timer or control box, the rain sensor or the effectiveness and sizing of anti-siphon valves or backflow preventers.

ADDENDUM: REPORT OVERVIEW – NEW CONSTRUCTION

Because homebuilders in the State of Texas are not licensed or registered there is little or no governmental oversight of their building practices. The local city building inspectors are more often than not overworked and underpaid municipal employees. They haven't the time available to perform thorough inspections of houses as they are being constructed. This results in a situation where the minimal building code standards as set forth in the International Residential Code, the National Electrical Code and all of the installation instructions for the various materials and systems used in construction are, in our experience, never fully met. Another way of stating this would be: In our many years of inspection experience and after inspecting several thousand houses, we have never – N-E-V-E-R – seen a house in the 16-county area comprising the D/FW Metroplex that is, in our opinion, fully in compliance with both the letter and the spirit of the prevailing adopted codes. This statement includes houses in all price ranges, of all ages, of all different designs, and by all builders.

This house is no exception. It is not the ideal house. The ideal house would be located on the ideal site that has non-expansive, non-compressive, non-subsiding soil, and a solid substrate that is relatively close to the surface and fully capable of supporting the structure indefinitely. It would have a complete set of roof gutters, area drains, soil that is properly graded away from the foundation, and a significant (8") difference between the elevation of the finish grade and interior floors. The site would be fully irrigated, with no shrubs, trees or swimming pools within 25 feet of the foundation. This house would, of course, be constructed of quality, time-proven materials in both strict compliance with the minimal building standards set forth in the latest versions of the International Residential Code and the National Electrical Code and all materials manufacturers' installation instructions. Additionally, the house would be built in accordance with a multitude of other references and standards that specify best practice scenarios for all facets of residential construction. (A comprehensive list of these publications is available on request.) The lot and structure would have been both mechanically outfitted and chemically treated with all available options to prevent wood destroying insect activity.

This inspection is visual only. A representative sample of building components are viewed in areas that are accessible at the time of the inspection. No destructive testing or dismantling of building components is performed.

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It is the goal of the inspection to put a home buyer in a better position to make a buying decision. Not all improvements will be identified during this inspection. Unexpected repairs should still be anticipated. The inspection should not be considered a guarantee or warranty of any kind.

Please refer to the inspection agreement for a full explanation of the scope of the inspection.

ADDENDUM: Building Code Compliance

In dealing with your builder and the municipal building inspection department there are a few things you'll need to know. As of January 2002 all municipalities in the State of Texas with a population of over 5000 were required to adopt, at a bare minimum, the 2000 International Residential Code. With the advent of the Texas Residential Construction Commission in 2003, Texas House Bill 730, Section 430.001 requires that all residential construction in the State of Texas adhere to the International Residential Code (IRC) and the National Electrical Code (NEC), as well as all materials and systems manufacturers' installation instructions, regardless of incorporation or population. Since building codes are the province of government, the referenced standards have the force of law and must be adhered to.

Municipalities may opt to adopt newer versions of the IRC, such as the 2003 or 2006 versions, or newer versions of the NEC, such as the 2002, 2005, 2008, or 2012 versions, but the 2000 IRC version and the 1999 NEC version are entry level requirements. Materials and systems manufacturers' installation instructions are not permitted to be altered or ignored.

Amendments or exceptions to the International Residential Code or National Electrical Code may not be made by the Chief Building Official of the municipality, and certainly not by your unlicensed builder. The legislation set forth in Texas Statute 214.212, reads as follows:

§ 214.212. International Residential **Code**

- (a) To protect the public health, safety, and welfare, the International Residential **Code**, as it existed on May 1, 2001, is adopted as a municipal residential **building code** in this state.
- (b) The International Residential **Code** applies to all construction, alteration, remodeling, enlargement, and repair of residential structures in a municipality.
- (c) A municipality may establish procedures:
 - (1) to adopt local amendments to the International Residential **Code**; and
 - (2) for the administration and enforcement of the International Residential **Code**.
- (d) A municipality may review and consider amendments made by the International **Code** Council to the International Residential **Code** after May 1, 2001.

Added by Acts 2001, 77th Leg., ch. 120, § 1, eff. Jan. 1, 2002.

Each municipality is required to include in their city ordinances or land development documents all exceptions or changes to the International Residential Code and National Electrical Code that the members of the City Council have agreed upon and officially adopted. If an exception, deletion or any other alteration of the code has not been formally passed into ordinance, in this Inspector's reading of the law, it is not valid.

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Any city ordinance is a matter of public record and is available for examination either on the city's web site or in the office of the Chief Building Official. Most cities' websites and ordinances can be located at www.ci.yourcity.tx.us. Some municipalities' ordinances are available online at: www.ordinance.com or www.municode.com. If your builder or municipal inspector cannot produce a copy of the city ordinance specifically excluding any portion of the IRC or NEC, it must be adhered to.

YOUR CODE INFORMATION IS HERE: http://dallascityhall.com/building_inspection/construction_codes.html

Additionally, and according to the International Residential Code R102.4, and National Electrical Code 110-3(b), neither the municipality nor the Chief Building Official may ever override a manufacturer's installation instructions. We do not build our houses of found materials. Thus, all materials in the home are manufactured. The manufacturer of any given material, equipment, appliance or system is the sole arbiter of the manner in which his product is to be installed. Failure to comply with manufacturer's installation instructions both voids the manufacturer's warranty and constitutes a flagrant violation of the building codes.

The rabbit hole goes much deeper. There are at least 43 separate standards-authoring organizations referred to in the IRC's Chapter 43 – Referenced Standards. Therein are listed hundreds of additional standards which must be adhered to. Most, if not all of these standards additionally refer to other standards.

Additionally, anything published by the Consumer Product Safety Commission regarding residential construction trumps all other statutes. There are also numerous state- and county-promulgated standards which have the effect of law.

An individual who wishes to file a complaint against a registered municipal code enforcement officer or a code enforcement officer in training may write to:

Complaints Management and Investigative Section
P.O. Box 141369
Austin, Texas 78714-1369

or call 1-800-942-5540 to request the appropriate form or obtain more information.

Having said all that, we should add this: We are not the Building Police. Home inspectors in the State of Texas have no authority to compel full compliance with the prevailing building codes. They have no legal basis on which to enforce their opinions. Only a building official for a municipality has that enforcement authority and may direct code compliance. Additionally, we are not interpreting the building code. That is a solely a matter for the Authority Having Jurisdiction, i.e. the municipality in question. However, we always find discrepancies between what the municipal inspectors allow and stated code requirements, and feel that juxtaposing these two allows our clients to make a fully informed decision regarding the condition of the home they are buying.

ADDENDUM: THE CONSTRUCTION BOARD OF APPEALS

Once you have attempted to persuade your builder address the issues listed in this report as deficient, and should he be reluctant to make the necessary repairs, how should you proceed? First, request that the builder meet you at the building site along with the Chief Building Official (CBO) of your municipality. Have both the builder and the CBO illustrate to you in writing in the applicable building code where it is stated that the items in question do not need to be improved. If they cannot do so, then any decision that they make regarding the content of this report is purely subjective and specious. While they may not be purposely misleading you, they have just agreed upon a ***different kind of truth***.

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If the CBO rules in the builder's favor without producing adequate supporting documentation, you then should take your case to the municipal Construction Board of Appeals. Each municipality is required to form such a board as per International Residential Code R112, which says in part:

SECTION R112

BOARD OF APPEALS

R112.1 General.

In order to hear and decide appeals of orders, decisions or determinations made by the building official relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The building official shall be an ex officio member of said board but shall have no vote on any matter before the board. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the building official.

R112.2 Limitations on authority.

An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.

R112.3 Qualifications.

The board of appeals shall consist of members who are qualified by experience and training to pass on matters pertaining to building construction and are not employees of the jurisdiction.

R112.4 Administration.

The building official shall take immediate action in accordance with the decision of the board.

In the event that the Board of Appeals rules in the Building Official's favor you still have the ability to appeal this decision in the applicable district court.

YOUR BOARD OF APPEALS INFO IS HERE: http://www.dallascityhall.com/building_inspection/bi_board.html

ADDENDUM: RADON INFORMATION

EPA Radon Risk Information

Fifty-five percent of our exposure to natural sources of radiation usually comes from radon. Radon is a colorless, tasteless, and odorless gas that comes from the decay of uranium found in nearly all soils. Levels of radon vary throughout the country. Radon is found all over the United States and scientists estimate that nearly one out of every 15 homes in this country has radon levels above recommended action levels.

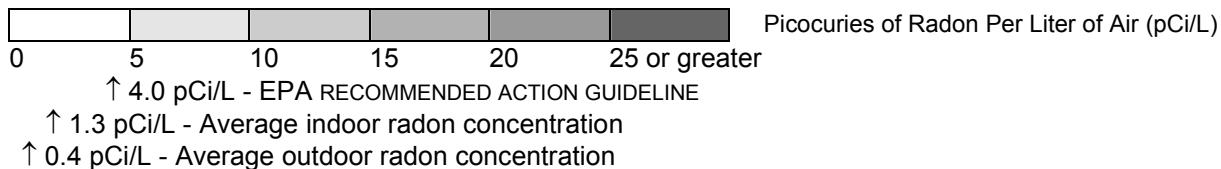
Radon usually moves from the ground up and migrates into homes and other buildings through cracks and other holes in their foundations. The buildings trap radon inside, where it accumulates and may become a health hazard if the building is not properly ventilated.

When you breathe air containing a large amount of radon, the radiation can damage your lungs and eventually cause lung cancer. Scientists believe that radon is the second leading cause of lung cancer in the United States. It is estimated that 7,000 to 30,000 Americans die each year from radon-induced lung cancer. Only smoking causes more lung cancer deaths and smokers exposed to radon are at higher risk than nonsmokers. Testing your home is the only way to know if you and your family are at risk from radon.

Testing for Radon

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Should you have your home tested, use the chart below to compare your radon test results with the EPA guideline. The higher a home's radon level, the greater the health risk to you and your family.



The U.S. Environmental Protection Agency (EPA) and the Surgeon General Strongly recommend taking further action when the home's radon test results are 4.0 pCi/L or greater. The concentration of radon in the home is measured in picocuries per liter of air (pCi/L). Radon levels less than 4.0 pCi/L still pose some risk and in many cases may be reduced. If the radon level in your home is between 2.0 and 4.0 pCi/L, EPA recommends that you consider fixing your home. The national average indoor radon level is about 1.3 pCi/L. The higher a home's radon level, the greater the health risk to you and your family. Smokers and former smokers are at especially high risk. There are straightforward ways to fix a home's radon problem that are not too costly. Even homes with very high levels can be reduced to below 4.0 pCi/L. EPA recommends that you use an EPA or State-approved contractor trained to fix radon problems.

What do radon test results mean?

If your radon level is below 4 pCi/L, you do not need to take action.

If you radon level is 4 pCi/L or greater, use the following charts to determine what your test results mean. Depending upon the type of test(s) you took, you will have to either test again or fix the home.

NOTE: All tests should meet EPA technical protocols.

Chart 1: Radon Test Conducted Outside Real Estate Transaction

Type of Test(s)	If Radon Level Is 4.0 pCi/L or Greater
Single Short-Term Test	Test Again*
Average of Short-Term Tests	Fix The Home
One Long-Term Test	Fix The Home

* If your first short term test is several times greater than 4.0 pCi/L - for example, about 10.0 pCi/L or higher - you should take a second short-term test immediately.

Chart 1: Radon Test Conducted During a Real Estate Transaction (Buying or Selling a Home)

Type of Test(s)	If Radon Level Is 4.0 pCi/L or Greater
Single Active Short-Term Test (this test requires a machine)	Fix The Home
Average of 2 Passive Short-Term Tests* (these tests do not require machines)	Fix The Home
One Long-Term Test	Fix The Home

* Use two passive short-term tests and average the results.

What should I do after testing?

If your radon level is 4.0 pCi/L or greater, you can call your State radon office to obtain more information, including a list of EPA or State-approved radon contractors who can fix or can help you develop a plan for fixing the radon problem. Reduction methods can be as simple as sealing cracks in floors and walls or as complex as installing systems that use pipes and fans to draw radon out of the building.

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EPA has a National Radon Program to inform the public about radon risks, train radon mitigation contractors, provide grants for state radon programs, and develop standards for radon-resistant buildings. EPA works with health organizations, state radon programs, and other federal agencies to make the program as effective as possible.

For more information about radon, its risks and what you can do to protect yourself, call 1-800-SOS-RADON and request a free copy of EPA's *A Citizen's Guide to Radon*. You may also call the Radon Fix-It Line at 1-800-644-6999 between noon and 8pm Monday through Friday, EST/EDT, for information and assistance. This toll-free line is operated by Consumer Federation of America, a nonprofit consumer organization.

NOTE FROM AARON: And it does not just come from the ground. Do you have or are you considering purchasing granite counter tops? Watch this: <http://www.youtube.com/watch?v=ID0ln4zxMK0&feature=email>

ADDENDUM: MOLD AND MOISTURE

Many homes have excessive moisture issues that might lead to mold growth, but the ability to detect the presence of mold is beyond the scope of this inspection. If you are concerned about the presence of mold you are strongly urged to consult with a qualified professional microbiologist, mycologist or mold inspector prior to purchasing this home.

Remember this:

Mold has been around since the beginning of time. Mold needs moisture to grow; if you don't have moisture, you don't have mold.

Translation: Treat all moisture problems, water damages, and condensation issues in the same manner as you would a fire. Most mold problems are caused by a lack of urgency for a moisture problem.

Mold begins to grow in wetted building materials as soon as 48 hours. It is vital that the material be dried as quickly as possible.

Fix the leaks, or source of water, don't ignore, or delay, but fix right away.

Read this for our company's opinion on the mold issue: <http://forensic-applications.com/moulds/habits.html>

Read all of these as well:

<http://www.dshs.state.tx.us/mold/>

<http://www.epa.gov/mold/>

<http://www.cdc.gov/mold/>

<http://www.cdc.gov/mold/cleanup.htm>

<http://www.responsiblemoldsolutions.org/index1.htm>

<http://oehc.uchc.edu/CIEH.asp>

<http://www.epa.gov/mold/moldguide.html>

<http://www.epa.gov/iaq>

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Mold assessment must be performed by a licensed technician. See:
<http://www.dshs.state.tx.us/mold/pdf/MoldAssessmentTechnician.pdf>

Mold abatement must be performed by a licensed abatement company. See:
<http://www.dshs.state.tx.us/mold/pdf/MoldRemediationCompany.pdf>

Texans' Worries About Mold Are Way Out Of Hand

By Gailen D. Marshall, director of the Division of Allergy & Clinical Immunology at the University of Texas Medical School at Houston

What do these things have in common: wine, penicillin, cheese, beer and mushrooms? Can't guess? Here is a big hint: It also is the latest dubious health scare costing Texas consumers millions of dollars in higher insurance premiums and needless home "health" testing, and it is being used as a get-rich-quick scheme for some personal injury lawyers. Ah, now you know – it is called mold.

So how did this very common type of fungus, present in all sorts of good things we use on a daily basis and ever present in our environment, grow into a major consumer crisis? The answer may surprise you.

As a board-certified allergist-immunologist, I have taught, done research and seen patients with a variety of immune-based medical conditions for 14 years. In the past several years, my clinical office has become increasingly populated by very frightened, sometimes angry individuals. They believe, or have been told, they have "toxic mold disease." But do they really?

First, let's examine some facts about mold. There are many different kinds of mold – at least 10,000 common types. Mold is everywhere, because it simply requires a source of water, sugar and oxygen along with a friendly surface to thrive and grow. In places where a lot of water is in the air itself (like Texas), mold easily finds comfortable growth sites and is especially prosperous.

Is mold harmful to people? Can molds cause memory loss, fatigue or brain damage? For most people, the answer is a resounding, and hopefully reassuring, "no!" The world is filled with mold – we breathe it, we eat it, and we drink it every day with no ill effects. Some people do develop allergies and experience symptoms of asthma or hay fever when exposed to some mold spores. There also are a few mold-related diseases that can be serious, but those are rare. So what about the "experts" who claim to diagnose all sorts of mold-related illnesses such as memory loss or learning disabilities? There is no proof to support those claims.

Still, even though health risks may be vastly exaggerated, most people would rather not have excess, visible mold in their homes. If there is a lot of mold, it looks bad, and it has an unpleasant odor. But removing mold is relatively simple. If you have mold, you have excess moisture, and that needs to be eliminated, whether it is a roof leak, a shower leak or condensation. Often, the mold simply can be cleaned off and won't return if the moisture is removed. (more)

Should you pay for a "mold test"? No. The nation's most reputable experts, including the Centers for Disease Control and Prevention and the reigning mold expert from Harvard's School of Public Health, don't support most home mold testing. If you see or smell mold in your home, clean it up and stop the source of water. It is that simple.

Should you panic? To me, this is the most important issue of all. You need to react to mold based on the facts, not on the hysteria and hype you may have heard or read. The mold scare already is having a troubling effect on the Texas economy and on individual lives. Texas insurance rates already are more than double the national average and are continuing to rise based in large part on mold-related claims. Moreover, families are being moved out of their homes by testers and remediaters and having their lives disrupted – most for no legitimate reason whatsoever.

The bottom line is this: If you are ill, see a physician. If he thinks you may have mold allergies, ask to be tested by a reputable specialist who has the credentials to provide calm, reliable medical information – then follow your doctor's direction for treatment. Don't be afraid to discuss with him why he thinks mold is causing your problems.

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If you see or smell mold in your home, simply clean it up and plug the water leak. If you need an expert to help, find a reputable person or company trained in moisture management to find and fix the water source. And perhaps most important, if someone comes to you to try to assess blame for the mold "exposure," ask yourself whether you want the aggravation, expense and frustration associated with trying to get compensated for the everyday risks associated with living on our planet.

Gailen D. Marshall Jr. is director of the Division of Allergy & Clinical Immunology at the University of Texas Medical School at Houston.

Editor's Note: This article appeared in The Dallas Morning News, Sunday, July 14, 2002, and is now available for distribution.

ADDENDUM: EMF

Typical residential exposures, not close to operating appliances or household wiring, are about 1 mG. A milligauss (mG) is the unit of magnetic field intensity.

Intensity is considered to be related to the potential for risk. Exposure intensity decreases as distance from power lines increases. If there is a risk, then increased distance from power lines would be expected to reduce risk.

Other factors may contribute to exposure intensity in a residence. A magnetic field exposure measurement is best way to assess the exposure situation. Many power companies provide this service.

So far, EPA has not issued an official statement on the issue of EMF exposure and health risk. However, other credible organizations have evaluated information about exposure and effects and have come to conclusions about risk. The conclusions of two of these assessments follow.

In June , 2001, an expert scientific working group of the International Agency for Research on Cancer (IARC), a World Health Organization agency, concluded that ELF magnetic fields are possibly carcinogenic to humans, based on consistent statistical associations of high level residential magnetic fields with a doubling of risk of childhood leukemia. Analyses of data from a number of well-conducted studies show a fairly consistent statistical association between a doubling of risk of childhood leukemia and power-frequency (50 or 60 Hz) residential extremely-low frequency (ELF) magnetic field strengths above 0.4 microTesla (4 milligauss). No consistent evidence was found that childhood exposures to ELF electric or magnetic fields are associated with brain tumours or any other kinds of solid tumors. The epidemiological studies included in the IARC evaluation found that children who are exposed to residential (ELF) magnetic fields less than 0.3 to 0.4 microTesla (3 to 4 milligauss) have no increased risk for leukemia. No consistent evidence was found that residential or occupational exposures of adults to ELF magnetic fields increase risk for any kind of cancer.

In addition, an assessment of health effects from exposure to ELF electric and magnetic fields (EMFs) by an expert working group, organized by the National Institute of Environmental Health Sciences (NIEHS)/National Institutes of Health, found that that EMFs are possible carcinogens for children exposed to EMFs at home (June 1998) based on epidemiological studies of residential exposure and childhood leukemia. The NIEHS working group also concluded that the results of in animal, cellular, and mechanistic studies do not confirm or refute the finding of the epidemiological studies. The NIEHS Working Group Report is available on the EMFRAPID Program website, <http://www.niehs.nih.gov/health/topics/agents/emf/index.cfm>

ADDENDUM: Foundation Design on Expansive Soils

Designing foundations to perform as intended on the undulating expansive clay soils of North Central Texas is an exacting task. It is estimated by the International Association of Foundation Drilling that these types of soils are

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responsible for \$12.5 billion of damages throughout the country each year. Because of this, extreme care must be taken in both the design and construction of such foundations in order to prevent poor performance and failure. The degree of care required is such that the applicable building code, the International Residential Code, defers to the more restrictive International Building Code, usually reserved for commercial structures.

Along with the regulating organizations specified by the design engineer, each of these regulations requires thorough documentation of the procedures outlined for the design and construction of foundations. Engineered systems designed to withstand extraordinary building site conditions also require extraordinary attention to detail in their design, documentation and implementation. Clear and concise communication between the designer, the geotechnical engineer, the builder, the materials suppliers, and the contractors involved in the construction is imperative. This communication is necessarily required to be accurately recorded so that the construction process can be clearly understood and executed by everyone from the designer to the contractors in the field.

SOILS

Because the expansive clay soil is at the heart of the matter the pertinent building codes and the regulations of the other organizations referenced therein require thorough site-specific soil (geotechnical) testing in order to ascertain the bearing strength and other properties of the soil so that the foundation is designed accordingly. These tests require, among others, soil boring, sampling, and laboratory testing by a licensed professional geotechnical engineer. The requirements for detailed documentation of this process are spelled out in great detail in the many different applicable regulations.

The Wire Reinforcement Institute (WRI) states in part, "It is considered imperative that a soils investigation be made on any site on which a design is to (be) prepared. For a small site with one structure, the minimum is obviously one test boring, which should be made where the worst soil condition is anticipated; i.e., where fill is located, or where the worst clay is suspected. If it is not obvious, then more than one test hole is indicated. In no case should a design be attempted without an adequate soils investigation of the site. For large sites with large structures or more than one structure, several test holes must be used. In planning the investigation, plan for the worst.", and "The ultimate performance of a slab reflects how well the soil analysis was done. Slab design is only as good as the soil data on which it is based."

SOIL COMPACTION

The geotechnical engineer is also required to oversee the removal of any existing structures or vegetation from and specify any fill soils required to be added to any given site. Removal of underground structures and vegetation results in voids in the grade which must be filled with soil that is both tested and approved by a geotechnical engineer.

The fill soils must also be compacted in order to approximate the consistency of the adjacent undisturbed or native soils. This compaction is also required to be both specified, overseen, and documented by the geotechnical engineer.

FOUNDATION REINFORCEMENT

The foundation itself must adhere to myriad specifications in order to withstand the movement of the soil upon which it is built and to properly maintain the structure which it carries. Concrete's natural lack of tensile strength is overcome by the addition of reinforcement. In order to overcome the extreme bending which is experienced in expansive soils the prestressed post-tensioning method of reinforcement, in which tensile steel cables are put under enormous stress after concrete curing to produce a clamping load, was developed and is used in most residential construction in the North Central Texas area. This system consists of a number of components which are required to be designed and specified by a licensed professional engineer.

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The Post-Tensioning Institute regulates the design and construction of post-tensioned foundations and requires exacting oversight of the process as well as full documentation of every stage of the project from the design, to the list of components to their prescriptive installation instructions in order to ensure conformance with the engineer's specifications and the eventual performance of the structure. This oversight and documentation includes, but is not limited to, inspection and reporting at every stage of construction, detailed materials lists and invoices, stressing equipment calibration logs, tendon stressing logs, etc.

CONCRETE

The final stage in the construction of the foundation is the placement of the concrete. This process also requires painstaking oversight and documentation in order to achieve the desired results. Concrete is produced through a chemical process called hydration which requires extremely exact measurement and mixing of the various materials of which it is composed. All along the route from the design engineer's specification to the concrete plant batch master to the cement truck to the placement in the forms by the concrete contractor this building material must be closely observed, tested and documented. These tests and documentation include, but are not limited to logs kept by the concrete plant, the concrete truck driver and the placement contractor, as well as slump tests and core sampling. All of these procedures are intended to ensure the quality of the concrete and its performance over time.

CONCLUSION

On any construction project the collection and maintenance of thorough documentation is imperative to ensure building code compliance, proper construction and adequate performance of the structure over time. Without this documentation the materials employed and the steps taken during construction cannot be ascertained and the structure cannot reasonably be depended on to serve its intended function. **You are strongly urged to obtain all required documentation pertaining to the design and construction of this foundation prior to closing escrow on this home.**

ADDENDUM: Property Owner Site Consideration for Foundation Performance

Construction and Maintenance

The performance of residential structures built on ground supported concrete foundations depend not only on proper design and construction, but also on proper foundation environment maintenance performed by the occupant or owner of the property. Many residential foundations have experienced problems as a result of improper installation, maintenance or alterations of the drainage system and landscaping.

A properly designed and constructed foundation may still experience distress from soils which undergo volume changes caused by non-climatic moisture sources such as leaking pipes or irrigation.

Initial site grading shall provide positive drainage away from the foundation perimeter. The site drainage plan developed by the civil engineer should be maintained during the design life of the structure. Positive drainage, to prevent water from ponding next to foundations, is imperative in minimizing soil related foundation problems. Drainage or other discharge channels should be kept clear at all times of all debris in order to allow water discharge away from the building footprint.

The most commonly used technique for positive drainage is grading away from the foundation to promote rapid runoff and to avoid ponding water near the foundation. Poor drainage or ponding water can cause a change in soil moisture content, resulting in swelling of the supporting soils, causing foundation movements. Recommendation for positive drainage is 3% to 5% slope for a minimum distance of 10 feet from the edge of the foundation. Berming of landscape beds, while visually appealing, can create a damming effect between the berm and the foundation that may prevent

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water from draining away. Special attention must be paid to these areas by providing additional precautions, such as area drains. Area drains must be checked periodically to ensure that they are functional.

Should the site drainage be inadequate, properly compacted select fill material can be provided to reestablish positive drainage. The builder can be contacted to obtain information from the geotechnical engineer's report regarding the type of select fill material and the degree of compaction necessary to provide adequate drainage. Proper compaction is required to minimize subgrade settlements near the foundations and to prevent subsequent ponding of surface water.

Improper fill materials and/or compaction may result in the appearance of positive drainage; however, the drainage may not be effective as in the case of permeable sands placed on top of an expansive clay layer that is not sloped away from the foundation. If the reestablishment of positive drainage is not possible, and alternate area drain system may be provided.

Foundation design for sites with greater than 9% slope should insure that ground water is not trapped on the cut (uphill) side of the foundation and that the drainage provided to remove this water from around the structure is far enough away, (minimum 5 feet from the edge of the structure) as to prevent the undermining of the foundation by the water flow. This drainage can also minimize the seepage through backfills into adjacent basement walls.

Subsurface drains may be used to control a rising water table, groundwater, underground streams, and surface water penetrating through pervious, fissured or highly permeable soil; however, drains cannot stop the migration of moisture into the soil beneath the foundation. Moisture barriers, while expensive, can be effective if placed near the edge of the foundation to minimize moisture migration. The geotechnical engineer can recommend the proper depth for a moisture barrier system depending upon the type of soil and the climatic conditions prevalent in the area where the foundation is constructed.

Roof drains should be tied into the area drainage system (where present) or direct water away from the foundations. Property owners should also be aware of the potential hazard of leaky swimming pools, irrigation systems, or plumbing. A noticeable increase in monthly water bills can indicate a problem that should be corrected immediately.

It is important to note that consistent moisture content of the supporting soils is the key to proper foundation performance. In areas where silt or sandy material is present, excessive water can cause the soil to lose bearing capacity. In areas where expansive clays are present, excessive water can increase swelling and insufficient moisture will cause the shrinkage of the supporting soils.

The following is a list of items to be considered when planning proper foundation maintenance:

- (1) Maintain positive drainage away from the foundation and install drainpipes (if applicable). Never allow water to pond near or against the foundation.
- (2) Replace and compact any loose fill adjacent to the foundation with native soil; do not use sand or a granular material.
- (3) Check gutters and downspouts to be sure that they are clear and that the water is discharged away from the foundation area.
- (4) Avoid seasonal drying around the perimeter of the foundation.
- (5) Existing vegetation near the foundation typically draws added water from the adjacent soil towards the foundation, thus causing added soil movement.

The objective of a proper maintenance program is to maintain as near constant moisture content as possible for the soil around the perimeter and under the foundation.

It is recommended that all property owners conduct a yearly survey of their foundation and perform any maintenance necessary to improve drainage and prevent ponding of water adjacent to these structures. This is especially important during the first ten (10) years after construction because this is usually the time when the most severe adjustment between the new foundation and its support soil occurs.

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Property owners should also be made aware of the precautions that are to be taken when modifying or cutting holes in foundation slabs reinforced with unbonded post-tensioning tendons. An expert should only ever accomplish this.

Landscaping

Ground supported slabs constructed using proper foundation design, construction techniques and adequate drainage systems can still experience distress if the site slope, type of vegetation, surrounding landscape and irrigation water supply is not properly selected and maintained. One of the most critical aspects of landscaping is the continuous maintenance of properly designed slopes. Installing flowerbeds or shrubs next to the foundation and keeping the area flooded will result in localized swelling. This expansion may result in added edge lift of the foundation system.

It is recommended that initial landscaping or hardscape be done on all sides and that drainage away from the foundation be provided and maintained. Partial landscaping on one side of the foundation may result in swelling on the landscaped side due to added non-climatic irrigation water. This can cause differential movements resulting in non-serviceable slabs or foundations.

Landscaping is often overlooked by property owners as an area that may contribute to possible foundation problems. When planning flowerbeds or locations of trees and shrubs, consideration must be given to the effect that vegetation may have on existing drainage patterns. Landscaping should be installed so as to avoid water ponding or standing at any location around the perimeter of the foundation. Positive drainage away from all foundations and off the property is critical to the performance of any slab foundation supported on the ground. Landscaping and ground cover can help prevent erosion and, if properly maintained, protect the ground from loss of moisture.

Caution must also be taken when new patios and fences are installed. Water must at all times drain away from such structures and follow the drainage pattern previously established. Remember that any changes in the exterior layout of the property, flowerbeds, decks, patios, fences, trees and shrubs, must be planned such that positive drainage away from any foundation structure and off the property is provided at all times.

Sprinkler systems are beneficial in maintaining uniform moisture content in the soils that surround the foundation slab; however, they should be placed around the entire perimeter of the foundation. Precautions, such as the proper backfilling of excavations form the sprinkler lines, location of valve boxes a minimum of five feet (5') away from the foundation edge, monitoring for leaks and setting controls so that a uniform amount of water is achieved for all areas are important factors to consider if a sprinkler system is to be beneficial.

Trees located near a foundation can be a potential contributing factor to foundation distress. Experience has shown that the presence of or the removal of large trees that are in close proximity to residential foundations can cause long-term problems. Depending on the type of tree, proximity to the edge of the foundation and its size, vertical movements in the foundation by as much as 3 – 5 inches are not uncommon.

This problem can be aggravated in most areas by cyclic wet and dry seasons; however, the condition will be most severe during extreme droughts. Trees that require large amounts of water or that have large surface root systems such as willow, elm or oak are the most detrimental to foundation performance. It is recommended that trees not be planted closer than half of the anticipated canopy diameter of the mature tree or 20 feet from the edge of the foundation, whichever is the larger distance. Existing trees that are closer than this should be thoroughly soaked at least twice each week during dry periods and once each week during periods of moderate rainfall. Close monitoring of the surface root system may indicate that more frequent watering is required. Root barriers are effective in protecting foundation while preserving the beauty of mature trees. The system should be placed adjacent to the foundation, be constructed of monolithic concrete or other impermeable solid material, be a minimum of 36 inches deep and extend the full length of the tree canopy. Whether the barrier will be truly permanent is questionable because the roots may be able to grow around or under the trench; however, it should at least increase the time it takes for the roots to grow back. In all cases you should check first with a certified arborists before installing root barriers.

In areas with expansive soil conditions, the root systems of trees and large bushes tend to dry up the soil. When they are removed, soil swelling or heaving of the soil may occur. Studies have shown that this swelling can last as long as 20 years depending on the size and extent of the root system. Foundations that are built in heavily wooded areas on

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expansive clay soil should be designed with this anticipated vertical expansion considered. Alternatively, the site can be left alone for several years after removal of the trees and/or large bushes to allow the moisture of the desiccated area to stabilize; however, this option is not generally considered practical. Tree removal can be safely accomplished provided that the tree is no older than any part of the house since the subsequent heave can only return the foundation to its original level. There is no advantage to staged reduction in the size of the tree; therefore, if a tree is to be removed, it should be removed completely at the earliest possible opportunity. When a tree is older than the foundation, it is not considered advisable to remove the tree because of the danger of inducing damaging heave, unless the foundation was designed for the total computed vertical movement. This process does not occur for foundations built on non-expansive sandy soil conditions.

If the anticipated heave caused by the removal of a tree is too large, some kind of pruning, such as crown thinning or crown reduction can be considered. Pollarding, where most of the branches are removed and the height of the main trunk is reduced, though often mistakenly specified, is not a viable option. Most published advise links the height of the tree to the likelihood of damage when in fact it is the leaf area that is most important; therefore, crown thinning or reduction in which some branches are shortened or removed is the preferred method. Pruning should be done in such a way as to minimize future growth while maintaining shape and without leaving the tree vulnerable to disease. In all cases this should be done by a qualified arborists (preferable), or a tree surgeon or landscaping contractor under the supervision of an arborist. In some cases there may be some opposition to the removal or reduction of size of an offending tree. The property owner, a neighbor, local authorities or a Tree Preservation Order may require that alternate methods, such as root barriers, be utilized. In this case, the property owner needs to be made aware of the risk of property damage that can result from leaving the tree.

Every property owner should conduct a yearly survey of the foundation and perform any preventative maintenance necessary to improve drainage and minimize the effects of landscaping and existing vegetation on the foundation. Special attention is important during the first 10 years after the foundation is constructed as this is the time of the most severe adjustment between the new construction and the environment; however, this condition can change yearly for the life of the foundation.

ADDENDUM – HVAC Systems

Residential heating and air conditioning systems are almost without exception improperly designed and installed. In fact, most builders do not have the systems professionally designed. In reality, little thought is given to the proper installation of the system in your home which will use the most energy. Though the information on proper installation has been readily available to builders and contractors for decades, it is rarely heeded. The result is that the heating, cooling and ventilating systems in most homes are very inefficient and unnecessarily costly to operate.

At a minimum your system should be designed by a licensed professional HVAC engineer and installed by a licensed HVAC contractor in strict accordance with the American Society of Heating, Refrigerating and Air-Conditioning Engineers' specifications as set forth in ASHRAE Manual J, Residential Load Calculation; Manual S, Residential Equipment Selection; and Manual D, Residential Duct Systems. Because the design and installation of a home's heating and cooling system requires the efforts of several different specialists beginning with the system design by an HVAC engineer and ending with the proper installation by a licensed HVAC contractor, it is beyond the scope of this inspection to ascertain with a great degree of accuracy its correct design, installation and performance.

Critical issues that must be properly addressed on most existing systems, but cannot be addressed within the scope of a general home inspection, are:

- (1) Verification of proper airflow in the system
- (2) Verification of proper refrigerant charge.
- (3) Verification of properly sealed ducts.

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Air handler and furnace units should be installed in conditioned air, that is, they should be installed within the interior of the home, such as in an interior closet. Common installations in unconditioned attics and crawl spaces do not allow for optimum performance and can prematurely age systems.

The use of flexible ductwork is widespread, but not suggested. Smooth sheet metal ducts are required for optimal performance and durability.

Load calculations should be performed for each room of the house, instead, when practiced at all, of the common whole house calculation approach.

You are strongly urged to have your new or existing home's HVAC system further analyzed by a licensed professional HVAC engineer who can provide you with remedial options.

See:

<http://www.bestofbuildingscience.com/videos.html>

<http://www.eere.energy.gov/consumer/>

<http://www.toolbase.org/Technology-Inventory/HVAC/hvac-sizing-practice>

ADDENDUM: Clothes Dryer Ducts

The decrease in efficiency due to friction losses in an excessively long dryer duct system will reduce the system's ability to convey the warm, moist air from the dryer to the exterior duct outlet. This will require the clothes dryer to be operated for longer periods to dry clothes. The reduced air flow velocity and greater potential for condensation in excessively long dryer duct systems may also initiate a cycle of lint build-up inside and along the developed length of the duct which, in turn, will restrict air flow through the duct and create an additional load on the dryer. Clothes dryer lint is extremely flammable. Lint accumulation around clothes dryer heating elements or burners creates a very real fire hazard. Therefore, not only does an excessively long and/or restricted dryer duct reduce the serviceable life of the appliance, it also increases the potential for ignition of dryer lint.

An excessively long dryer duct system for exhausting an electric dryer can result in overheating of the dryer and an increased potential for a fire to occur in the appliance. In a dryer duct system exhausting a gas-fired dryer an excessively long dryer duct system can lead to corrosion of the duct, back-drafting of or leaking of combustion by-products, and an increased potential for the introduction of CO (carbon monoxide) into the air in the interior of the home. It may also create an increased potential for a fire to occur in the appliance. Since dryer lint is extremely flammable, if it cannot be properly exhausted and it builds up around and inside the dryer, the potential for a fire at the appliance is increased.

It is often not practically feasible for an inspector to determine with any degree of accuracy the configuration of dryer ducts enclosed in walls and ceilings, or covered with insulation in attics. Additionally, different dryer models have different venting requirements. You are strongly urged to have this dryer ducting system inspected by an HVAC technician to determine if it is adequate for use with your particular model of clothes dryer.

See: <http://preview.cpsc.gov/Regulations-Laws--Standards/Voluntary-Standards/Voluntary-Standards-Topics/Clothes-Dryers/>

http://vcisafety.org/dryer_vent_fires.cfm

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ADDENDUM: GROUND FAULT CIRCUIT INTERRUPTER (GFCI) DEVICES

I have received quite a few questions about grounded circuits and ground fault circuit interrupters. The normal home circuits have a hot leg, usually a dark color wire, black, blue, red (anything except green); a neutral leg, usually a white or light grey wire and, in a grounded circuit, a green grounding wire. To better understand how it works, imagine electrons running along the hot wire into the appliance providing energy then along the white wire back to the power company's pole, where it is grounded. Electricity runs along the wires trying to go back to the ground. Naturally, the electricity will seek the shortest path with the least resistance to ground. When you come in contact with a live wire, you become the white current carrying wire to the ground. The electric current runs through your body, "short circuits" your heart and causes ventricular fibrillation and death. The green ground wire is there to provide a second shorter path to ground, with less resistance than the white wire provides. It also provides a constant path for the appliance, improving safety over a two-wire ungrounded system. Technology has provided us with GFCI (ground fault circuit interrupters) to break the circuit. GFCIs contain a small current transformer. The circuit conductors pass through the transformer, creating equal magnetic fields that balance. If the circuits become different, the transformer amplifies the difference and sends a signal to a solid-state control circuit that activates a trip mechanism to break the circuit. At one-fourth of a milliamp, you can feel the current. At 8 millamps, death can occur if the duration is longer than 15 percent of the heart's cycle. At 10 millamps, you can't let go, and respiratory paralysis can occur. At 30 millamps, you go into ventricular fibrillation and death. Remember, we are talking about millamps. The branch circuits in your home are 15 or 20 amps. When a home is inspected, the certified home inspector should test all GFCI (ground fault circuit interrupter circuits) not only for correct polarity and that they trip, but also that they trip below 8 millamps and within milliseconds. Having the advanced equipment to thoroughly and accurately test your circuits can save lives.

WARNING: Severe electric shock or death can occur if a person touches the energized (line or hot) conductor and neutral conductor at the same time, even if the circuit is GFCI protected. This is because the current transformer within the GFCI protection device doesn't sense any imbalance between the departing and returning current. Therefore, the switching contacts remain closed.

When a GFCI protection device fails, the switching contacts remain closed and the device continues to provide power—providing no GFCI protection.

A new study from the Leviton Institute, the educational and training arm of Leviton Manufacturing, has found that a high percentage of ground fault circuit interrupters (GFCIs) installed in homes didn't work when they were tested, and might not protect people from an electrical ground fault.

A ground-fault can occur when current leaks from an electrical circuit, for example, through damaged wiring or a defective appliance. GFCIs are designed to detect ground faults and shut down the circuit if they occur. The GFCI Circuit Breaker Field Study, sponsored by The Leviton Institute, reviewed data from 13,380 building inspections and found that on average, 15% of GFCIs were inoperative when tested. The study found a much higher incidence of failure in areas where lightning is prevalent. In those regions, as many as 58.2% of GFCIs were found to be inoperative.

"GFCIs don't last forever," said Steve Campolo, lead investigator in the study. "Voltage surges from lightning, utility switching and other sources all take their toll on the devices. That's why Underwriters Laboratories requires that GFCIs be tested monthly." The results from the study additionally suggest that many homeowners either aren't testing the devices or are ignoring the results.

Traditional GFCI designs may compound the problem. For example, most GFCIs will continue to deliver power even if ground-fault protection has been compromised. "It's natural for users to assume that all is well if the GFCI is still delivering power," Campolo said. New "lockout-action" GFCI receptacles now coming on the market offer greater protection. If the GFCI is tripped, it can't be reset unless it's working properly.

The study used data collected by home inspectors who met membership requirements of the American Society of Home Inspectors. The Leviton Institute is the educational arm of The Leviton Manufacturing Co., Little Neck, N.Y. Its

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mission is to educate consumers, specifiers and others about the benefits of today's electrical wiring devices and systems and to promote the safe use of electrical devices in the home. Leviton Manufacturing Co. offers a wide variety of industrial, commercial and residential wiring products and offers its distributor customers a full range of training, education, marketing, merchandising and other customer-driven support programs. Equipped with the latest in R&D and design and testing facilities, Leviton continually introduces high-quality devices that set the pace of progress in the industry.

For more information, contact Leviton Manufacturing Co., Inc., 59-25 Little Neck Parkway, Little Neck, N.Y., 11362-2591; Phone: (800) 323-8920; Tech Line: (800) 824-3005; Fax: (800) 832-9538.

These failures were primarily attributed to damage from short circuits and voltage surges (lightning and other transients) to the metal oxide varistors (MOVs) used for built-in surge suppression. In areas of high lightning activity (such as Southwest Florida), the failure rate for GFCI circuit breakers was more than 57%.

For these reasons the manufacturers of GFCI devices recommend that the devices be tested every 30 days.

1. Visually inspect the device for obvious defects and broken parts (***do not continue if the device is broken!***).
2. Press the reset button (or check for voltage at the device) to determine if it is tripped.
3. If device was found in a tripped state (no voltage, or you hear or feel a "click" when you press the reset button), be suspicious - ground fault protection may be inoperative when voltage is present after the device is reset - DO NOT USE until you complete the following test sequence!
4. Press the test button and observe that the device trips (hear or feel a "click").
5. Verify no voltage at the outlet (a voltage meter, load device, or trouble light will work).
6. Press the reset button and verify that power is restored.

If the device fails to respond in the expected manner at any stage of the test, then it should not be used. Call an electrician to replace the device.

<http://www.cpsc.gov/cpscpub/pubs/099.pdf>

http://www.leviton.com/OA_HTML/SectionDisplay.jsp?section=42316&minisite=10251

ADDENDUM: ARC FAULT CIRCUIT INTERRUPTER (AFCI) DEVICES

THE AFCI

The "AFCI" is an arc fault circuit interrupter. AFCIs are newly developed electrical devices designed to protect against fires caused by arcing faults in the home electrical wiring.

THE FIRE PROBLEM

Annually, over 40,000 fires are attributed to home electrical wiring. These fires result in over 350 deaths and over 1,400 injuries each year¹. Arcing faults are one of the major causes of these fires. When unwanted arcing occurs, it generates high temperatures that can ignite nearby combustibles such as wood, paper, and carpets. Arcing faults often occur in damaged or deteriorated wires and cords. Some causes of damaged and deteriorated wiring include puncturing of wire insulation from picture hanging or cable staples, poorly installed outlets or switches, cords caught in doors or under furniture, furniture pushed against plugs in an outlet, natural aging, and cord exposure to heat vents and sunlight.

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HOW THE AFCI WORKS

Conventional circuit breakers only respond to overloads and short circuits; so they do not protect against arcing conditions that produce erratic current flow. An AFCI is selective so that normal arcs do not cause it to trip.

The AFCI circuitry continuously monitors current flow through the AFCI. AFCIs use unique current sensing circuitry to discriminate between normal and unwanted arcing conditions. Once an unwanted arcing condition is detected, the control circuitry in the Ault, Singh, and Smith, "1996 Residential Fire Loss Estimates", October 1998, U.S. Consumer Product Safety Commission, Directorate of Epidemiology and Health Sciences.

AFCI trips the internal contacts, thus de-energizing the circuit and reducing the potential for a fire to occur. An AFCI should not trip during normal arcing conditions, which can occur when a switch is opened or a plug is pulled from a receptacle.

Presently, AFCIs are designed into conventional circuit breakers combining traditional overload and short-circuit protection with arc fault protection. AFCI circuit breakers (AFCIs) have a test button and look similar to ground fault circuit interrupter (GFCI) circuit breakers. Some designs combine GFCI and AFCI protection. Additional AFCI design configurations are anticipated in the near future.

It is important to note that AFCIs are designed to mitigate the effects of arcing faults but cannot eliminate them completely. In some cases, the initial arc may cause ignition prior to detection and circuit interruption by the AFCI.

The AFCI circuit breaker serves a dual purpose – not only will it shut off electricity in the event of an "arching fault", but it will also trip when a short circuit or an overload occurs. The AFCI circuit breaker provides protection for the branch circuit wiring and limited protection for power cords and extension cords. Single-pole, 15- and 20- ampere AFCI circuit breakers are presently available.

WHERE AFCIs SHOULD BE USED

The 1999 edition of the National Electrical Code, the model code for electrical wiring adopted by many local jurisdictions, requires AFCIs for receptacle outlets in bedrooms, effective January 1, 2002. Although the requirement is limited to only certain circuits in new residential construction, AFCIs should be considered for added protection in other circuits and for existing homes as well. Older homes with aging and deteriorating wiring systems can especially benefit from the added protection of AFCIs. AFCIs should also be considered whenever adding or upgrading a panel box while using existing branch circuit conductors.

INSTALLING AFCIs

AFCI circuit breakers should be installed by a qualified electrician. The installer should follow the instructions accompanying the device and the panel box. In homes equipped with conventional circuit breakers rather than fuses, an AFCI circuit breaker may be installed in the panel box in place of the conventional circuit breaker to add arc protection to a branch circuit. Homes with fuses are limited to receptacle or portable-type AFCIs, which are expected to be available in the near future, or AFCI circuit breakers can be added in separate panel boxes next to the fuse panel box.

TESTING AN AFCI

AFCIs should be tested after installation to make sure they are working properly and protecting the circuit. Subsequently, AFCIs should be tested once a month to make sure they are working properly and providing protection from fires initiated by arcing faults. A test button is located on the front of the device. The user should follow the instructions accompanying the device. If the device does not trip when tested, the AFCI is defective and should be replaced.

AFCIs vs. GFCIs

The AFCI should not be confused with the GFCI or ground fault circuit interrupter. The GFCI is designed to protect people from severe or fatal electric shocks while the AFCI protects against fires caused by arcing faults. The GFCI

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also can protect against some electrical fires by detecting arcing and other faults to ground but cannot detect hazardous across-the-line arcing faults that can cause fires.

A ground fault is an unintentional electric path diverting current to ground. Ground faults occur when current leaks from a circuit. How the current leaks is very important. If a person's body provides a path to ground for this leakage, the person could be injured, burned, severely shocked, or electrocuted.

The National Electrical Code requires GFCI protection for receptacles located outdoors; in bathrooms, garages, kitchens, crawl spaces and unfinished basements; and at certain locations such as near swimming pools. A combination AFCI and GFCI can be used to satisfy the NEC requirement for GFCI protection only if specifically marked as a combination device.

NUISANCE TRIPPING

Another argument against the use of AFCIs is over the issue of nuisance tripping. However, consistent findings throughout the AFCI implementation process have revealed that the majority of the nuisance trip issues are related to installation problems specifically the wiring practices of some electricians. Specific examples include reversing neutral and ground wires, shared neutral wiring on single-pole circuits, and ground wires touching neutral wires.

Electrical contractors have been very active in providing information about these types of wiring problems. Many contractors indicate that the initial installation issues associated with wiring errors have disappeared as the installers become more familiar with the installation and operation of AFCIs.

One common misconception is that AFCIs are not tested for nuisance tripping on real-world products and circuits. Between all of the AFCI manufacturers' products, there are now millions of operating hours with AFCIs (both in field tests and in new and existing homes) that showcase the successful performance of AFCIs in protecting new and old appliances. These tests include the new combination AFCI.

Nuisance tripping is a random occurrence that is practically infeasible for a home inspector to discover in the course of a one-time visual inspection of a property. If you are experiencing nuisance tripping of your AFCI breakers, contact a licensed electrician to do a thorough evaluation of the installation and make repairs or replacements as he deems necessary.

ADDENDUM: Warning Concerning Utility Lines Near Roof Decks

The Roofing Contractors Association of Texas has issued the following warning to persons who have service lines installed in proximity to the underside of roof decks:

CAUTION: ACCIDENTAL PUNCTURING OF SERVICE LINES INSTALLED NEAR THE UNDERSIDE OF ROOF DECKS MAY POSE A RISK OF GAS LEAKS, ELECTRIC SHOCK, WIRING SHORTS, FIRE HAZARDS, CABLE AND SATELLITE RECEPTION PROBLEMS, WATER AND HVAC CONDENSATE LEAKS. ROOFING INSTALLERS ARE NOT ABLE TO SEE THROUGH PLYWOOD OR OTHER TYPES OF ROOF DECKING TO CHECK FOR IMPROPERLY-INSTALLED SERVICE LINES.

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satellite, gas lines (including freon and other refrigerants) as well as other service lines be installed where they are not likely to be hit by nails. Roofers nailing through a plywood deck are unable to see or to know that one of these lines might be installed in an unsuitable way or in an unsuitable area since they are not visible even with the roofing material removed from the deck.

The IRC calls for installing these type lines far enough away from surfaces that may be subject to nailing to prevent nails from reaching them. In the rare cases where space limitations do not permit enough space, the lines are supposed to then be installed with appropriate "nail shields" that will divert nails to one side or the other of a line.

In the vast majority of the cases where a puncture occurs, lines have been found to be improperly "tucked" or 'nested' into an area near the junction of a rafter and the roof deck. This is an improper installation of the line in most cases since a rafter is 5 1/4 inches in height where it meets the decking. The proper place for the line to have been run and secured is at least 2 1/2 inches below the roof deck or about halfway in between the bottom and top edges of the rafter. Those lines could also be installed underneath the rafter and moved slightly upward where the rafter meets a top plate.

Nails that secure roofing to plywood decking are REQUIRED to penetrate that sheathing PAST the point of the nail so they MUST be nailed all the way through the plywood until part of the straight shank of the nail is exposed. This is a must for proper fastening of the roofing material. In the case of open soffits, an exception can be made for cosmetic reasons that might splinter tongue and groove wood that shows on the exterior of the home but inside the attic, this exception is not allowed unless the nail penetrates at least 3/4 of an inch into SOLID sheathing (not recommended for plywood).

Fires can also result from nails penetrating electrical lines and junction boxes that are hidden by decking but that are installed in inappropriate places where nails might be used. These service lines and junction boxes should always be positioned in areas where there is little likelihood of nails ever reaching them. Just as wiring in walls is not run at the height that would make it vulnerable to nails used to hang pictures or other decorations inside the home, similar care should be taken in both new construction and in adding rooms during a remodeling project.

By far, the biggest reason causing the accidental and unavoidable puncturing of freon and coolant lines is in the tendency of the original installer of the line to want to "nest" the line in the corner between the decking and the rafter. Some installers then secure it there by nailing a nail halfway into the rafter and then bending it over the line to "trap" the line in that corner. The correct positioning should be to affix the line halfway down the rafter's height and to clip it in place there where there is no risk of future nail puncture during roof replacement or other expected construction activities.

If you suspect that your freon line or any other type of line has been run incorrectly, contact a licensed professional and ask him to look at the line's location and to move it away from the roof deck if it has been installed near the decking, in the corner created by the rafter and the decking or has been run in any other place that is in danger of being hit by the normal nailing associated with re-roofing or other types of remodeling projects.

ADDENDUM: TAMPER-RESISTANT ELECTRICAL RECEPTACLES

What are tamper-resistant electrical receptacles and what is the new requirement?

The 2008 National Electrical Code® (NEC®) will require new and renovated dwellings to have tamper-resistant (TR) receptacles. These receptacles have spring-loaded shutters that close off the contact openings, or slots, of the receptacles. When a plug is inserted into the receptacle, both springs are compressed and the shutters then open, allowing for the metal prongs to make contact to create an electrical circuit. Because both springs must be compressed at the same time, the shutters do not open when a child attempts to insert an object into only one contact opening, and there is no contact with electricity. Tamper- resistant receptacles are an important next step to making the home a safer place for children.

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Why require tamper-resistant electrical receptacles?

Each year, approximately 2,400 children suffer severe shock and burns when they stick items into the slots of electrical receptacles. It is estimated that there are six to 12 child fatalities a year related to this.

If homeowners do not have children, are TR receptacles required?

Yes. Owners or tenants of homes and apartments change frequently. In addition, exposure to electrical shock and burn accidents are not limited to a child's own home. Children visit homes of relatives and friends who don't have children of their own. This requirement ensures all new homes and apartments are safe for children, whether the home is their own or they are there on a temporary basis.

Do TR receptacles require greater insertion strength than standard receptacles?

TR receptacles require comparable force to other receptacles. The insertion force may vary depending on the newness of the device to the shape or style of the plug being inserted.

Are TR receptacles costly?

No. The projected cost of a TR receptacle adds about \$0.50 to the cost of an unprotected receptacle. Based on current statistics, the average home has about 75 receptacles resulting in an overall added cost of under \$40. This amount may vary slightly based on the type and style of TR receptacle used. This minimal increase in cost buys a significant increase in electrical safety for children.

Shouldn't people accept responsibility for their children and teach their children not to stick items in receptacles?

Accidents involving children and receptacles cannot be blamed entirely on poor parenting. They involve people who look away for a moment, only to face undue tragedy and pain as the result of a child's curiosity. The NEC's mission is to provide electrical safety in the home. TR receptacles are a simple and easy way to protect children from serious injuries that continue to happen every year.

Why are TR receptacles preferred over products such as receptacles with caps or with sliding receptacle covers?

Receptacle caps may be lost and also may be a choking hazard for some ages. Children can learn to defeat sliding receptacle covers when they watch their parents. TR receptacles provide security against the insertion of objects other than cord plugs into the energized parts.

What is the NEC?

The NEC is the National Electrical Code. The NEC's mission is to provide practical safeguards from the hazards that arise from using electricity. It is the most widely adopted safety code in the United States and the world, and it is the benchmark for safe electrical installations. The NEC is an evolving document, developed through an open consensus process. A new edition is issued every three years.

For more information, visit:

www.nfpa.org

http://www.leviton.com/OA_HTML/ibeCCtpSctDspRte.jsp?section=23899&minisite=10021

<http://www.childoutletsafety.org/video.html>

<http://www.childoutletsafety.org/>

<http://www.passandseymour.com/?content=pstr/index2.cfm>

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<http://www.youtube.com/watch?v=c7KEcLhlZ60>

ADDENDUM: Whole House Surge Protection

Recommended Client Improvement: Modern home electronic devices and systems - computers, audio and video equipment, security systems, structured wiring, home appliances, heating and cooling systems as well as the electrical system itself are susceptible to unpredictable and unavoidable destructive power surges. Without adequate electrical surge protection they may have or can experience shortened lives or potential sudden failure. A whole house surge protector is recommended in addition to any other individual device or system protection. Standard circuit breakers are not designed to protect from electrical surges. Electrical or mechanical equipment can fail at any time, therefore, there is no warranty, express or implied.

ADDENDUM: ANTI-SCALD DEVICES

Many well-meaning organizations tell consumers to lower the thermostat on their boilers to below 120° F. 30% of all burns treated in hospital emergency rooms are related to scalding which can occur at higher temperatures. The elderly and babies are especially vulnerable. It is estimated that up to 24,000 children younger than 14 are burned by scalding ever year. Some of these victims' injuries result in death.

With statistics like that, lowering the water temperature in water heaters sounds like a no-brainer. Luke warm water can't burn anyone, and it even conserves energy. Unfortunately, Legionella bacteria thrive at 120 ° F. If you want to keep your hot water tank safe from this bacterium the water has to be at least 140 ° F.

Water is a very legitimate safety issue. Water heated more than 120 F can scald a person, resulting in emergency rooms treatments. If water is really hot, it doesn't take more than a second or two for a person to get a burn that will scar them for the rest of their life.

Many new homes have pressure-balancing systems that should eliminate this problem. Unfortunately, a majority of us have older houses with systems that do not have these safeguards. The dilemma is that we have to keep people from being scalded, yet retain the ability to have scalding hot water when needed. It doesn't matter if you are young or old, if you are going to use water heated above 114 degrees F, some type of anti-scalding device should be retrofitted into every home.

- About 112,000 people are scalded every year.
- 90% of all scald injuries occur in the bathroom.
- Tap water scald injuries are the second most common cause of serious burn injuries in all age groups.
- The disabled and the elderly have delayed reactions to sudden rise in water temperature.
- With assisted bathing, temperature changes are not felt by the person controlling them.
- Bathers may be left unattended for extended periods of time, even though they are unable to change the water temperature.

All worldwide safety organizations recommend anti-scald devices. We strongly urge the installation of these devices.

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ADDENDUM: PEX Supply Plumbing

PEX (cross-linked Polyethylene) water pipes were observed in this home. Use of PEX water pipes are relatively new in local construction and are developed with an eye towards the affordable housing end of the spectrum (as opposed to copper) and it is critical that they be installed in strict accordance with the manufacturer's requirements and all applicable standards/codes/specifications or pipe/connector failure and leaks will occur. Some of these requirements include proper PEX connection installation, insuring the crimping tool used for installing the connectors is properly adjusted, supporting and strapping the PEX pipe, the location of the PEX pipe, proper allowance for expansion and contraction, proper bend radius, use of protective sleeves/bushings, properly designed holes where the PEX penetrates wood or particle board, not exceeding certain levels of chlorine in the water, labeling and testing. There are several methods of connecting PEX, all of which involve mechanical fittings. There are two approved standard specifications for PEX connections: ASTM F 1807 and ASTM F 1960. Both reference mechanical insert fittings. The crimp fittings specified in ASTM F1807 are the most widely used. Other fitting systems, including insert and outside diameter compression fittings, are also available. PEX cannot be joined by solvent cement or heat fusion methods. It is also disclosed that a class action has been filed concerning the use of certain PEX fittings.

A licensed and properly trained plumber must verify the PEX installation complies with the manufacturer's requirements and all other applicable standards/codes/specifications in addition to using crimp check gauges and any other specialized tools to verify the connections. Addition of chemicals into the water either from water softeners or the municipal utility must be approved by the PEX manufacturer.

Recommendation: Water Quality: If you plan to move into a new home plumbed with PEX tubing, or have recently done so, and if you are concerned about the possibility of chemicals entering the drinking water, you might want to flush all the lines daily for 1-2 minutes for the first 3-6 months and perhaps once a week for the next 6-12 months. Another helpful approach is to install a reverse osmosis water purification system for drinking water and ice makers. Both flushing and reverse osmosis are recommended. [ref: Vanguard Piping Systems]

Contamination Of Drinking Water

The PEX EIR found that methyl tertiary-butyl ether (MTBE) and tert-Butyl alcohol can leach from PEX in amounts that exceed taste, odor and health guidelines set by the State of California for drinking water. The PEX EIR found that PEX pipes can initially leach as much as 290 ppb of MTBE. The California Department of Public Health and the California Office of Health Hazard Assessment have established a drinking water taste and odor standard of 5 ppb for MTBE and a drinking water public health goal and maximum contaminant level of 13 ppb.

The PEX EIR also found that PEX can leach ethyl tertiary butyl ether (ETBE), a chemical in the same family as MTBE, in amounts exceeding 100 ppb. An expert toxicologist report commissioned as part of the PEX EIR found that the leaching of ETBE from PEX pipe could contribute to taste and odor impacts, and could potentially lead to adverse health effects.

The PEX EIR found that PEX pipe is susceptible to permeation by outside contaminants such as pesticides, oil, gasoline, benzene and termicticides.

Numerous studies and articles submitted to the State of California comparing potable water pipe materials, including variants of PEX, polybutylene, polypropylene, CPVC, copper and steel, have found that PEX displayed the strongest biofilm formation and the strongest initial promotion of the growth of Legionella bacteria.

California's January 2009 approval of PEX relies upon the less-protective PEX chlorine resistance standard ASTM F2023, instead of the much superior NSF P171 standard. ASTM F2023 only assures an adjusted lifetime of 25 years, while the NSF P171 standard assures a 40 year adjusted lifetime. At least one reputable PEX manufacturer (Lubrizol Advanced Materials, Inc.) has questioned the adequacy of this standard since it only results in "an expected service life of 25 years, five years less than the traditional home loan."

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Even short term exposure to sunlight can dramatically reduce the resistance of PEX to chlorine and result in premature rupture of the pipe. Studies show just a one-week exposure to sunlight may reduce the chlorine resistance lifetime of some PEX pipes by half; with a two week exposure completely depleting PEX of any chlorine resistance.

Lack of Recyclability

Because it is a thermoset plastic, PEX cannot be melted down and reused. A 2005 report by the San Francisco Department of the Environment found that PEX was the only type of plastic piping that no plastic recycler would accept. Copper pipe generally contains around 70% recycled material and has almost a 100% recycling rate.

Toxic Smoke

PEX produces toxic smoke when burned in building fires.

NOTICE: You are strongly urged to have this plumbing supply piping inspected by a licensed plumber and a manufacturer's representative to insure materials integrity and proper installation prior to the end of any time periods, such as option periods, loan lock periods, close of escrow, et al.

SPECIFIC LIMITATIONS: Pipes within walls, under attic insulation, under the foundation or other areas concealed from ready visibility are unknown and cannot be reported upon and are specifically excluded as to function and leakage. Home plumbing systems must be constantly monitored for leaks. [Nails in plumbing lines can rust through in a short period of time or a year, poor mechanical connections can come loose under pressure and use, etc. New built properties or older properties are not immune from flooding due to unforeseen and non-visible plumbing defects] Pipes inside walls, underground or hidden from view are unknown and not inspected. No other representation is made. The sellers or occupants will obviously have a more intimate knowledge and experience of the home than we could possibly hope to have during our limited one-time visit so it is recommended that you review the seller disclosure or ask for disclosure under your personal responsibility of due diligence.

ADDENDUM: Thermal Pane (Insulated Glass Unit) Fogging

Most people do not know it, but the cause of fogging in thermal pane window units is not so much due to a loss of seal, as it is to a failure of desiccant placed within the units to absorb moisture. It is incorrect to think that there is a hermetic seal drawn on these windows. This is an impossibility (nature abhors a vacuum). So then, the seal that is initially accomplished is imperfect and leaks from the very beginning. That's right, they leak straight out of the factory. All of them leak. Thinking that thermal windows are not leaking is just plain mistaken thinking. It's a bit like thinking that a house in an area with known expansive soils has a stable foundation. Mythology.

As soon as a thermal pane unit leaves the shop, it is destined for failure. Moisture diffusion into a sealed unit is impossible to avoid and continuous. Manufacturers deal with this reality by loading absorption material, or "desiccant" (usually a silica gel or similar material), in the spacer bar construction of every unit. This material has one job - to bond with water molecules. The material comes in the form of beads, similar to those you find accompanying new leather and electronic products, or as a blended compound, often a black butyl or cork-like wafer.

Every insulated glass unit (IGU) has a finite capacity for how much water it can hold ("hide"). Over time, as moisture accumulates, the unit finally reaches a threshold saturation point, it becomes visible as condensation between the panes of glass (this is directly associated to the falling dew point between the panes of glass).

The options available for fogging IGUs are:

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(1) Replacement of the thermal panes. This is the most expensive option. Prices vary greatly due to types and shapes of panes. Replacement costs begin at about \$75 per small rectangular pane and rise sharply.

(2) Repair of the thermal panes. This option is about half as expensive as replacement. See:
<http://www.wefixfoggywindows.com/>

<http://www.crystalclearwindowworks.com/>

<http://www.windowmedicsofttexas.com/windowconden.htm>

(3) Do nothing about the thermal panes. This is the most frugal option.

ADDENDUM: Native Subterranean Termites (*Reticulitermes spp.*)

Subterranean termites are the most destructive insect pests of wood in the United States. They cause billions of dollars in damage each year and have a negative impact on a family's most valuable possession - the home.

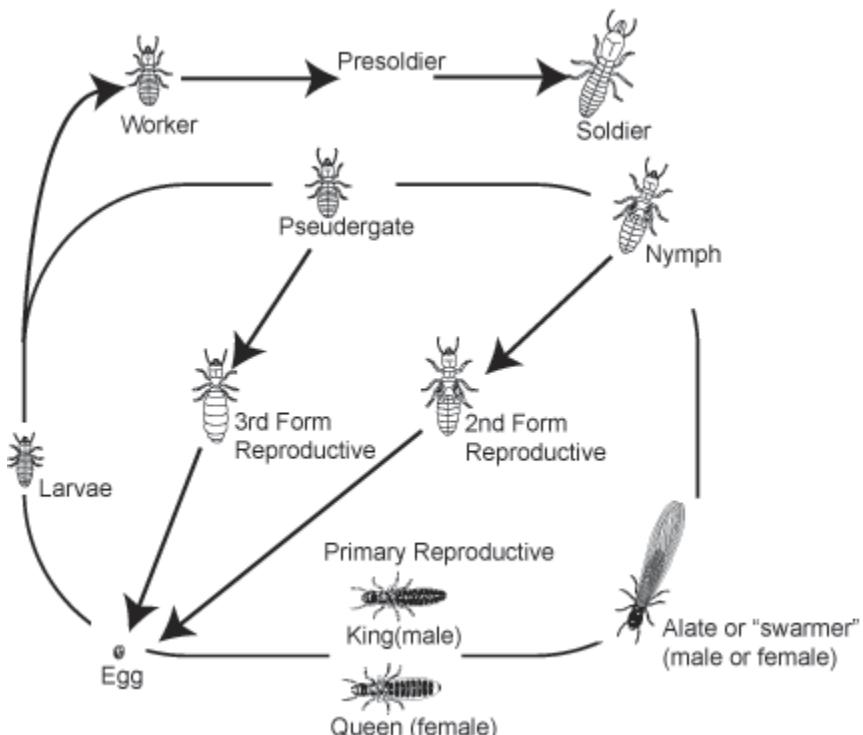
In nature, subterranean termites are beneficial because they break down cellulose into usable nutrients. The biomass resulting from this process is recycled to the soil as humus. Subterranean termites are, therefore, considered important to our ecosystem.

Problems occur when termites attack the wooden elements of homes, businesses and warehouses built by humans. The presence of termites is often not readily noticed because their activity is hidden behind wallboards, siding or wood trim. Homeowners in all areas of Texas should watch for subterranean termites and take precautions against infestations. To minimize damage from termites, it is helpful to know the description, life cycle and signs of infestation of termites as well as preventive and control measures.

Identification

Subterranean termites are social insects that live in nests or colonies in the soil. They contain three forms or castes: reproductives, workers (pseudergates) and soldiers. Individuals of each caste have several stages: the egg; the larva that develops into a pseudergate and eventually into a brachypterous nymph or soldier; and the adult. There are three forms of adult reproductive termites including primary, secondary and tertiary.

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TAMU-Entomology Reproductive males and females can be winged (primary) or wingless (secondary or tertiary). Females of each can lay eggs and produce offspring. The bodies of winged primary reproductives, also called swarmers or alates, vary by species from coal black to pale yellow-brown. Wings may be pale or smoky gray to brown and have distinct vein patterns used in identification. Reticulitermes swarmer termites are about 1/4 to 3/8 inch long.

Secondary and tertiary reproductives live within the colony and are white to cream-colored. These termites form a backup for the primary queen and may replace her if she is injured or dies. These termites mate within the colony and lay viable eggs. If supplementary reproductives and worker termites become isolated from the main colony, they can establish a new sub-colony.



Termite workers (pseudergates) make up the largest number of individuals within a colony and do all the work. They are wingless, white to creamy white and 1/4 to 3/8 inch long. They forage for food, feed the other castes, groom the queen and maintain and build tunnels and shelter tubes. Their mouthparts are very hard and adapted for chewing through wood or other cellulose materials. The worker caste is responsible for the damage that makes termites an economically important problem.

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Soldiers resemble workers in color and general appearance, except they have well-developed brownish heads with strong mandibles or jaws. Soldiers defend the colony against invaders, primarily ants and other termites. They cannot forage for food or feed themselves, and they depend on the workers to care for them.

Ants and termites often swarm at about the same time of year but control measures for each differ greatly. It is therefore, important to be able to distinguish between swarming termites and ants.

Biology and habits

After 2 to 4 years a subterranean termite colony is mature and produces "swarmers" (winged primary reproductives). Termite swarmers leave the colony in large numbers during the spring and early summer. Swarming begins in South Texas in January and February; in the Panhandle region of Texas, swarms do not occur until April and May. Environmental factors such as heat, light, and moisture trigger the emergence of swarmers, with each species having its own set of requirements. The number of swarmers produced is proportional to the age and size of the colony.

Both male and female swarmers fly from the colony and travel short distances. Termites are weak fliers and must rely on wind currents to carry them to new habitats. Only a small percentage of swarmers survive to develop colonies; most fall prey to birds, toads, insects and other predators, and many die from dehydration or injury.

During the swarming process, males (kings) and females (queens) pair off using pheromones. Successful reproductive pairs land, lose their wings and seek cover under rocks or other moist materials. A pair will make a very small nest before mating. Initially, the new queen termite lays only a few eggs. The male remains with the female and helps care for developing eggs and the larva that hatch.

Eggs are not deposited continuously. In fact, only a few hundred are deposited during the first year. As the young queen grows larger, she lays more eggs. The king and queen care for the young larvae that hatch from the eggs because they cannot care for themselves. The larvae then molt into pseudergate workers, which in turn, can molt into presoldiers or brachypterous nymphs (with wing pads). These nymphs will eventually molt to become primary reproductives. The colony stabilizes when the queen reaches her maximum egg production. If the queen dies, supplemental reproductives take over the queen's duties.

The maximum size of a termite colony depends on location, food availability and environmental conditions, especially temperature and moisture. Some colonies remain small; others contain up to several thousand individuals. New colonies form when groups of termites become isolated from the main colony and establish sub-colonies. This is called "colony splitting" or "budding." These sub-colonies may exist independently or reunite with the main colony.

Subterranean termites get their nutrition from wood and other material containing cellulose. Paper, cotton, burlap or other plant products often are actively consumed by termites. Sometimes termites will even tunnel into the dead heartwood or pith of living plants. Most species of subterranean termites cannot digest cellulose directly and depend on single celled protozoans and bacteria living in their hindguts to help digest the cellulose. Digested cellulose is then shared with the developing larvae, other workers, soldiers and reproductives.

Termites are attracted to certain odors of wood-decaying fungi that make the wood more palatable and easier to penetrate. In some instances, the fungi provide a source of nitrogen in the termite diet.

Moisture is important to subterranean termites as they have very little resistance to dehydration. To survive, termites must maintain contact with the soil (their primary source of moisture) or other above-ground moisture sources, such as defective plumbing, leaky roofs, leaks from air conditioning condensers or poorly maintained gutters.

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Subterranean termites also must protect themselves from temperature extremes and attack by ants and other insects. Termites that forage for food above ground protect themselves with shelter tubes or "mud tubes". Worker termites build shelter tubes from particles of soil or wood and bits of debris held together by salivary and fecal secretions. Mud tubes may be thinly constructed or can be large with thick walls to accommodate many termites moving vertically between the soil and their food source.

Subterranean termites also transport moist soil into the structures they infest. The presence of shelter tubes and mud within galleries is used to identify termite damaged wood. Shelter tubes are often used to bridge across masonry or other objects, allowing termites access to a food source (wood) above ground. Inspecting of structures for termite damage may identify these tubes which indicate an ongoing infestation.

Damage

Dead trees and brush provide a natural food source for foraging subterranean termites. When natural vegetation is cleared and houses are built, termites often switch to feeding on wooden structures. Termites enter buildings through wood that is in direct contact with the soil and by building shelter tubes over or through cracks in foundations. Any cellulose material in direct contact with the soil, such as trees, vines or plumbing fixtures, can serve as an avenue of infestation.

Signs of infestation

Active termite infestations can be difficult to detect. To find out if a home is infested, the structure should be checked for evidence of swarmers (including wings or dead termites in windows), mud tubes or damaged wood inside or around a structure

Swarmers: Generally, the first sign of infestation homeowners notice is swarming reproductives on windowsills or near indoor lights. Swarming termites inside the house usually indicate an active infestation in the structure. Termite wings may be found on windowsills or stuck to cobwebs indoors. Though swarmers outdoors are a natural phenomenon, they indicate that termites are present and may be attacking nearby structures.

Mud tubes: Mud shelter tubes on crawl space piers, utility penetrations or on foundation walls and slabs are a sign of termite infestation. Termite shelter tubes can blend in well with the soil or concrete, making them difficult to see. To make inspecting the home for termites easier, prune vegetation away from the house walls. The soil line should be several inches below the top of slabs or foundation walls. An inspector should look for mud tubes carefully along cracks, in corners or where the top of the foundation is close to the ground. A screwdriver is useful to break open suspected termite tubes and detect live termites.



Wood damage often is not found initially, but is positive indication of a current or past termite infestation. Wherever wood comes in contact with the soil there is a high risk for termite entry. Carefully examine any wood that thuds or sounds dull when struck by a screwdriver or hammer. Probing suspected areas with sharp instrument such as a screwdriver or an ice pick will often disclose termite galleries or damage.

Characteristics of damaged wood

Subterranean termite damage is usually confined to the soft, spring-growth of wood. Termite tunnels and galleries tend to follow the wood grain and are lined with mud or may have a pale, spotted appearance resulting from soft fecal material plastered on tunnel surfaces. Moisture sources may cause wood decay and can encourage subterranean termite infestation. Deterioration caused by wood-destroying fungi can be confused with termite damage.

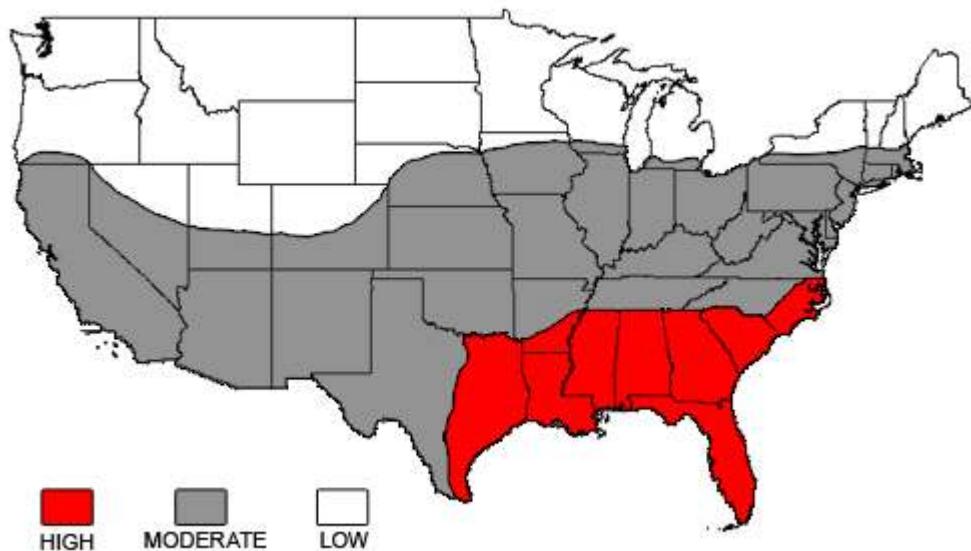
Distribution

Several species of subterranean termites are found in the United States; they live in every state except Alaska. Two major types of subterranean termites are commonly found in Texas. They are the native subterranean termite and Formosan subterranean termite, and both are serious threats to wooden structures.

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Native subterranean termite species in the Genus *Reticulitermes* are found throughout the United States. Because they are so broadly distributed they are considered the most economically important.

The second and increasingly important termite is the introduced Formosan subterranean termite, *Coptotermes formosanus*. The Formosan termite is easily transported from one infested area to another in landscape timbers, railroad cross-timbers, mulch and wooden pallets. Isolated infestations of Formosan termites have been reported in many areas of the state.



Texas A&M University
Department of Entomology
Center for Urban & Structural Entomology

ADDENDUM: INSPECTOR QUALIFICATIONS

International Code Council (ICC) Residential Combination Inspector
International Code Council (ICC) Residential Building Inspector 5082671-B1
International Code Council (ICC) Residential Electrical Inspector 508267 E-1
International Code Council (ICC) Residential Mechanical Inspector 5082671-M1
International Code Council (ICC) Residential Plumbing Inspector 5082671-P1
American Society of Home Inspectors (ASHI) Certified Inspector No. 203652
National Association of Home Inspectors (NAHI) Certified Real Estate Inspector, CRI 200353
Master Inspector Certification Board, Certified Master Inspector
Texas Professional Real Estate Inspectors Association (TPREIA) Master TPREIA Inspector (MTI)
Texas Real Estate Commission (TREC) Professional Inspector 4336
Texas Department of Agriculture, Structural Pest Control Service (SPCS) License No. 11379
SPCS Certified Applicator No. 40247
HUD 203K Consultant D0981
Exterior Design Institute (EDI/EIMA) EIFS Third Party Inspector and Moisture Analyst (CEI)

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Post-Tensioning Institute Level One Certificate for Unbonded Prestressed Post-Tensioned Concrete Installer No. 320054833

CertainTeed® Master Shingle Applicator

Building Officials Association of Texas (BOAT)

City of Garland, Texas Building and Fire Codes Board

Preservation Dallas, Advanced Historic Home Specialist

Texas Residential Construction Commission (TRCC), Registered Builder No. 16229

Texas Residential Construction Commission (TRCC), Registered Third-Party Inspector 1350