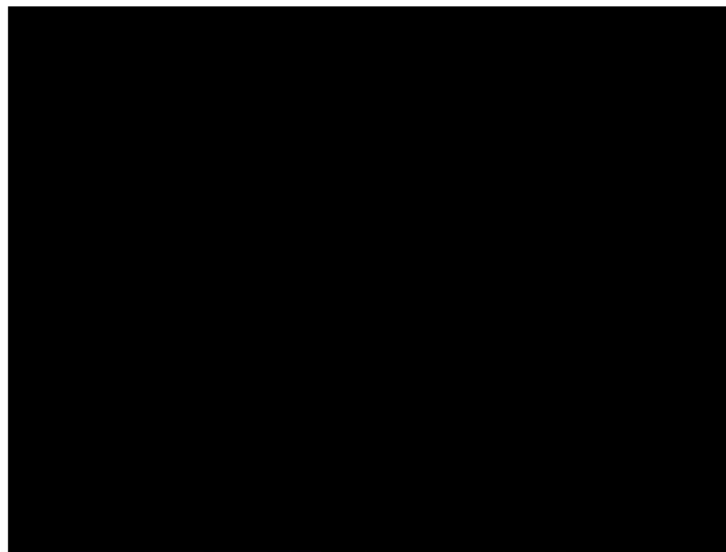


# TEXAS INSPECTOR

Texas Inspector  
7401 Vineyard Trail  
Garland, TX 75044  
ICC R-5 Combination Residential Inspector  
aaron@texasinspector.com  
214-616-0112  
<http://www.texasinspector.com>



## PROPERTY INSPECTION REPORT

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**Prepared For:** [REDACTED] \_\_\_\_\_  
(Name of Client)

**Concerning:** [REDACTED] \_\_\_\_\_  
(Address or Other Identification of Inspected Property)

**By:** Aaron D. Miller, ACI, CEI, CMI, CPI, CRI, MTI, RCI [REDACTED]

International Code Council (ICC) Residential

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Combination Inspector 5082671-R5  
International Code Council (ICC) Residential  
Building Inspector 5082671-B1  
International Code Council (ICC) Residential  
Electrical Inspector 5082671-E1  
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  
International Association of Certified Home  
Inspectors (INACHI), Certified Professional  
Inspector No. NACHI05060294  
Master Inspector Certification Board, 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 Registered Business No.  
11379  
Texas Department of Agriculture, Structural  
Pest Control Service Certified Applicator No.  
40247  
Exterior Design Institute (EDI/EIMA) EIFS  
Third Party Inspector and Moisture Analyst  
(CEI) MA TX-29  
Post-Tensioning Institute Level One  
Certificate for Unbonded Prestressed Post-  
Tensioned Concrete Installer No. 320054833  
AAMA InstallationMasters Certified Window  
and Door Installer  
CertainTeed® Master Shingle Applicator  
Building Officials Association of Texas  
(BOAT)  
Texas Residential Construction Commission,  
Legacy  
City of Garland, Texas Unified Building  
Standards Commission Member  
North American Deck and Railing Association  
(NADRA), Member  
Master Deck Professional Certification,  
NADRA  
AAMA Door and Window Installation Master  
Certification

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(Name and License Number of Inspector)

(Date)

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## **PURPOSE, LIMITATIONS AND INSPECTOR / CLIENT RESPONSIBILITIES**

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.texas.gov](http://www.trec.texas.gov).

The TREC Standards of Practice (Sections 535.227-535.233 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 turn on decommissioned equipment, systems, and utility services or apply an open flame or light a pilot to operate any appliance. The inspector is NOT required to climb over obstacles, 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 shall indicate, by checking the appropriate boxes on the form, whether each item was inspected, not inspected, not present or deficient and explain the findings in the corresponding section in the body of the report form. The inspector must check the Deficient (D) box if a condition exists that adversely and materially affects the performance of a system or component or constitutes a hazard to life, limb or property as specified by the TREC Standards of Practice. General deficiencies include inoperability, material distress, water penetration, damage, deterioration, missing components, 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 may be considered life-safety upgrades to the property. For more information, refer to Texas Real Estate Consumer Notice Concerning Recognized Hazards or Deficiencies below.

THIS PROPERTY INSPECTION IS NOT A TECHNICALLY 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 ACTIONS, 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.

#### TEXAS REAL ESTATE CONSUMER NOTICE CONCERNING HAZARDS OR DEFICIENCIES

Each year, Texans sustain property damage and are injured by accidents in the home. While some accidents may not be avoidable, many other accidents, injuries, and deaths may be avoided through the identification and repair of certain hazardous conditions. Examples of such hazards include:

- malfunctioning, improperly installed, or missing ground fault circuit protection (GFCI) devices for electrical receptacles in garages, bathrooms, kitchens, and exterior areas;
- malfunctioning arc fault protection (AFCI) devices;
- ordinary glass in locations where modern construction techniques call for safety glass;
- malfunctioning or lack of fire safety features such as smoke alarms, fire-rated doors in certain locations, and functional emergency escape and rescue openings in bedrooms;
- malfunctioning carbon monoxide alarms;
- excessive spacing between balusters on stairways and porches;
- improperly installed appliances;
- improperly installed or defective safety devices; and
- lack of electrical bonding and grounding; and
- lack of bonding on gas piping, including corrugated stainless steel tubing (CSST).

To ensure that consumers are informed of hazards such as these, the Texas Real Estate Commission (TREC) has adopted Standards of Practice requiring licensed inspectors to report these conditions as “Deficient” when performing an inspection for a buyer or seller, if they can be reasonably determined.

These conditions may not have violated building codes or common practices at the time of the construction of the home, or they may have been “grandfathered” because they were present prior to the adoption of codes prohibiting such conditions. While the TREC Standards of Practice do not require inspectors to perform a code compliance inspection, TREC considers the potential for injury or property loss from the hazards addressed in the Standards of Practice to be significant enough to warrant this notice.

Contract forms developed by TREC for use by its real estate licensees also inform the buyer of the right to have the home inspected and can provide an option clause permitting the buyer to terminate the contract within a specified time. Neither the Standards of Practice nor the TREC contract forms require a seller to remedy conditions revealed by an inspection. The decision to correct a hazard or any deficiency identified in an inspection report is left to the parties to the contract for the sale or purchase of the home.

INFORMATION INCLUDED UNDER “ADDITIONAL INFORMATION PROVIDED BY INSPECTOR”, OR PROVIDED AS AN ATTACHMENT WITH THE STANDARD FORM, IS NOT REQUIRED BY THE COMMISSION AND MAY CONTAIN CONTRACTUAL TERMS BETWEEN THE INSPECTOR AND YOU, AS THE CLIENT. THE COMMISSION DOES NOT REGULATE CONTRACTUAL TERMS BETWEEN PARTIES. IF YOU DO NOT UNDERSTAND THE EFFECT OF ANY CONTRACTUAL TERM CONTAINED IN THIS SECTION OR ANY ATTACHMENTS, CONSULT AN ATTORNEY.

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#### 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 Texas Inspector 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, Information Attached or Provided under Separate Cover, but not Paginated, et al. These contain crucial, pertinent

information and the client is strongly urged to treat them as such. Failure to do so will result in a curtailed understanding of the property condition.

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. All such images remain the property of the Inspector.

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 conditions 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.

This is NOT a wood-destroying insect report and is not intended to convey information regarding wood-destroying organisms. This is also NOT a mold report and is not intended to convey information regarding the presence of mold in the structure. For either of these opinions and reports you are strongly urged to consult with a person licensed by the appropriate agency to conduct these investigations prior to the end of any time periods associated with the purchase of this home.

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, seller's disclosure statements, 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/> .

**This report does not constitute a repair list nor is it in any way intended to be used as such. This inspector provides neither repair lists nor summary reports.** It is up to the buyer and his agent to make all decisions regarding the negotiation of repairs on this property. 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.

**NOTICE TO BUILDERS AND MUNICIPAL INSPECTORS IN THE EVENT OF INTERIM INSPECTIONS**

**This report format is being used as a convenience to the buyer client and any agents involved in the sale/purchase of this house. If the inspection is a pre-pour or pre-drywall inspection the TREC Inspector SOP does not apply and was not followed. All interim inspections are performed referencing the building, energy, and electrical codes adopted by the municipality and/or the state of Texas, to include local amendments. Do not attempt to inform the client that this inspector was referencing some other, unrelated set of standards.**

**In the event of a final inspection where the new home is substantially completed the state of Texas requires that the inspector adhere to the minimal TREC Inspector SOP. This inspector does so and exceeds that standard by referencing the building, energy, and electrical codes adopted by the municipality and/or the state**

of Texas, to include local amendments. Do not attempt to inform the client that this inspector was referencing some other, unrelated set of standards.

The codes referenced in this report are:

2018 IRC and Greenville Amendments

2018 IECC and Greenville Amendments

2020 NEC as per TDLR as of 11/1/20

Report Identification: [REDACTED]

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I	NI	NP	D	Inspection Item
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## I. STRUCTURAL SYSTEMS

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### A. Foundations

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

*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/files/Foundation-Book-for-Buyers.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  
*Grounds for Departure:* N/A

*Comments:*

#### FOUNDATION

The foundation does not appear to be in need of immediate remedial repair based upon a visual inspection. Indicators of minor movement of the structure were observed which appear

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I NI NP D

Inspection Item

to be usual considering the construction, age, and location of the building. Signs of this movement include, but are not limited to minor drywall cracks, minor trim separation, minor door edge reveal discrepancies, minor exterior veneer cladding cracks, frieze separation in some locations, et al. No apparently significant structural problems were observed. Typical flaws were observed, as discussed below.

**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.

#### SOIL TYPE AND SUITABILITY

See the USGS soil type and use information provided to you in a separate report along with this inspection report for more information regarding the type of soil on your lot and the suitability of the soil type for construction of reinforced slab-on-ground foundations.

#### TERMITES

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.

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. Other options may be approved by the municipality such as physical barriers. Similar documentation will be required for these treatments which should be obtained from the builder at the pre-drywall phase of construction.

Report Identification: [REDACTED]

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I NI NP D

Inspection Item

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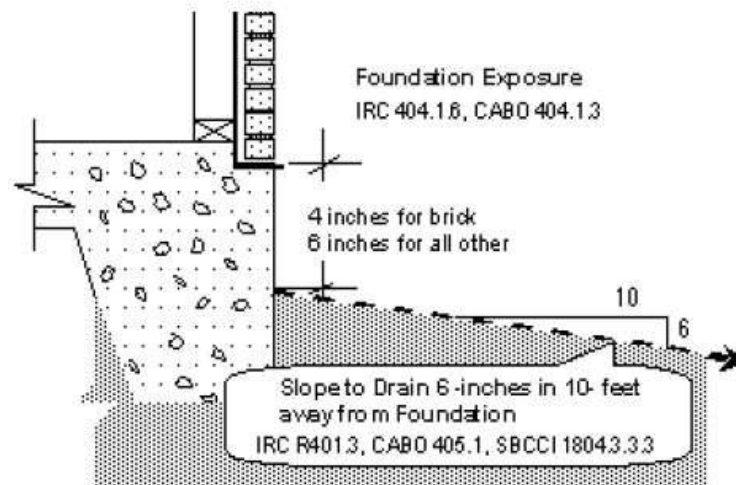
## B. Grading and Drainage

All residential lot drainage in the DFW area must be designed in accordance with the guidelines contained in the "Storm Water Management Design Manual" incorporating the City of Fort Worth Local Criteria Section and the North Central Texas Council of Governments (NCTCOG) integrated Storm Water Management (iSWM) Design Manual for Site Development. These standards were first promulgated in 2006, and are commonly referred to as I-SWIM Standards.

Comments:

### GRADING

The grading around the perimeter of the foundation must be improved to promote the flow of storm water away from the house. 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)". This is equivalent to the 5% grade required by the foundation design firm's engineer. **FAILURE TO MAKE THESE IMPROVEMENTS MAY EFFECTIVELY VOID YOUR FOUNDATION WARRANTY!**



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

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Inspection Item

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.

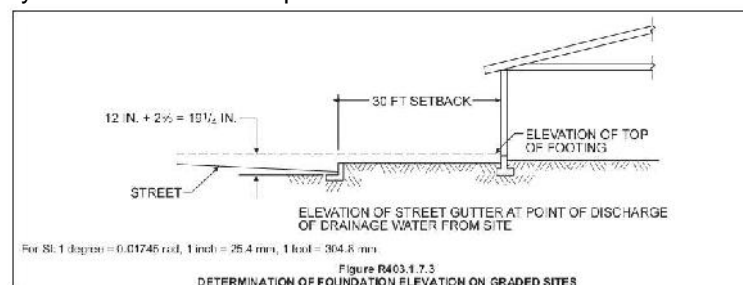
**NOTE: The municipality's plat drainage requirements can exceed those set forth by the IRC, i.e. require more than a 6" drop in elevation in the first 10' out from the perimeter of the foundation, but cannot be less stringent. The surveyor responsible for the final lot survey has no authority to approve lot drainage that is not code-compliant, as per IRC 105.8 "Responsibility. It shall be the duty of every person who performs work for the installation or repair of building, structure, electrical, gas, mechanical or plumbing systems, for which this code is applicable, to comply with this code.."**

See: <http://www.texasinspector.com/files/Drainage-Improvement-Primer.pdf>

**It is crucial that you understand that water ponding around the foundation perimeter will cause potential heaving of the soil far in excess of that predicted in the geotechnical report upon which the design of this foundation is predicated. This will lead to differential movement and foundation distress.**

#### DRAINAGE

The top of the foundation or finish floor is significantly lower than the street level. The top of the foundation must be a minimum of 12 inches plus 2% above the level of the street drain (curb/street intersection) as per IRC 403.1.7.3 R403.1.7.3 Foundation elevation. On graded sites, the top of any exterior foundation shall extend above the elevation of the street gutter at point of discharge or the inlet of an approved drainage device a minimum of 12 inches (305 mm) plus 2 percent. Alternate elevations are permitted subject to the approval of the building official, provided it can be demonstrated that required drainage to the point of discharge and away from the structure is provided at all locations on the site.



The lot is lower than adjacent lots to the west. Grading improvements must be undertaken where possible. The general topography of the area is such that it will be difficult to control storm water entirely without improvements to grading or mechanical drainage improvements. Without these improvements, during heavy rains or snow melts, the accumulation of storm water on the lot will be unavoidable.

#### DRAINAGE

The builder has installed a perched drainage plane at the approach sidewalk where water draining will be trapped between the sidewalk and the garage foundation. This must be

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I NI NP D

Inspection Item

improved in order to prevent excess moisture from accumulating in the soil adjacent to the foundation.



Perched  
drainage  
plane.

The swales on the sides of the lot are improperly sloped and will not perform as intended and required. Swales must slope a minimum of  $\frac{1}{4}$ " per foot as per accepted engineering practice.

See: <http://www.foundationperformance.org/projects/FPA-SC-01-0.pdf>

#### 6.1.1.1 Site Grading

Site grading causes excess water to flow away from the foundation via surface sloping and drainage swales. Adequate surface drainage slopes are essential to minimize foundation movement and damage. Current International Residential Code requires 6" minimum fall the first 10' out from and perpendicular to building walls, and 2% minimum elsewhere to drain off lot. Because current building practices sometimes have homes built closer than 10' to the adjacent structure or lot line, it is necessary to have greater slopes so that the 6" minimum is maintained.

Report Identification: [REDACTED]

I=Inspected

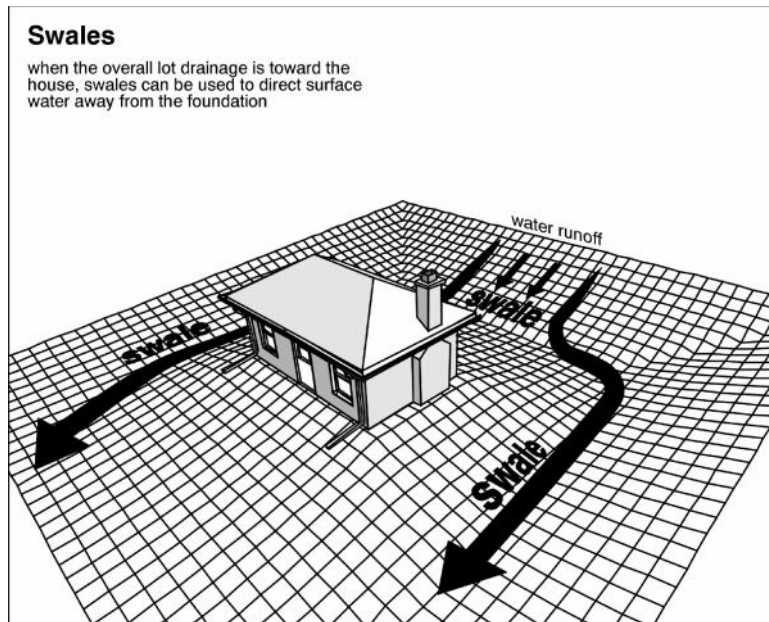
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D=Deficiency

I NI NP D

Inspection Item



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

#### MOSQUITO HARBORAGE

Mosquitoes are quite capable of nesting and breeding anywhere that provides some moisture and shade. Grass in swales happens to be one of their favorite locations as is pine straw, rocks, mulch, ground cover, vines, etc. Basically anywhere and on anything that can hold moisture. For some reason people seem to think mosquitoes need water – as in large puddles or pools – to breed but in fact there are many species that require just a tad bit of moisture to reproduce. These are the species that wreak havoc on most homeowners. Especially if you lot is well shaded and moist. Ref: Handbook of Pest Control – The Behavior, Life History, and Control of Household Pests, 10<sup>th</sup> Edition, Arnold Mallis, Chapter 15, Page 1051, Heading Aquatic Habitats.

#### SOIL

The soil level 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.

#### SOIL STABILITY ON LAKE LOTS

An evaluation of soil stability is beyond the scope of this inspection. As with many ravine, creek and lake lots, there is potential for erosion. If erosion problems are suspected, a soils

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I	NI	NP	D	Inspection Item
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engineer should be consulted to evaluate this condition and the remedies available for correction.

Buildings on slopes of expansive soils are subject to downhill movements during their entire service lives. Slopes greater than the residual friction angle of the soil are subject to slip failures of either the shallow or classic circular type. Creep occurs in all slopes whether they are steeper or less steep than the residual angle. The rate of creep is governed by the amount of moisture that enters the slope and how deeply the water penetrates into the soil. The creep rate is faster during the wet season and slower in the dry season. All of these explain the sawtooth rates with which these soils move downhill with the seasonal cycles.

Foundations built on or in such slopes must be designed accounting for the nature of downhill creep, the movements to which it will subject slab foundations, and the lateral forces which it will apply to piers drilled into the slope. Aside from avoiding the slope altogether, design countermeasures to retard creep include careful attention to site drainage and moisture control (both surface and subsurface), vegetation, stabilization, and structural design.

**NOTICE TO PROSPECTIVE PURCHASERS OF LAKE LOTS:**

<https://codes.findlaw.com/tx/property-code/prop-sect-5-019.html>

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**C. Roof Covering Materials**

*Types of Roof Covering:* Asphalt Composition Roofing Material – Tab Shingles Over Roof Sheathing

*Viewed From:* Viewed With Binoculars

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

*Roof Pitch > 6/12*

*Note: Specific Limitations. The Inspector is not required to and does not physically walk on roof surfaces. All roof surfaces will be inspected from a ladder at the edge of the roof (if the inspector deems this safe using a 16-ft. ladder), and through the use of binoculars while standing on the ground. 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. There are different roof types and materials and different methods of installing them, but all have limited warranties and most, if not all, eventually leak. Every roof is only as good as its waterproof membrane, which is concealed and cannot be examined without removing the material, and this is true of almost every type of roof. 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. The report does not constitute a warranty either expressed or implied regarding roof leakage. The Texas Inspection Standards of Practice for property inspections is not designed for the purpose of underwriting or insurability. The Inspector is not allowed by state law to issue warranties. 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.*

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**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.**

Comments:

#### SLOPED ROOFING

There is a flat valley at the east end of the balcony and a dead valley at the west side of the turret in the front of the house. The term "dead (flat) valley" is used to indicate a valley on a pitched roof that terminates into a flat or low slope area. This low slope allows water to pool and can lead to leaks even if it is underlaid properly. Building a flat roof valley is no different than a plumber installing a drainpipe that is flat for a few feet just to accommodate some aesthetic feature.



Dead valley.

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I NI NP D

Inspection Item

Flat valley.



Dead valleys are flat valleys that terminate at a knee wall. All valleys must be designed to have a clear drainage channel off of the roof –i.e. no dead valleys. This is a violation of IRC R903.1 General. Roof decks shall be covered with approved roof coverings secured to the building or structure in accordance with the provisions of this chapter. Roof assemblies shall be designed and installed in accordance with this code and the approved manufacturer's installation instructions such that the roof assembly shall serve to protect the building or structure. (Commentary) In all cases, a roof must be designed to provide protection from the elements. For the roof to adequately perform this function, it must be designed in accordance with this chapter. This section requires flashing where the roof intersects vertical elements such as walls, chimneys, dormers, plumbing stacks, plumbing vents and other penetrations of the weather-protective barrier.

Roof drainage to remove water from the roof to an approved location is also regulated. This also violates IRC 903.2 Flashing. Flashings shall be installed in a manner that prevents moisture from entering the wall and roof through joints in copings, through moisture permeable materials and at intersections with parapet walls and other penetrations through the roof plane.

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Inspection Item

Some roofers claim that their products make a flat valley watertight. Are they right? The answer here is a little more complex than it may seem. Flat valleys can be made watertight using one of several products including metal flashing and modified bitumen membranes. Most products designed for this purpose are good products and can be made watertight even in a flat valley. However, the problem arises when an extreme weather event, say an ice storm, occurs that causes water to backup in the valley. The valley then holds water until the water level reaches the top of the flashing or the membrane. On a relatively low slope roof (4-6/12) this may just be a couple of inches. The water then flows over the top of the flashing or membrane and right into the house. Ice storms occur almost every year in North Central Texas.

Flat and dead valleys must be avoided. When they are not, redesign of the areas concerned is strongly urged.

#### FLASHINGS

##### SIDEWALL FLASHING

The sidewall flashing at the turret is not installed properly.

##### COUNTER OR CAP FLASHING

The cap or counter flashing is improperly installed where the brick and stone veneer is supported by the roof structure. This requires immediate repair as per R905.2.8.1 Base and cap flashing. Base and cap flashing shall be installed in accordance with manufacturer's installation instructions. Base flashing shall be of either corrosion-resistant metal of minimum nominal 0.019-inch (0.5 mm) thickness or mineral surface roll roofing weighing a minimum of 77 pounds per 100 square feet (4 kg/m<sup>2</sup>). Cap flashing shall be corrosion-resistant metal of minimum nominal 0.019-inch (0.5 mm) thickness.

Cap  
flashing  
missing.



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Inspection Item

Cap  
flashing  
missing.



#### DRIP EDGE

The drip edge flashing is improperly cut at an outside corner near the northeast corner of the house. These corners should be formed by making a single cut through one leg of the flashing and then bending the remaining leg at a 90-degree angle. This bend should place the rake portion of the flashing above the eaves portion so that moisture will drain past the overlap. The improper manner in which these cuts have been made negates the effectiveness of the flashing and will lead to water damage in these areas in the near future. This flashing has been installed in violation of the shingle manufacturer's installation instructions, IRC 102.4, 903.1 and 903.2:

##### R903.1 General.

Roof decks shall be covered with approved roof coverings secured to the building or structure in accordance with the provisions of this chapter. Roof assemblies shall be designed and installed in accordance with this code and the approved manufacturer's installation instructions such that the roof assembly shall serve to protect the building or structure.

##### R903.2 Flashing.

Flashings shall be installed in such a manner so as to prevent moisture entering the wall and roof through joints in copings, through moisture permeable materials, and at intersections with parapet walls and other penetrations through the roof plane.

##### R903.2.1 Locations.

Flashings shall be installed at wall and roof intersections; wherever there is a change in roof slope or direction; and around roof openings. Where flashing is of metal, the metal shall be corrosion resistant with a thickness of not less than 0.019 inch (No. 26 galvanized sheet).

This requires repair.

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Inspection Item

Drip edge  
improper.



#### GUTTERS/DOWNSPOUTS

The addition of gutters at the turret roof is recommended.

It is important to note that the addition of gutters on the house wherever they do not exist is recommended by the Texas Section of the American Society of Civil Engineers and thus required by many DFW Metroplex municipalities. **Failure to make this improvement likely voids the home's foundation warranty.**

The gutters require cleaning to avoid spilling roof runoff around the building – a potential source of water entry or water damage.

The gutters at the east and west ends of the balcony must be spaced a minimum of 1" away from the siding as per the siding manufacturer's installation instructions and IRC 102.4.

The gutters at the east side of the garage and at the east end of the balcony are holding water and do not appear to have sufficient slope to drain properly. Gutters must slope  $\frac{1}{4}$ " –  $\frac{1}{2}$ " per 10 linear feet toward the nearest downspout as per industry standards.

Damaged gutters on the east side of the garage, et al., must be repaired or replaced as necessary to avoid spilling roof runoff around the building – a potential source of water entry or water damage.

The downspouts are required by IRC 801.3 and recommended by the Texas Section of the American Society of Civil Engineers to discharge water at least five (5) feet from the house. See:

<http://www.texasinspector.com/files/Foundation-Design-Guidelines-TXASCE.pdf>

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Inspection Item

Downspouts that discharge onto the roof should be extended to discharge directly into the gutters below. This condition, if left unattended, can result in premature deterioration of the roofing under the end of the downspout.

See:

[https://www.gaf.ca/Warranties\\_Technical\\_Documents/Steep\\_Slope\\_Technical\\_Advisory\\_Bulletins/English\\_Bulletins/Damage\\_to\\_Shingles\\_from\\_Gutter\\_and\\_Downspout\\_Runoff\\_Steep\\_Slope\\_Technical\\_Point\\_TAB\\_R\\_2011\\_150.pdf](https://www.gaf.ca/Warranties_Technical_Documents/Steep_Slope_Technical_Advisory_Bulletins/English_Bulletins/Damage_to_Shingles_from_Gutter_and_Downspout_Runoff_Steep_Slope_Technical_Point_TAB_R_2011_150.pdf)

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#### D. Roof Structures and Attics

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

*Viewed Upp Attic Level from Ladder Only - No Service Floor there*

*Grounds for Departure:* >10" of Insulation

*Approximate Average Depth of Insulation:* 12 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.

*Attic Ventilation Type:* Soffit Vents

*Ridge Vents*

*Power Vents*

*Insulation Types:* Blown-In Fiberglass

*Comments:*

#### ROOF STRUCTURE

An attic access opening a minimum of 22" X 30" is required above the living room as per IRC R807.1: R807.1 Attic access. In buildings with combustible ceiling or roof construction, an attic access opening shall be provided to attic areas that exceed 30 square feet (2.8m<sup>2</sup>) and have a vertical height of 30 inches (762 mm) or greater. The rough-framed opening shall not be less than 22 inches by 30 inches (559 mm by 762 mm) and shall be located in a hallway or other readily accessible location. A 30-inch (762 mm) minimum unobstructed headroom in the attic space shall be provided at some point above the access opening. See Section M1305.1.3 for access requirements where mechanical equipment is located in attics. NOTE: The requirement for an attic access is predicated on the likelihood that during the life of the structure, access to an attic space for repair of piping, electrical, and mechanical systems will be required.

#### ATTIC SERVICE FLOOR

The attic service flooring is improperly configured in the upper attic. IRC R1305.1.3 states, "The passageway shall have a continuous solid flooring in accordance with Chapter 5 not less than 24 inches (610 mm) wide. A level service space at least 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present along all sides of the appliance where access is required." This requires improvement.

The attic service flooring in the lower attic is improperly configured. M1305.1.3 Appliances in attics. Attics containing appliances requiring access shall have with an opening and a clear and unobstructed passageway large enough to allow removal of the largest appliance, but not less than 30 inches (762 mm) high and 22 inches (559 mm) wide and not more than 20 feet (6096 mm) long when measured along the centerline of the passageway from the opening to

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the appliance. The passageway shall have continuous solid flooring in accordance with Chapter 5 not less than 24 inches (610 mm) wide. A level service space at least 30 inches (762 mm) deep and 30 inches (762 mm) wide shall be present along all sides of the appliance where access is required. The clear access opening dimensions shall be a minimum of 20 inches by 30 inches (508 mm) by 762 mm), where such dimensions are large enough to allow removal of the largest appliance.

See: <http://www.texasinspector.com/Monster%20Attics.pdf>

The OSB sheathing being used as service flooring leading to and/or surrounding the furnace in the lower attic is not designed for this purpose by the manufacturer, nor is it permissible by any current building code. This is not a floor-rated material and will not support the live loads that are necessarily imposed upon it by persons accessing and servicing the mechanical equipment it is intended to reach. IRC 1401.2 and IRC 1305.1.1 state clearly the requirement for flooring as an access for furnace equipment.

There is not always sufficient room for mechanical equipment and appliances to be installed in spaces such as basements, alcoves, utility rooms and furnace rooms. In an effort to save floor space or simplify an installation, designers often locate appliances and mechanical equipment on roofs, in attics or in similar remote locations. Access to appliances and equipment could be difficult because of roof slope, stone roof ballast or the lack of a walking surface, such as might occur in an attic or similar space with exposed ceiling joists. The intent of Chapters 5 and 13 of the IRC is to require a suitable access opening, passageway and workspace that will allow reasonably easy access without endangering the homeowner or service persons entering these areas to service or maintain mechanical equipment.

Chapter 5 of the IRC is primarily concerned with the structural integrity and safety afforded by any flooring system or walking surface including, but not limited to, interior floors (both wood and concrete), attic service floors, exterior decks and other surfaces intended to be walked upon. From 501.1,

“R501.1 Application. The provisions of this chapter shall control the design and construction of the floors for buildings, including the floors of attic spaces used to house mechanical or plumbing fixtures and equipment. Floors (including attic floors) that house mechanical equipment or plumbing fixtures (see the definition in Chapter 2) must comply with this chapter.

R501.2 Requirements. Floor construction shall be capable of accommodating all loads in accordance with Section R301 and of transmitting the resulting loads to the supporting structural elements.”

Further, the Structural Board Association (SBA) publication, “OSB in Wood Frame Construction, U.S. Edition 2001”, states plainly: 5.2 Floor Sheathing: Sheathing grade subfloors are intended to have an additional layer of structural material such as an underlayment panel, wood strip flooring applied at right angles to the joists, or concrete topping.

This material must be replaced with or amended to be a floor-rated material. This is a pedestrian safety hazard. This will also likely cause some home warranty companies to refuse to service the equipment located in the areas of these floors.

#### PANEL EDGE SUPPORT

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I	NI	NP	D	Inspection Item
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The flooring is also not properly installed in that the panel edges are not fully supported by framing as is required in IRC Table 503.2.1.1(j). "Unsupported edges shall have tongue-and-groove joints or shall be supported with blocking"

Properly configured attic service floor steps must be installed at the attic floor elevation offset in the lower southeast attic as per IRC R311.5.3.1:

R311.5.3.1 Riser height. The maximum riser height shall be 73/4 inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm).

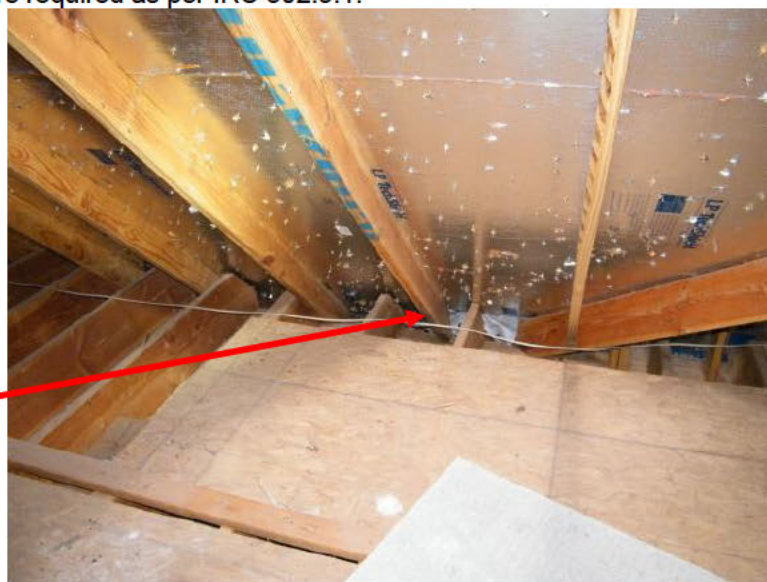
NOTE: The code establishes that the maximum riser height is 73/4 inches (197 mm). The International Residential Code does not provide a minimum riser height as does the International Building Code, where a 4-inch (102mm) limit is specified. The provisions specify how the riser height is to be measured. See Commentary Figure 311.5.3.1(1). A significant safety factor relative to stairways is the uniformity of risers and treads in any flight of stairs. The section of a stairway leading from one landing to the next is defined as a flight of stairs. It is very important that any variation that would interfere with the rhythm of the stair user be avoided. While it is true that adequate attention to the use of the stair can compensate for substantial variations in risers and treads, too frequently the stair user does not give the necessary attention.

To obtain the best uniformity possible in a flight of stairs, the maximum variation between the highest and lowest risers is limited to 3/8 inch (9.5 mm). This tolerance is not to be used as a design variation, but its inclusion is in recognition that construction practices make it difficult to get exactly identical riser heights and tread dimensions in constructing a stairway in the field.

This constitutes a pedestrian trip hazard and must be repaired for your safety and the safety of servicepersons entering your attic.

#### RAFTERS

The rafters are not tied together at the top plates with the parallel ceiling joists and rafter ties are required as per IRC 802.3.1.



Rafters not tied to joists.

#### ATTIC INSULATION / VENTILATION

Report Identification: [REDACTED]

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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 installer's certificate required by IRC N1101.4 is not posted conspicuously in the attic.

N1101.4 Building thermal envelope insulation. An R-value identification mark shall be applied by the manufacturer to each piece of building thermal envelope insulation 12 inches (305 mm) or more wide. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and R-value of insulation installed in each element of the building thermal envelope. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled R-value, installed density, coverage area and number of bags installed shall be listed on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the area covered and R-value of installed thickness shall be listed on the certificate. The insulation installer shall sign, date and post the certificate in a conspicuous location on the job site.

Insulation depth indicators are not installed as required by IECC R303.1.1.1..

The knee wall insulation is missing from the north wall of the master bathroom and requires installation as per 2018 IECC.

#### POWER VENT FAN

The junction/switch box for the power ventilator is not properly mounted.

**SPECIFIC LIMITATIONS:** The power ventilators were not operated or inspected for operation at an ambient temperature below their lowest thermostat setting.

The attic side wall door must be insulated and gasketed as per 2018 IECC 402.2.3. 402.2.3 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 that 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 opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

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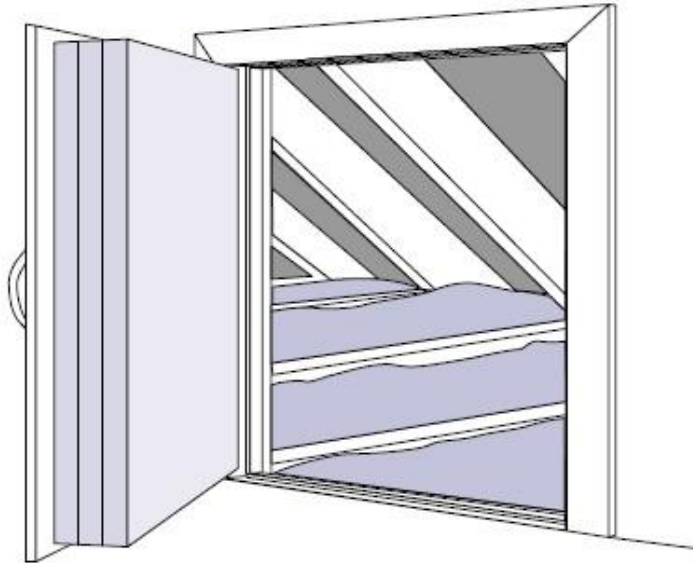
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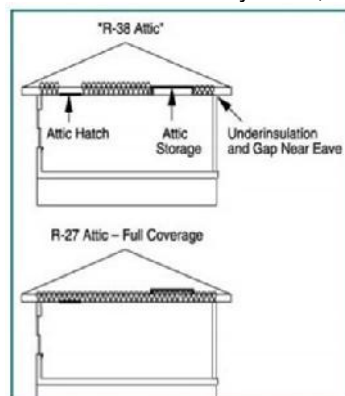
Inspection Item



*Add R-value to a knee-wall door by adhering rigid insulation boards (sandwiched together with construction adhesive and screws) to the back of the door. Pay special attention to the clearance between the insulation and the door frame and air sealing details.*

The hollow core side wall door at the second floor attic entrance is rated at R-2.17 while the surrounding walls are insulated to R-13. 2.17 does not equal 13.

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.



R-38 installed with 5% gaps or uninsulated areas yields the same heat loss as R-27 with full coverage - a 30% reduction!

1000 s.f. of Attic

950 s.f. is R-38

50 s.f. is R-4

$$R_{avg} = \frac{R_1 \times A_1 + R_2 \times A_2}{A_{Total}}$$

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Inspection Item

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

For engineers and the criminally curious, here is a mind-numbing video on the subject:

<https://www.youtube.com/watch?v=KTB64fFE>

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#### E. Walls (Interior and Exterior)

*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*

*Fiber-cement Siding*

*Fiber-cement Trim*

*Wood Trim*

*Interior Wall Claddings: Drywall*

*Stone Veneer*

*Wood Paneling*

*Comments:*

#### GARAGE WALLS

Damage to the interior finish was observed and must be repaired.

#### INTERIOR WALLS

No drywall has been installed at the north side of the master bathroom and it is open to the garage attic. This is not allowed as per IRC 302.9.1.

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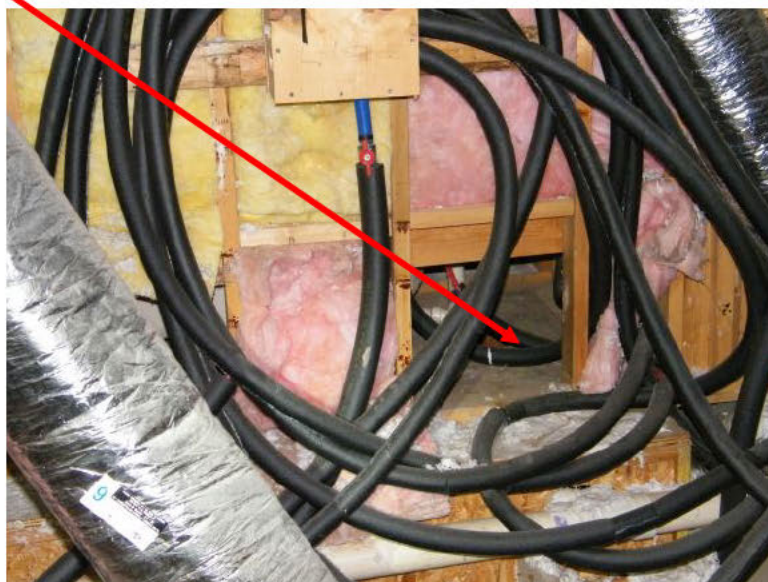
D=Deficiency

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Inspection Item

Loose  
junction  
box.

Insulation  
and drywall  
missing.



Drywall damage was noted in the pantry.

#### CABINETS

The structure being used as a kitchen island is not secured to the floor. This is hazardous for many reasons and requires immediate repair.

#### EXTERIOR WALLS

Typical minor cracking was observed on the exterior walls of the house. This implies that some structural movement of the building has occurred, as is typical of all houses in the north central Texas area.

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Inspection Item

#### RUSTED LINTELS

Rust is bleeding through the paint on the window and door lintels. This is a result of the builder omitting the primer prior to painting. While it is true that these lintels are pre-primed for protection during storage, shipment and handling, the primer's integrity is nearly always compromised during the construction process. These should be stripped, primed with a high-grade alkyd exterior primer and re-painted. Rust causes the metal lintels to expand and results in mortar cracking. This requires repair.

#### VEGETATION

Vines and shrubs should be trimmed away from and not allowed to grow on exterior wall surfaces. Excessive vegetation against exterior walls is conducive to the attraction of wood destroying insects and the collection of excessive moisture on wall surfaces.



#### UTILITY OPENINGS

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

#### SEALANTS

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 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.

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Inspection Item

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.

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.

Report Identification: [REDACTED]

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

#### MORTAR AS SEALANT

Mortar has been applied at the heads of all the windows in the brick veneer. This is not allowed by the window manufacturer and is not in compliance with IRC 102.4, 612.1, or 703.1. All window and door manufacturers require installation of their products per ASTM E 2112, which states in 11.4.2: Any chemicals, petroleum-based releasing agents or protective coatings made of petroleum or corrosive materials that are used in the installation of interior finishes or exterior cementitious products such as mortar, stucco or EIFS, shall not be applied to any portion of the fenestration product.

Mortar is not a sealant. It is a porous material that is hydroscopic and water passes right through it. This mortar must be replaced with a proper low-modulus sealant.

#### SIDING

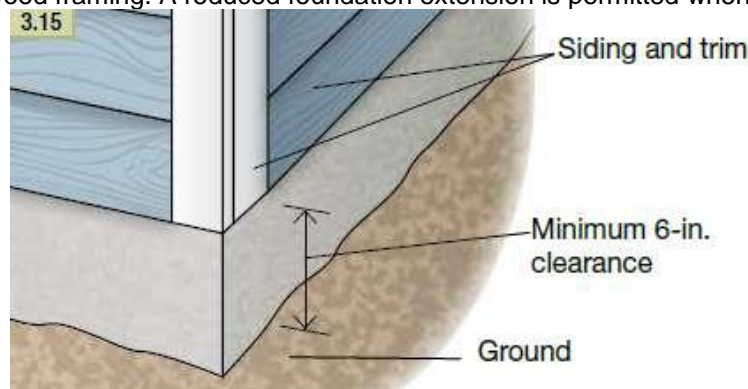
##### BUTT JOINTS

The siding butt joints have not been installed in moderate contact and flashed as per the manufacturer's installation instructions. While the builder does have the option cot caulk these joints, caulking is not recommended by the manufacturer and not all of the joints have been caulked.

See: <http://www.youtube.com/watch?v=9Vy1I79CO1E>

##### SIDING AT GRADE

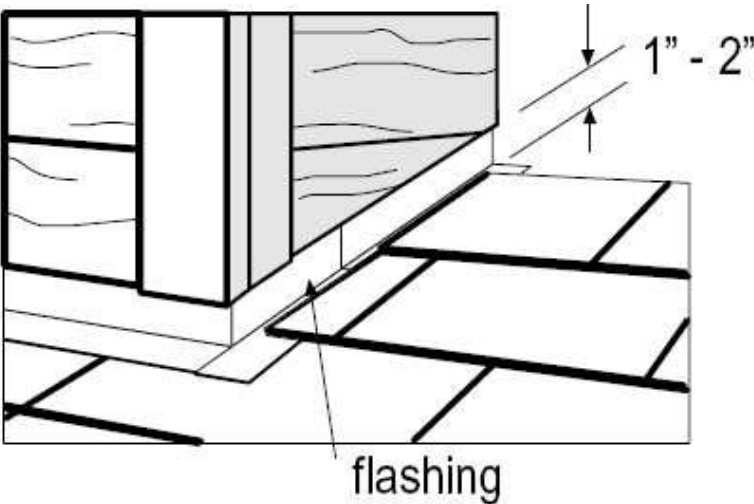
The siding is installed too close to grade at the northeast chimney chase as per the manufacturer's installation instructions (1"-2" to masonry and 6" to grade), and IRC 404.1.6 R404.1.6 Height above finished grade. Concrete and masonry foundation walls shall extend above the finished grade adjacent 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.



##### SIDING AT ROOF

As indicated in the manufacturer's installation instructions, fiber-cement siding and trim material must be kept at least 1 - 2 inches above horizontal or sloped surfaces such as decks, balconies, porches, patios, sidewalks, driveways, and roofs. Most of today's manufactured siding, trim, decking, and roofing materials must be installed with spacing to permit expansion and to reduce the chance of wicking water.

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

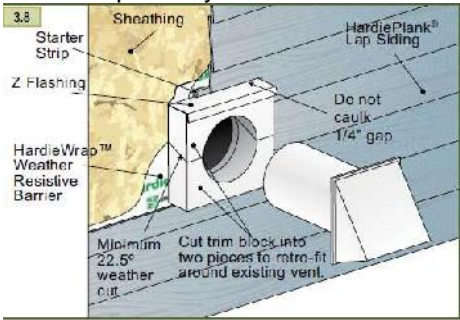


Moisture will wick into the material on warm days during the winter. Then when temperatures drop, the water inside the fiber-cement material will freeze, expand, and crumble the material. In addition to the freeze-thaw-freeze problem, any salt (calcium chloride or sodium chloride) that you may have used to break up winter ice accumulations at driveways, porches, and patios will likely accelerate the damage.

The siding should not be in contact with the roof surface. It must be installed a minimum of 2" above the roofing surface. This voids the manufacturer's warranty.

UTILITY PENETRATIONS

The utility penetrations in the siding have not been flashed as per the siding manufacturer's installation instructions. This is required by IRC 102.4 and 703.10.2.



FLASHING

Kick-out flashing is required at the east end of the patio and at both sides of the northeast chimney chase as well as 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.

I=Inspected

NI=Not Inspected

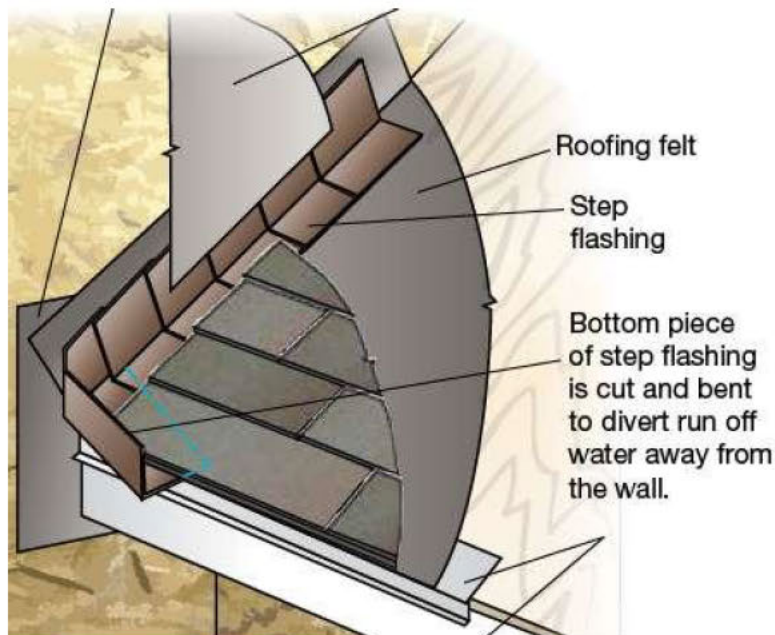
NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

See: <https://www.youtube.com/watch?v=h10YS1yZ9JA>

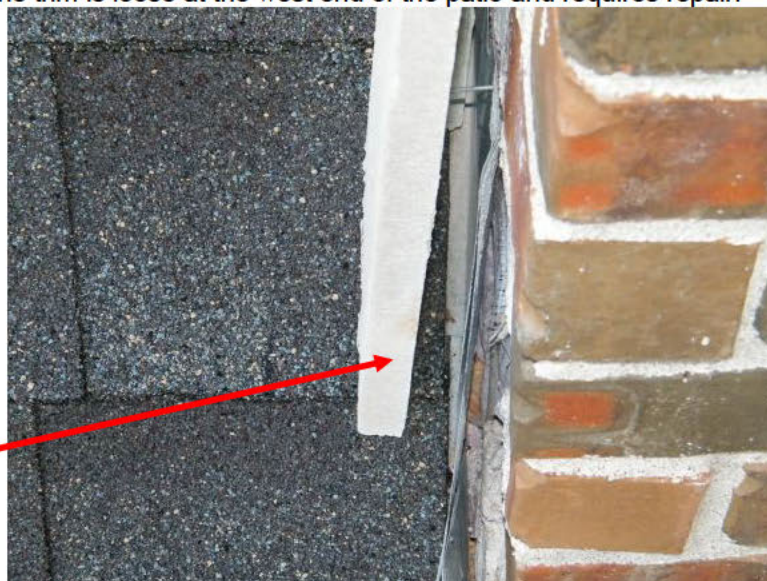


#### TRIM

The siding must be spaced 1/8" from abutting perpendicular trim pieces and caulked as per the manufacturer's installation instructions. This installation voids the manufacturer's warranty.

See: <https://www.jameshardie.com/JamesHardieMainSite/media/Site-Documents/TechnicalDocuments/Reports/ESR-2290-2015.pdf>

The trim is loose at the west end of the patio and requires repair.



Trim loose.

The fascia is missing at the west end of the patio and requires installation. This constitutes a vermin entry point.

I=Inspected

NI=Not Inspected

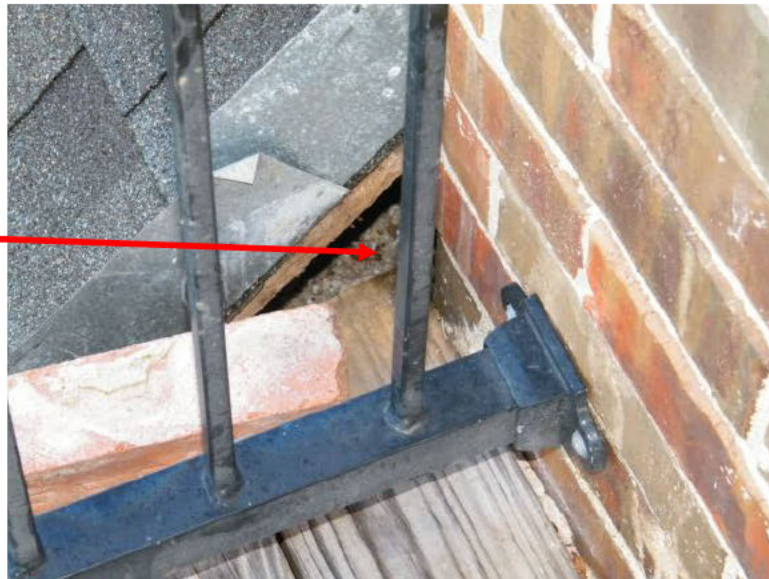
NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

Vermin  
entry point  
in fascia.



The exterior of the house requires re-painting.

#### BRICKS

No expansion joints were observed in the brick veneer walls as required by BIA Technical Note 18A and other industry standards.

The brick and stone veneer window sills are not sloped 15° as recommended by BIA Technical Notes 36, and required by IRC 703.7, and ACI 530-13, which is a referenced standard in the IRC.

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 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.

#### STONE VENEER

Weep holes and flashing material are required above and below all windows and above all doors with lintel-supported 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.

#### MAINTENANCE OF EXTERIOR WALLS

Report Identification: [REDACTED]

I=Inspected

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D=Deficiency

I NI NP D

Inspection Item

Understanding the function of exterior wall systems is key to identifying and correcting problems. A good maintenance program includes regular inspections. Proactive maintenance that addresses deteriorating conditions before large-scale failures develop helps minimize damage caused by component failure and is critical in insuring that the home's water-resistive barrier remains intact and functions as intended.

This list features components that undergo weathering, wear and tear, and deterioration, as well as typical conditions to watch for:

- Sealant joints.
- Weatherstripping at the perimeter of operable windows and doors.
- Gaskets between the exterior glazing and window frame.
- Sealers (typically a clear material applied to the surface of the exterior wall system). Since sealers are generally not visible, testing the portions of the exterior wall system where the sealer is known to have been applied may be necessary to ensure it's performing as intended.
- Waterproof coverings such as paints and elastomeric coatings.
- The exterior cladding component itself.
- Debris and biological growth accumulation at drainage points (gutters, downspouts, and flashings).
- Landscaping adjacent to the base of the exterior wall system and foundation. Maintain a minimum distance of 6 inches between the base of the system and the earth, including landscaping build-up along foundations. Also, make sure that sprinklers adjacent to the building are positioned to spray water away from the exterior wall system to prevent moisture infiltration.
- Cracking, deterioration of mortar joints, peeling paint, efflorescence, and any form of distress.

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#### F. Ceilings and Floors

*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*

*Stone*

*Vinyl*

*Wood*

*Laminate*

I=Inspected

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NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

Comments:

#### CEILINGS

Water damage was noted in the game room, master bedroom, and garage ceilings. Repairs must be undertaken to prevent further damage to the structure.

Water damage and mold garage.



Water damage game room.



Evidence of patching was detected in various locations.

**MOLD GROWTH WAS NOTED AT THE WATER STAIN IN THE SOUTHWEST CORNER OF THE GARAGE CEILING. YOU ARE STRONGLY URGED TO HAVE THIS HOUSE TESTED FOR THE PRESENCE OF MOLD BY A LICENSED MOLD ASSESSMENT AND REMEDIATION FIRM PRIOR TO THE END OF ANY TIME PERIODS ASSOCIATED WITH THE PURCHASE OF THIS HOME!**

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

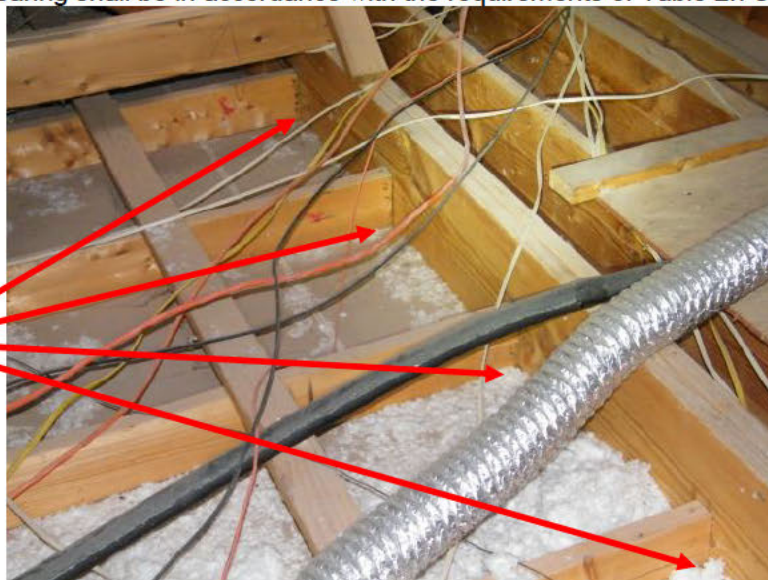
I	NI	NP	D	Inspection Item
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#### GARAGE CEILING

The penetration of the attic access hatch and various other holes in the garage ceiling effectively breaches the fire-rated assembly required by IRC 309.2 Separation required. The garage shall be separated from the residence and its attic area by not less than ½-inch (12.7 mm) gypsum board applied to the garage side. The wood or composite trim used to support the drywall cover does not an equivalent flame spread rating as the drywall, and the gap around the edge of the drywall cover does not provide a fire separation due to its discontinuous nature. This is a fire hazard.

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

Joist hangers are missing in the attic above the garage. The floor or ceiling joist must be supported on each end by a top plate, ledger strip or joist hanger as per IRC 502.6.2. This is also a requirement in the National Design Standard, which is a referenced standard in the International Residential Code. NDS 2.3.1.2 Bearing Joists shall bear directly on beams, girders, ledgers, or load-bearing walls or be supported by hangers or framing anchors. Joist bearing shall be in accordance with the requirements of Table 2.7C.



Joist  
hangers  
missing.

#### FLOORS

##### TILE

The tile floor in the kitchen is cracked and requires repair.

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

Tile crack  
kitchen.



#### WOOD FLOORS

Wood floor reducer strip is needed in several locations.

#### BASEBOARD

The installation of the floor trim is incomplete.

#### LAMINATE FLOORS

Damage was noted in the breakfast room. Replacement is required.

Water  
damage to  
flooring.



Poor repair in the north side of the family room is evident.

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

I	NI	NP	D	Inspection Item
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Unsightly  
repair.

**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 the 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 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.

Report Identification: [REDACTED]

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D=Deficiency

I NI NP D

Inspection Item

NOTE: Wood floor installation in areas with sources of water, e.g. kitchen, bathrooms, laundry rooms, near exterior doors, et al. while perhaps in fashion, is a very impractical and imprudent choice. Water damage to wood flooring installed in these areas is to be expected, as it is unavoidable.

☒ ☐ ☐ ☒

#### G. Doors (Interior and Exterior)

*Comments:*

##### INTERIOR DOORS

The interior doors in this house were installed by an amateur with no talent for the job. Most, if not all, of the doors need to be re-hung by a skilled carpenter.

The manufacturer of the exterior front door requires that all edges of the door be finished upon installation. This requires improvement as per IRC 609.1 and 102.4. This is not a cosmetic defect, but one of function. The wood edges (rails and stiles) of the door are a hygroscopic material, i.e. they absorb moisture from the ambient air. Left unpainted this wood will expand and contract due to seasonal changes in interior humidity. Swelling doors cause sticking doors.

##### EXTERIOR DOORS

The exterior doors in this house were installed by an amateur with no talent for the job. Most, if not all, of the doors need to be re-hung by a skilled carpenter.

The front door must be trimmed or adjusted as necessary to work properly as per industry standards.

Weather-stripping material is damaged at the front door and requires replacement.

##### CORNER SEAL PADS

The corner seal pads are missing from the strike and/or hinge jamb bottoms of the exterior doors. These require replacement to complete the door weather stripping as per the door manufacturer, IRC 102.4 and 609.1, as well as IECC 402.4. These fit securely behind the bottom of the side jamb weatherstrip pieces to help block potential pathways where wind and wind-driven water can infiltrate the bottom of the door system

##### PAN FLASHING

The exterior door at the balcony has no visible pan flashing installed as required by the manufacturer of the door, IRC 102.4, 609.1 and 703.1.1.

A sill pan gathers leak water and drains it away from the structure, adding an extra layer of protection to help keep water away from the floor system.

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

Report Identification: [REDACTED]

I=Inspected

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NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

The manufacturer of the exterior front door requires that all edges of the door be finished upon installation. This requires improvement as per IRC 609.1 and 102.4. This is not a cosmetic defect, but one of function. The wood edges (rails and stiles) of the door are a hygroscopic material, i.e. they absorb moisture from the ambient air. Left unpainted this wood will expand and contract due to seasonal changes in interior humidity. Swelling doors cause sticking doors.

#### GARAGE DOORS

The door between the garage and the interior of the house must be equipped with an auto-closer device as per IRC 302.5.1.

#### VERMIN ENTRY POINTS

The bottoms of the side (vertical) garage doorjamb fit poorly and will allow for rodent entry. Mice and rats often find easy access to garage areas through open doors or under and beside poor-fitting garage doors. Once in the garage, they may gain entry into the main structure along electrical lines, pipes, poorly sealed fire wall sheathing, or around furnace ducts, hot water heaters, or laundry drains.

Rodents destroy insulation, electrical wiring, plumbing, and other structural components of buildings (Fig. 1). Insulation damage alone may amount to a loss of several thousand dollars in only a few years. Energy loss from damaged buildings results in added annual costs. Rodent-induced fires from damaged electrical wiring or nest building in electrical panels cause loss of property and threaten human safety.

Rodents also serve as vectors or reservoirs of a variety of diseases, such as salmonellosis, leptospirosis, and murine typhus, that are transmittable to humans. Additionally, they may be sources of swine dysentery, brucellosis, sarcoptic mange, and tuberculosis, all of which affect livestock or pets.

The most effective means of limiting rodent damage is rodent-proof construction. New buildings are required to be designed and built to prevent rodent entry as per IRC 2404.9. Rodentproofing. Buildings or structures and the walls enclosing habitable or occupiable rooms and spaces in which persons live, sleep or work, or in which feed, food or foodstuffs are stored, prepared, processed, served or sold, shall be constructed to protect against the entry of rodents.

NOTE: If your builder/municipal inspector tells you that the bottoms of the doorjamb must be mitered at a 45° angle in order to comply with the code requirement to prevent untreated wood from contacting masonry, that is true, but not a convincing argument. One cannot simply flaunt one section of the code in order to comply with another. That is tantamount to excusing your running over a pedestrian in your car because you were accelerating smoothly after stopping at a red light. There are alternatives that the builder chose not to opt for such as using pressure-treated wood or naturally decay-resistant species such as western red cedar.

See: <https://wildlife-damage-management.extension.org/rodent-exclusion-methods/>

Report Identification: [REDACTED]

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D=Deficiency

I NI NP D

Inspection Item

☒ ☐ ☐ ☒

## H. Windows

*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. **You are strongly urged to have these windows professionally leak tested in strict accordance with either AAMA 502-08, Voluntary Specification for Field Testing of Newly Installed Fenestration Products, or ASTM E1105.-15, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference, and/or AAMA 502-08, Voluntary Specification for Field Testing of Newly Installed Fenestration Products, prior to the end of any time periods associated with the purchase of this home.***

*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

Comments:

### WINDOWS

The windows are in mild disrepair. This is a common condition that does not necessitate immediate major repair. Trimming and adjustment, hardware improvements and glazing repairs would be logical long term improvements. In practice, improvements are usually made on an as needed basis only. The most important factor is that the window exteriors are well maintained to avoid rot or water infiltration.

Some signs of minor window leakage were noted in the sills. This is common and can be addressed by first cleaning the weather stripping material along the tops and bottoms of the operator sashes. Should the leakage persist, adjustment of the sashes may help. Ultimately the weather stripping materials will require replacement.

The windows in many, if not all, places throughout the house appear to have lost their seal. This has resulted in condensation developing between the panes of glass and can cause the glass to lose its insulating properties. The glass should be repaired or replaced.

Damaged window screens require repair or replacement.

Report Identification: [REDACTED]

I=Inspected

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D=Deficiency

I NI NP D

Inspection Item

SPECIFIC LIMITATIONS: The windows on this house were not clean enough to detect thermal seal issues. You are strongly advised to have the windows professionally inspected for failed thermal seals once the windows have been professionally cleaned, and prior to closing escrow on this home.

☒ ☐ ☐ ☐

**I. Stairways (Interior and Exterior)**

Comments:

**STAIRWAYS**

The stairway appeared to be in satisfactory condition.

☒ ☐ ☐ ☒

**J. Fireplaces and Chimneys**

*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. The Inspector does not remove chimney caps or cap flashings. The interiors of flues are not inspected except visually from the vantage point of the firebox, when accessible. Freestanding wood burning stoves are beyond the scope of this inspection. Should you have present or future concerns regarding fireplaces, draft performance, inaccessible chimney structures or freestanding wood burning stoves, consult with a Professional Chimney Sweep for further evaluation.*

Fireplace Types: Steel Fireboxes

Chimney Types: Metal

Comments:

**FIREPLACE UNIT 1 - LIVING ROOM**

The gas log starter piping must be sealed with a non-combustible sealant where it enters the wall of the firebox as per IRC 1002.1 and the manufacturer's installation instructions, "The side refractories are designed to allow 1/2 in . iron pipe to pass through. Use a noncombustible sealant to seal any opening between the gas pipe and refractory on the inside. Repack the insulation removed to seal around the gas pipe where it exits the side of the fireplace."

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I NI NP D

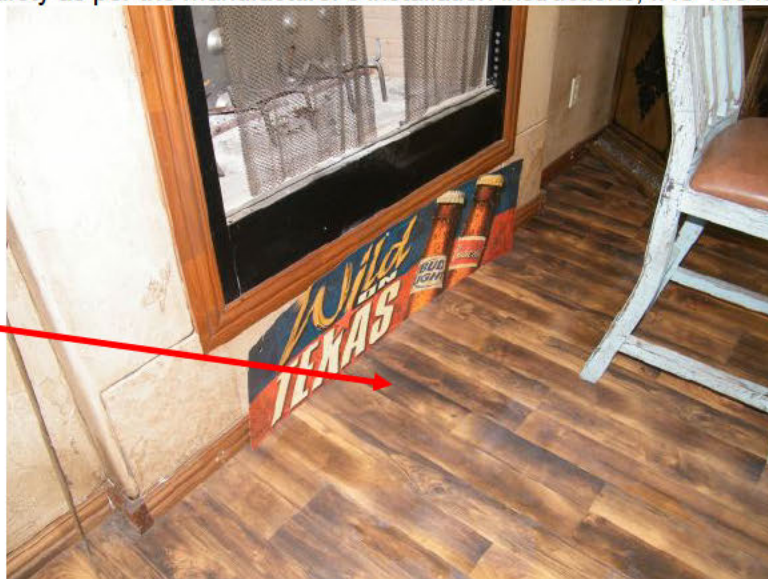
Inspection Item

Sealant  
required.



The hearth outside the fireplace is not large enough to reduce the risk of fire, should hot embers manage to escape from the fireplace. This situation must be altered for improved safety as per the manufacturer's installation instructions, IRC 1004.2 and IRC 102.4.

Hearth  
extension  
required.



#### FIREPLACE UNIT 2 - FAMILY ROOM

The gas log starter piping must be sealed with a non-combustible sealant where it enters the wall of the firebox as per IRC 1002.1 and the manufacturer's installation instructions, "The side refractories are designed to allow 1/2 in . iron pipe to pass through. Use a noncombustible sealant to seal any opening between the gas pipe and refractory on the inside. Repack the insulation removed to seal around the gas pipe where it exits the side of the fireplace."

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NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

Sealant  
required.



The fireplace shows evidence of having a poor draft. There are a number of improvements that can be undertaken to alter this condition (if it proves to be a problem). In some cases, it is not cost effective to improve the draft, and glass doors are installed to contain the smoke within the firebox. It may also be that the fires burned in this unit were laid to close to the mount of the shallow firebox.

**NOTICE:** The National Fire Protection Association (NFPA) requires a Level 2 inspection of fireplaces upon resale of the property in NFPA 211 14.5.1(3). This should be performed by a professional chimney sweep who is a member of the Chimney Safety Institute of America and the National Chimney Sweep Guild.

#### LEVEL 1 INSPECTIONS -

If your appliance or your venting system has not changed and you plan to use your system as you have in the past, then a Level 1 inspection is a minimum requirement. A Level 1 inspection is recommended for a chimney under continued service under the same conditions and with the continued use of the same appliance. Most chimney sweeps include a Level 1 inspection during a routine cleaning.

In a Level 1 inspection, your chimney service technician should examine the readily accessible portions of the chimney exterior, interior and accessible portions of the appliance and the chimney connection. Your technician will be looking for the basic soundness of the chimney structure and flue as well as the basic appliance installation and connections. The technician will also verify the chimney is free of obstruction and deposits.

#### LEVEL 2 INSPECTIONS -

A Level 2 inspection is required when any changes are made to the system. Changes can include a changes in the fuel type, changes to the shape of, or material in, the flue (I.E. Relining), or the replacement or addition of an appliance of a dissimilar type, input rating or efficiency. Additionally, a Level 2 inspection is required upon the sale or transfer of a property or after an operating malfunction or external event that is likely to have caused damage to the

Report Identification: [REDACTED]

I=Inspected

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D=Deficiency

I NI NP D

Inspection Item

chimney. Building fires, chimney fires, seismic events as well as weather events are all indicators that this level of inspection is warranted. A Level 2 inspection is a more in-depth inspection than a Level 1 inspection.

A Level 2 inspection includes everything in a Level 1 inspection, plus the accessible portions of the chimney exterior and interior including attics, crawl spaces and basements. It will address proper clearances from combustibles in accessible locations. There are no specialty tools (i.e. demolitions equipment) required to open doors, panels or coverings in performing a Level 2 inspection. A Level 2 inspection shall also include a visual inspection by video scanning or other means in order to examine the internal surfaces and joints of all flue liners incorporated within the chimney. No removal or destruction of permanently attached portions of the chimney or building structure or finish shall be required by a Level 2 inspection.

#### LEVEL 3 INSPECTIONS -

When a Level 1 or a Level 2 inspections suggests a hidden hazard and the evaluation cannot be performed without special tools to access concealed areas of the chimney or flue, a Level 3 inspection is recommended. A Level 3 inspection addresses the proper construction and condition of concealed portions of the chimney structure and the flue. Removal or destruction, as necessary, of permanently attached portions of the chimney or building structure will be required for the completion of a Level 2 inspection.

A Level 3 inspection includes all the areas and items checked in a Level 1 and a Level 2 inspection, as well as the removal of certain components of the building or chimney where necessary. Removal of components (i.e. chimney crown, interior chimney wall) shall be required only when necessary to gain access to areas that are the subject of the inspection. When serious hazards are suspected, a Level 3 inspection may well be required to determine the condition of the chimney system.

☒ ☐ ☐ ☒

#### K. Porches, Balconies, Decks, and Carports

Note: Specific Limitations. The Inspector is not required to inspect or report on detached structures or waterfront structures and equipment (e.g. detached garages, buildings, barns, storage areas, boathouses, boat docks, bulkheads, seawalls, et al.).

Comments:

#### BALCONY

The balcony support posts are inadequately connected to the roof beam to resist uplift and lateral displacement. This requires the addition of metal brackets as per IRC 502.9.

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

I	NI	NP	D	Inspection Item
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Improper  
post-to-  
beam  
connections



The loose balcony deck boards represent a trip hazard and should be repaired. This is a safety concern that should be addressed promptly.

Loose deck  
board.



Joist hangers are missing from the joists to beam connections at the south side of the balcony structure. The floor or ceiling joist must be supported on each end by a top plate, ledger strip or joist hanger as per IRC 502.6.2. This is also a requirement in the National Design Standard, which is a referenced standard in the International Residential Code. NDS 2.3.1.2 Bearing Joists shall bear directly on beams, girders, ledgers, or load-bearing walls or be supported by hangers or framing anchors. Joist bearing shall be in accordance with the requirements of Table 2.7C.

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

Joist hangers missing.



Based on data from the Consumer Product Safety Commission, more than 6,000 people are injured in the USA each year in incidents involving the structural failure or collapse of a deck or porch. According to statistics amassed by the North American Deck and Railing Association, the number of deck failures and resulting injuries has been increasing at an ever greater rate over the last 10 years. Between 2000 and 2008, there were at least 30 deaths reported as a direct result of deck collapses, and more than 75 percent of the people on a deck were injured or killed when it collapsed.

More than 40 million decks in the United States are over 20 years old. It's important for every homeowner to check their deck with the assistance of a qualified engineer or home inspector. As with all structures, decks and porches must be properly maintained and inspected on an annual basis. It is also important to have them inspected after major storm events, major snow or ice storms, and before any event that will result in a large number of occupants. The overwhelming majority of older decks were built before code requirements were in place to protect consumers.

Some of the most common errors in deck building include, but are not limited to, deck-to-house connections, framing member sizing, post-to-beam connections, improper fasteners, undersized and improperly configured railings, improper design to allow for anticipated live and dead loads, et al. Mistakes made in any of these areas can lead to deck failure and personnel injuries or deaths.

You are strongly urged to have this deck inspected by a licensed structural engineer prior to the end of any time periods associated with the purchase of this home.

#### DRIVEWAY

The driveway slopes from the street toward the house and it appears that water ponds on the driveway during periods of heavy rains. The installation of channel drains is suggested to mitigate this situation.

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

I	NI	NP	D	Inspection Item
---	----	----	---	-----------------

### SIDEWALK

The tile sections appended to the sidewalk/front porch junction protrude from the surface and constitute a very real pedestrian slip and fall hazard for which you, as the owner, will be held liable.



Trip hazard.

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### L. Other

Comments:

N/A

## II. ELECTRICAL SYSTEMS

☒ ☐ ☐ ☒

### A. Service Entrance and Panels

*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.*

*SPECIFIC LIMITATION: TREC regulation 535.229(b)(3)(E)(iii) requires the inspector to identify bonding deficiencies. This is not practically feasible to accomplish within the scope of a visual inspection and/or without the use of special tools. You are strongly urged to hire a licensed electrician to verify the bonding of all metal structures within the house that are likely to become energized, prior to the end of any time periods associated with the purchase of this home.*

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

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

Panel Rating: Main Service Rating 200 Amps

Grounds for Departure: N/A

Disconnect Type: Breakers

Comments:

#### SERVICE/ENTRANCE

The conduit has settled at the service entry and has become disconnected from the meter enclosure. This requires improvement.

Conduit  
loose.



The opening in the bottom right side of the meter socket enclosure must be sealed as per NEC 312.5(A).

Close  
opening.



A (meter) slip riser is required in the electrical service conduit as per NEC 300.5(J) Earth Movement. Where direct-buried conductors, raceways, or cables are subject to movement by

Report Identification: [REDACTED]

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

settlement or frost, direct-buried conductors, raceways, or cables shall be arranged so as to prevent damage to the enclosed conductors or to equipment connected to the raceways.

Your builder, municipal inspector, or even a representative of the electric utility company may attempt to convince you that the slip riser is not required. This is not the case.

The utility company is not immune from NEC requirements on residential service installations, so the fact that your particular utility company does not abide by the code does not obviate any party's responsibility to comply with the code that is adopted by the municipality - and the state of Texas.

Many utility companies operate on the false assumption that they are bound only by the regulations as set forth by the National Electrical Safety Code, and not the National Electrical Code published by the NFPA. This is not the case.

The NEC in Section 90-2(b)(5) states that this Code does not cover "Installations...under the exclusive control of electric utilities for the purpose of communications, metering, generation, control, transformation, transmission or distribution of electric energy. Such installations shall be located in buildings used exclusively by utilities for such purposes; outdoors on property owned or leased by utility; or on or along public highways, streets, roads, etc.; or outdoors on private property by established rights such as easements."

Slip risers are specifically required in the installation manuals published by the major electric utility companies throughout the nation. The largest local provider, Oncor, covers this in their publication here (see page 31):

<https://www.oncor.com/EN/Documents/About%20Oncor/Construction%20Development/Complete%20Electric%20Service%20Guidelines%20Book.pdf>

The native soil type report that I provided during the initial pre-drywall inspection is attached. It clearly indicates that this house is located in an area of expansive soil. Within a few years the soil will either pull the conduit loose from the meter socket or pull the meter socket off the wall. In an attempt to save \$30 your builder is setting you up for a future repair costing hundreds.

#### MAIN DISTRIBUTION PANELBOARD

The lugs for the service conductors are not covered as required by NEC 110.27 and 408.3(2). This requires improvement.

I=Inspected

NI=Not Inspected

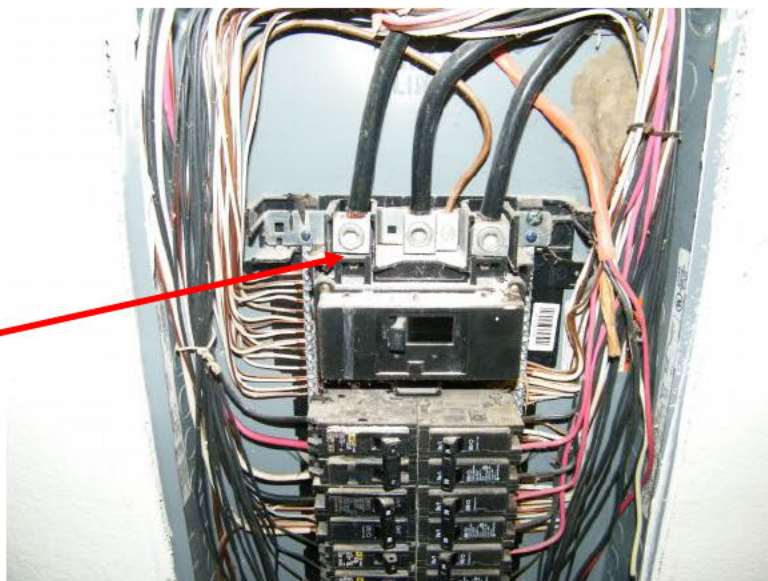
NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

Lug  
protectors  
missing.



Any unused openings in the main distribution panelboard must be covered as per NEC 110.12(A).

Close  
openings.



☒ ☐ ☐ ☒

**B. Branch Circuits, Connected Devices, and Fixtures**

Type of Wiring: Copper (Where Observed)

Comments:

DISTRIBUTION WIRING

Report Identification: [REDACTED]

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

Some electrical cables are located within 6'-0" of the attic stair or scuttle openings. All electrical cables located within 6'-0" vertically and horizontally of the attic stair opening are required by NEC 334.23:

334.23 In Accessible Attics.

The installation of cable in accessible attics or roof spaces shall also comply with 320.23:

320.23 In Accessible Attics.

Type AC cables in accessible attics or roof spaces shall be installed as specified in 320.23(A) and (B).

(A) Where Run Across the Top of Floor Joists. Where run across the top of floor joists, or within 2.1 m (7 ft) of floor or floor joists across the face of rafters or studding, in attics and roof spaces that are accessible, the cable shall be protected by substantial guard strips that are at least as high as the cable. Where this space is not accessible by permanent stairs or ladders, protection shall only be required within 1.8 m (6 ft) of the nearest edge of the scuttle hole or attic entrance.

In accessible attics, Type AC cable installed across the top of floor joists or within 7 ft of the floor or floor joists across the face of rafters or studs must be protected by guard strips. Where the attic is not accessible by a permanent ladder or stairs, guard strips are required only within 6 ft of the scuttle hole or opening.

(B) Cable Installed Parallel to Framing Members. Where the cable is installed parallel to the sides of rafters, studs, or floor joists, neither guard strips nor running boards shall be required, and the installation shall also comply with 300.4(D).

#### AFCIs

Arc-Fault circuit interrupters were not observed to be installed in all of the required locations. The installation of arc fault circuit interrupters (AFCI) in most of the branch circuit locations is required. As per 2014 NEC 210.12 Arc-fault circuit-interrupter protection shall be provided as required in 210.12(A) (B), and (C). The arc-fault circuit interrupter shall be installed in a readily accessible location. (A) Dwelling Units. All 120-volt, single-phase, 15- and 20-ampere branch circuits supplying outlets or devices installed in dwelling unit kitchens, family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreation rooms, closets, hallways, laundry areas, or similar rooms or areas shall be protected by any of the means described in 210.12(A)(1) through (6)

#### JUNCTION BOXES

The loose junction boxes must be properly secured as per NEC 314.23 Supports. Enclosures within the scope of this article shall be supported in accordance with one or more of the provisions in 314.23(A) through (H). (A) Surface Mounting. An enclosure mounted on a building or other surface shall be rigidly and securely fastened in place. If the surface does not provide rigid and secure support, additional support in accordance with other provisions of this section shall be provided.

All junction boxes must be fitted with cover plates, in order to protect the wire connections as per NEC 314.25.

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

Cover plate  
missing.



#### EXTENSION CORDS

Extension cords must not be used as permanent wiring. This requires repair as per NEC 400.12 Uses Not Permitted.

Unless specifically permitted in 400.10, flexible cords and cables shall not be used for the following:

- (1) As a substitute for the fixed wiring of a structure
- (2) Where run through holes in walls, structural ceilings, suspended ceilings, dropped ceilings, or floors
- (3) Where run through doorways, windows, or similar openings
- (4) Where attached to building surfaces

#### RELOCATABLE POWER TAPS (XBYS) (COMMONLY CALLED POWER STRIPS)

The relocatable power taps that were observed in this house are not intended to be permanently secured to building structures, tables, work benches or similar structures, nor are they intended to be used as a substitute for fixed wiring. Additionally, the cords of relocatable power taps are not intended to be routed through walls, windows, ceilings, floors or similar openings of buildings. This is a violation of NEC 110.3. Refer to the UL White Book for further details. (GUIDE INFORMATION FOR ELECTRICAL EQUIPMENT THE WHITE BOOK 2016-17 UL PRODUCT CATEGORIES CORRELATED TO THE 2011 AND 2014 NATIONAL ELECTRICAL CODE®)

Improper electrical connections must be improved at the proposed location for the jamb switch in the west under-stair closet. All electrical connections must be made inside junction boxes fitted with cover plates as per NEC 110.14 and 300.15.

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

Improper  
connection.



#### RECEPTACLES

Receptacles are loose in various locations and must be re-secured.

The face-up receptacles at the makeshift kitchen island are not allowed as per NEC 406.5(G).

Face-up  
outlets not  
allowed.



#### COVER PLATES

Missing receptacle cover plates must be replaced, to include the floor outlet in the family room.

The exterior receptacles requires "in use" type covers. NEC 406.8 requires an outdoor receptacle, installed in a wet location, to have an enclosure that is weatherproof when the attachment plug cap is inserted or removed. This type of cover would be one that completely protects the enclosure, from the entrance of water when the attachment plug cap is inserted.

Report Identification: [REDACTED]

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

#### TAMPER-RESISTANT RECEPTACLES

Tamper-resistant receptacles are required in all locations in both new construction and replacements as of January 1, 2009, as per 2008 NEC 406.12. Tamper-resistant receptacles feature a built-in shutter design that prevents the insertion of small objects into the receptacle's contact slots while enabling easy insertion of a properly rated plug.

#### FIXTURES (LUMINAIRES)

The light fixtures (luminaires) are inoperative in various locations. If the bulbs are not blown, the circuits should be investigated and repaired as required.

All exterior light fixtures (luminaires) must be sealed where they meet the brick veneer or the siding as per NEC 410.10(A).

The light fixture (luminaire) above the bathtub in the master bathroom requires a lens and must be approved for wet locations as per NEC 410.10 Luminaires in Specific Locations. (A) Wet and Damp Locations. Luminaires installed in wet or damp locations shall be installed such that water cannot enter or accumulate in wiring compartments, lampholders, or other electrical parts. All luminaires installed in wet locations shall be marked, "Suitable for Wet Locations." All luminaires installed in damp locations shall be marked "Suitable for Wet Locations" or "Suitable for Damp Locations." A pamphlet entitled Luminaires Marking Guide, available from Underwriters Laboratories Inc., was developed to help the authority having jurisdiction quickly determine whether common types of UL-listed fluorescent, high-intensity discharge, and incandescent fixtures are installed correctly.

The pendant fixture (luminaire) located in the master bathroom must be removed as per NEC 410.10(D): (D) Bathtub and Shower Areas. No parts of cord-connected luminaires, chain-, cable-, or cord-suspended luminaires, lighting track, pendants, or ceiling-suspended (paddle) fans shall be located within a zone measured 900 mm (3 ft) horizontally and 2.5 m (8 ft) vertically from the top of the bathtub rim or shower stall threshold. This zone is all encompassing and includes the space directly over the tub or shower stall. Luminaires located within the actual outside dimension of the bathtub or shower to a height of 2.5 m (8 ft) vertically from the top of the bathtub rim or shower threshold shall be marked for damp locations, or marked for wet locations where subject to shower spray.

#### CEILING (PADDLE) FAN(S)

The ceiling (paddle) fan at the balcony is inoperative and must be repaired or replaced.

The ceiling (paddle) fans in the laundry room and family room are out of balance. This requires improvement.

#### DOORBELL

The doorbell was inoperative and requires repair or replacement.

#### SMOKE DETECTORS

New interconnected smoke detectors must be installed every 10 years as per the National Fire Protection Agency, Underwriters Laboratories, and the Consumer Products Safety

Report Identification: [REDACTED]

I=Inspected

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D=Deficiency

I NI NP D

Inspection Item

Commission in the bedrooms, common areas outside the sleeping areas, and on each story of the house, in accordance with IRC R 313.1 and NFPA 72.

Additionally, as per Texas HB 2118, Sept. 1, 2007:

(b) If a one-family or two-family dwelling does not comply with the smoke detector requirements of the building code in effect in the political subdivision in which the dwelling is located, any home improvement to the dwelling that requires the issuance of a building permit must include the installation of smoke detectors in accordance with the building code in effect in the political subdivision in which the dwelling is located, including performance, location, and power source requirements.

#### CARBON MONOXIDE DETECTION

No CO detectors were observed. These are required by the codes adopted in your area in existing and new homes. These must be installed in strict accordance with the IRC, NFPA 72 and NFPA 720. IRC 315.1 Carbon monoxide alarms. For new construction, an approved carbon monoxide alarm shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in dwelling units within which fuel-fired appliances are installed and in dwelling units that have attached garages. Note: there are various types of carbon monoxide detectors but they should meet UL Standard 2034 where they must sound a warning before carbon monoxide levels reach 100 parts per million over 90 minutes, 200 parts per million over 35 minutes or 400 parts per million over 15 minutes. The UL standard requires the alarm must sound before an average, healthy adult begins to experience symptoms of carbon monoxide poisoning. The warning provides time to evacuate the premises. Buyer should secure the installation and maintenance instructions that come with the detector(s) that describes proper installation and location, periodic testing and maintenance.

**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.

**NOTICE:** Due to the age of the home and the possibility of hidden wiring issues, e.g. knob and tube installations, concealed amateur repairs, et al, you are strongly urged to have a licensed electrician inspect the system and make all necessary repairs prior to the purchase of the home.

### III. HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS

☒ ☐ ☐ ☒

#### A. Heating Equipment

Type of Systems: Central Forced Air Furnaces

Energy Sources: Gas

*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***

Report Identification: [REDACTED]

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

**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.**

*Comments:*

#### FURNACES

Given the age of the furnaces, they may be nearing the end of their useful lives. It would be wise to budget for new furnaces.

The heating system requires cleaning and servicing by a licensed HVAC technician who should verify the integrity of the heat exchanger in writing.

The dirty air filters should be replaced immediately and every 30 days thereafter as per the manufacturer's installation instructions.

No sediment traps were observed at these units. A sediment trap, not a drip or drip leg – the two terms are not synonymous - is required on the gas lines of these units. A drip or drip leg is the container placed at a low point in a system of piping using "wet" gas to collect condensate and from which the condensate is removable. Most gas supplies currently use dry gas thus eliminating the need for drips or drip legs.

Sediment traps, on the other hand, are required at all gas appliance installation except for illuminating appliances, ranges, clothes dryers and outdoor grills. In addition to the code requirement, most appliance manufacturers require the installation of a sediment trap (dirt leg) to protect the appliance from debris in the gas. Sediment traps are necessary to protect appliance gas controls from the dirt, soil, pipe chips, pipe joint tapes and compounds and construction site debris that enters the piping during installation and repairs. Hazardous appliance operation could result from debris entering gas controls and burners. Despite the fact that utilities supply clean gas, debris can enter the piping prior to and during installation on the utility side of the system and on the customer side.

Sediment traps are designed to cause the gas flow to change direction 90 degrees (1.57 rad) at the sediment collection point, thus causing the solid or liquid contaminants to drop out of the gas flow. The nipple and cap must not be placed in the branch opening of a tee fitting because this would not create a change in direction of flow and would allow debris to pass over the collection point. Failure to install this sediment trap will result in invalidation of the unit's manufacturer's warranty.

#### G2419.4 (408.4) Sediment trap.

Where a sediment trap is not incorporated as part of the gas utilization equipment, a sediment trap shall be installed downstream of the equipment shutoff valve as close to the inlet of the equipment as practical. The sediment trap shall be either a tee fitting with a capped nipple in the bottom opening of the run of the tee or other device approved as an effective sediment trap. Illuminating appliances, ranges, clothes dryers and outdoor grills need not be so equipped.

Report Identification: [REDACTED]

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

☒ ☐ ☐ ☒

## B. Cooling Equipment

Type of Systems: Central Forced Air Compressed Gas Split Systems

*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 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.***

Comments:

AIR CONDITIONER UNIT 1 - LOWER ATTIC - 14° F. T

As is not uncommon for homes of this age and location, the air conditioner is older. It will require a higher level of maintenance, and be more prone to component breakdown. Predicting the frequency or time frame for repairs on any mechanical device is not practically feasible.

The temperature drop across the evaporator coil of the air conditioning system was observed to be lower than what is commonly considered typical. This indicates that servicing is needed. A qualified heating and cooling technician must be consulted to further evaluate this condition and make repairs as required.

The air conditioning system requires servicing. A licensed HVAC technician should be employed to inspect and clean the unit, including the A-coil or flat coil, and the condenser coil. The unit and the system should also be tested for coolant leaks. This process should then be repeated annually for the duration of your occupancy of the house.

The insulation for the refrigerant piping is not properly protected as required by 2015 IRC 1103.4 and 1103.4.1. The wording for these citations is precisely the same as in the 2015 IECC.

2015 IECC R403.4 Mechanical system piping insulation (Mandatory). Mechanical system piping capable of carrying fluids above 105°F (41°C) or below 55°F (13°C) shall be insulated to a minimum of R-3.

R403.4.1 Protection of piping insulation. Piping insulation exposed to weather shall be protected from damage, including that caused by sunlight, moisture, equipment maintenance and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted.

Report Identification: [REDACTED]

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

NOTE: On June 16, 2015, Texas Governor Greg Abbott signed HB 1736 into Texas law. This moved the state's single-family residential code from 2009 code to the 2015 International Residential Code (IRC), Chapter 11. All local jurisdictions must comply with the new code by September 1, 2016. Regardless what you AHJ claims to be inspecting to, the 2015 IECC applies.

There are many products that will fulfill these protection requirements. They include, but are not limited to insulation materials meeting the standard and coatings for insulation materials that bring them under the standard, et al.

The secondary condensate drain line is not plumbed to the exterior of the building as required by IRC 1411.3.1.

The condensate drain line for this unit requires a proper (not a running) trap adjacent to the auxiliary drain pan as per the manufacturer and IRC M1401 Installation. Heating and cooling equipment and appliances shall be installed in accordance with the manufacturer's installation instructions and the requirements of this code.

See: <http://www.texasinspector.com/documents/CondensateArticle-ASHI.pdf>  
<http://www.aaronsinspections.com/documents/condensatetraps.pdf>

The condensate drain lines must be configured to permit the clearing of blockages and performance of maintenance without requiring the drain lines to be cut as per IRC 1411.3.3.

The primary and secondary condensate drain lines require insulation as per IRC N1103.5 Piping insulation. All mechanical system piping shall be insulated in accordance with Table N1103.5.

Exceptions: Piping installed within appliances and equipment or piping serving fluids between 55°F (13°C) and 120°F (49°C).

#### AIR CONDITIONER UNIT 2 - UPPER ATTIC - 14.5° F. T

As is not uncommon for homes of this age and location, the air conditioner is older. It will require a higher level of maintenance, and be more prone to component breakdown. Predicting the frequency or time frame for repairs on any mechanical device is not practically feasible.

The temperature drop across the evaporator coil of the air conditioning system was observed to be lower than what is commonly considered typical. This indicates that servicing is needed. A qualified heating and cooling technician must be consulted to further evaluate this condition and make repairs as required.

The air conditioning system requires servicing. A licensed HVAC technician should be employed to inspect and clean the unit, including the A-coil or flat coil, and the condenser coil. The unit and the system should also be tested for coolant leaks. This process should then be repeated annually for the duration of your occupancy of the house.

The condensate drain line for this unit requires a proper (not a running) trap adjacent to the auxiliary drain pan as per the manufacturer and IRC M1401 Installation. Heating and cooling equipment and appliances shall be installed in accordance with the manufacturer's installation instructions and the requirements of this code.

Report Identification: [REDACTED]

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

See: <http://www.texasinspector.com/documents/CondensateArticle-ASHI.pdf>  
<http://www.aaronsinspections.com/documents/condensatetraps.pdf>

The condensate drain lines must be configured to permit the clearing of blockages and performance of maintenance without requiring the drain lines to be cut as per IRC 1411.3.3.

The primary and secondary condensate drain lines require insulation as per IRC N1103.5 Piping insulation. All mechanical system piping shall be insulated in accordance with Table N1103.5.

Exceptions: Piping installed within appliances and equipment or piping serving fluids between 55°F (13°C) and 120°F (49°C).

☒ ☐ ☐ ☒

#### C. Duct System, Chases, and Vents

*Comments:*

##### SUPPLY AIR DUCTWORK

Seal the plenum, duct hubs, evaporator coil seams and any openings with either aluminum tape or HVAC ductwork mastic for a possible savings in energy consumption of as much as 35%. This is a requirement as per IRC M1601.3.1.

Ducts were observed to be in direct contact and not spaced 4" apart as required by IRC 1601.1 and ACCA Manual D.

The ducts are required to be supported at 4'-0" intervals as per IRC 1601.2, the ACCA Manual D, the manufacturer's installation instructions, and the Air Diffusion Council's Flexible Duct Performance and Installation Standards . Improvement is required.

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

##### RETURN AIR DUCTWORK

Seal the plenum, duct hubs, evaporator coil seams and any openings with either aluminum tape or HVAC ductwork mastic for a possible savings in energy consumption of as much as 35%. This is a requirement as per IRC M1601.3.1.

Ducts were observed to be in direct contact and not spaced 4" apart as required by IRC 1601.1 and ACCA Manual D.

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.

#### IV. PLUMBING SYSTEM

☒ ☐ ☐ ☒

##### A. Plumbing Supply, Distribution Systems and Fixtures

Report Identification: [REDACTED]

I=Inspected

NI=Not Inspected

NP=Not Present

D=Deficiency

I NI NP D

Inspection Item

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

Location of main water supply valve: Garage Attic

Static water pressure reading: 45 psi

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

Gas Meter Location: Propane Tank

Type of Gas Piping: Threaded Steel (Where Observed)

Type of Gas: Propane (Liquified Petroleum) (Assumed not Verified)

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 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.

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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.

*Comments:*

#### SUPPLY PLUMBING

The supply piping in the attic requires insulation in order to protect it from freeze damage as per IRC P2603.6 and/or the PEX manufacturer. P2603.6 Freezing. In localities having a winter design temperature of 32°F (0°C) or lower as shown in Table R301.2(1) of this code, a water, soil or waste pipe shall not be installed outside of a building, in exterior walls, in attics or crawl spaces, or in any other place subjected to freezing temperature unless adequate provision is made to protect it from freezing by insulation or heat or both. Water service pipe shall be installed not less than 12 inches (305 mm) deep and not less than 6 inches (152 mm) below the frost line.

Insulate all  
PEX in attic.



COMMENTARY: Water, soil or waste pipes must be protected from freezing, whether installed inside or outside the building. Where pipe installation occurs in an exterior wall or unheated space, such as a crawl space or attic, adequate protection must be provided in the form of insulation or heat or both. Where the temperature of the air surrounding the insulation remains low for a significant period, insulation alone will not provide adequate protection from freezing without the addition of heat. In such conditions, the water in the pipe will freeze regardless of the amount of insulation used. Conditions differ significantly between occupied and unoccupied buildings because of heat added in occupied buildings for the comfort of the

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occupants. When a building remains vacant for an extended period, heat from another source must be supplied to offset heat loss.

Where piping is not directly adjacent to heated spaces in a building, electric resistance heat tapes or cables can be used to supply heat to the piping. Some types of heat tapes should not be used on piping in concealed spaces as the tapes can burn out and require replacement. Plastic piping requires self-limiting type heat tape to prevent overheating of the pipe.

Hose bibbs and wall hydrants located on the exterior wall must be protected from freezing when installed in areas subject to freezing temperatures. This protection can be accomplished by installing devices such as freezeproof hose bibbs that locate the valve seat within the heated space and allow residual water within the hydrant to drain after the valve is closed. Freezeproof hose bibbs cannot be installed where the valve seat is located in an unheated garage or storage room. The valve seat must extend through to the heated side of the exterior wall. The valve assembly on these devices is available in different lengths to accommodate various wall thicknesses (see commentary, Section P2903.10). Table R301.2(1) supplies a method for determining areas that have a winter-design temperature of 32°F (0°C) or less. Water service pipe installed outdoors underground must be at least 12 inches (305 mm) below grade or 6 inches (152 mm) below the frost depth, whichever is greater, to protect against freezing. The 12-inch (305 mm) minimum cover above the pipe protects it from external damage (see Commentary Figure P2603.6).

#### PEX

Label the outlets of the PEX manifold to demarcate the destination of the pipes as per IRC P2903.8.4.

The PEX piping is not supported at 32" o.c. as required by IRC 2605.1.

#### WATER FIXTURES

The majority of plumbing fixtures are older. They will require a higher degree of maintenance. It is not feasible to predict when these fixtures will need repair. You should budget for new fixtures in the near future.

The installation of the plumbing fixtures has not been performed in a professional or workmanlike fashion and should be further evaluated by a licensed plumber and improved as required.

The drainstop for the west master bathroom sink is inoperative and requires repair.

The drainstop for the sink is missing in the main floor hall bathroom and requires replacement.

The vegetable sprayer in the kitchen sink requires repair/replacement.

The base of the master shower stall is not deep enough. IRC P2709.1 requires a 2" difference in height between the door threshold and the top of the drain. This requires repair.

The surface of the bathtub in the main floor hall bathroom is damaged. Repair is required.

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The master bathtub was observed to drain slowly, suggesting that an obstruction may exist. Improvement is required.

The spout for the faucet in the master bathroom is loose.

An anti-siphon device is required at each exterior hose bibb as per IRC 2092.4.3.

#### GAS PIPING

The exterior gas piping must be painted as per IRC G2414.8.

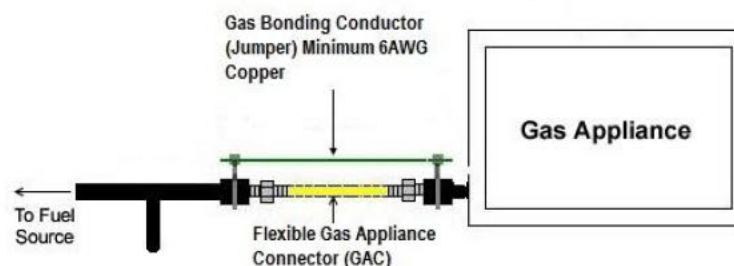


Paint exterior gas piping.

#### **GAS APPLIANCE CONNECTORS – RECOMMENDATION – NOT A CODE REQUIREMENT**

Solid copper bond jumpers from threaded steel gas piping to threaded steel gas piping at the cooktop(s), furnace(s) and water heater(s), et al., were not installed. The flexible gas appliance connectors are not designed or intended to be ground pathways and are not protected from “electrically induced fires”. A gas pipe shall not be used for grounding or as a grounding pathway as per NEC 250.104(B) and NEC 250.52(B). Flexible gas appliance connectors are similar in thickness and design to corrugated stainless steel tubing (CSST) gas piping material which is prone to damage from nearby (non-direct) lightning strikes which perforate the pipe and exacerbate fires. See “Google” - CSST litigation. See also “Electrically Induced Fires”, Fire Arson Investigator, July 1999 - [http://goodsonengineering.com/wp-content/uploads/2011/08/ElectricallyInducedFuelGasFires\\_web.pdf](http://goodsonengineering.com/wp-content/uploads/2011/08/ElectricallyInducedFuelGasFires_web.pdf)

**This is a fire and explosion hazard which requires immediate improvement!**



The flexible gas appliance connectors at the gas appliances do not appear to be properly bonded as required by NEC 250.104(B):

(B) Other Metal Piping. Where installed in or attached to a building or structure, a metal piping system(s), including gas piping, that is likely to become energized shall be bonded to the service equipment enclosure, the grounded conductor at the service, the grounding electrode conductor where of sufficient size, or the one or more grounding electrodes used. The bonding jumper(s) shall be sized in accordance with 250.122, using the rating of the circuit that is likely to energize the piping system(s). The equipment grounding conductor for the circuit that is

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likely to energize the piping shall be permitted to serve as the bonding means. The points of attachment of the bonding jumper(s) shall be accessible.

While there is no specific requirement set forth in the building or electrical codes for direct bonding of metal piping other than the supply gas piping within a house, it is highly recommended in two informational notes in the National Electrical Code. NEC 250.104 Informational Note No. 1: Bonding all piping and metal air ducts within the premises will provide additional safety. Informational Note No. 2: Additional information for gas piping systems can be found in Section 7.13 of NFPA 54-2012, National Fuel Gas Code.

The informational note in NEC 250.14, while advisable, is not enforceable. Direct bonding is a permissible alternative method, but not mandated. It is this inspector's opinion that direct bonding is a necessary added safety layer. Some municipal inspection departments in the North Central Texas area are in agreement, e.g. Frisco.

NFPA 54 7.13.1 Pipe and Tubing Other than CSST. Each aboveground portion of a gas piping system other than CSST that is likely to become energized shall be electrically continuous and bonded to an effective ground-fault current path. Gas piping, other than CSST, shall be considered to be bonded when it is connected to appliances that are connected to the appliance grounding conductor of the circuit supplying that appliance.

This inspector further recommends that a bonding jumper be installed as a shunt between the threaded steel gas piping and the appliance in question where a flexible gas appliance connector is used. The flexible gas appliance connectors are subject to damage from electrical wiring shorts, lightning strikes, et al. both during and after construction. These thin-walled stainless steel connectors are similar in nature to corrugated stainless steel tubing (CSST). The reason that CSST is excluded from the other piping requirements is that it requires special treatment, as should flexible gas appliance connectors that are, for all practical purposes, identical in nature.

You are strongly urged to have this system inspected and properly bonded by an electrical engineer with experience in forensic investigation of gas piping failures prior to the end of any time periods associated with the purchase of this home.

See also: <http://subrogationrecoverylawblog.com/2011/04/18/flash-kaboom-water-heater-failures-involving-gacs/>

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**B. Drains, Wastes, and Vents**

*Type of Sewer System: Public Sewer System (As per Sellers Disclosure Statement - Not Verified))*

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

Note: Specific Limitations: Plumbing fixture overflow devices, integral or site-plumbed, are not tested. These are typically not accessible. Even when accessible, if improperly installed or configured, damage may occur to the property during testing. The TREC SOP for inspectors

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does not provide for inspection techniques that will cause damage to the property as reasonably determined by the inspector. You are strongly urged to have these tested by a licensed master plumber prior to the end of any time periods associated with the purchase of this home.

*Comments:*

DRAIN/WASTE / VENT (DWV)

The DWV cleanout plug or cap is missing and requires replacement as per IRC 3005.2.10.1.

Cleanout  
cover  
missing.



The waste (DWV) piping is older. It may be prone to unexpected problems. Improvement is recommended on an as needed basis. You are strongly urged to have a licensed master plumber specializing in leak detection perform a hydrostatic test on this system in conjunction with a camera scan in order to determine the serviceability of the system, prior to the end of any time periods associated with the sale or purchase of this home.

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**C. Water Heating Equipment**

*Energy Sources:* Gas Tankless West Exterior Wall

50 Gallon Electric Tank Type Garage

*Capacity:* N/A - Tankless

50 Gallons

*Comments:*

**WATER HEATER UNIT 1 - TANKLESS**

Seal all holes in the tankless water heater recess box as per the manufacturer, IRC 102.4 and 1301.3.

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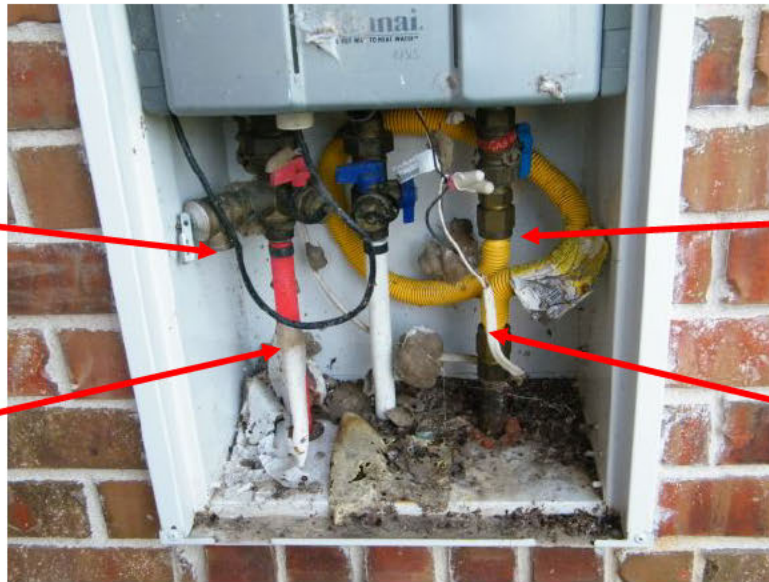
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TPR not  
drained.

Insulate  
PEX and  
valves.

Sediment  
trap  
missing.

Conduit  
required.



A lintel is required at the opening in the brick veneer wall above the tankless water heater recess box as per the manufacturer, IRC 102.4, 2001.1, and 703.8.3.

Lintel  
required.



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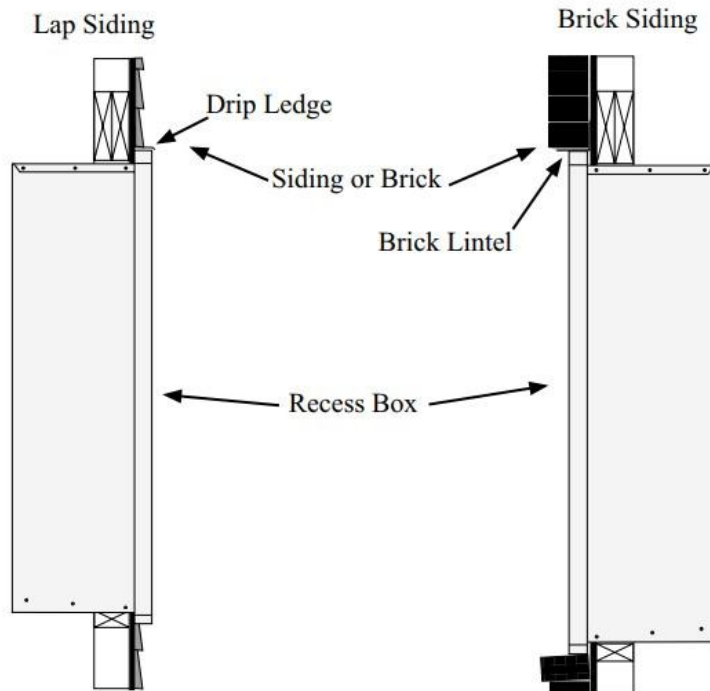
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R703.8.3 Lintels. Masonry veneer shall not support any vertical load other than the dead load of the veneer above. Veneer above openings shall be supported on lintels of noncombustible materials. The lintels shall have a length of bearing not less than 4 inches (102 mm). Steel lintels shall be shop coated with a rust-inhibitive paint, except for lintels made of corrosion-resistant steel or steel treated with coatings to provide corrosion resistance. Construction of openings shall comply with either Section R703.8.3.1 or 703.8.3.2.

Masonry veneer, like all veneers, is a non-load-bearing wall covering. It is not intended to support any loads, except for the dead load of the masonry veneer above. A noncombustible lintel is required above an opening through the masonry veneer. The lintel must be protected from rust. Lintels must be sized and installed in accordance with Section R703.8.3.1 or R703.8.3.2.

While it is true that there is no specific requirement in the IBC or IRC for masonry openings greater than a certain width to provide a lintel to support the brickwork above, there are several references to the Building Code Requirements for Masonry Structures (TMS 402) from the IBC and IRC. Section 1404.6 of the 2018 IBC references Sections 12.1 and 12.2 of TMS 402 and Section R606.1 of the 2018 IRC references TMS 402 in its entirety.

TMS 402, Section 12.2.2.3.2 Lintels – Provide noncombustible lintels or supports attached to noncombustible framing over openings where the anchored veneer is not self-supporting.

TMS 402, Empirical Design of Masonry, Section A.9.1 Chases and recesses – Masonry directly above chases and recesses wider than 12 in. (305 mm) shall be supported on lintels.

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Based on the above, a masonry opening with a maximum width of 12 inches does not need a lintel to support the masonry directly above. Masonry openings wider than 12 inches would be required to support the masonry directly above with a lintel. The tankless water heater(s) excavation 12 inches in width and therefore require lintel support.

The water heater is installed such that the wall insulation will be excluded from the area where it is installed. This is not allowed by the 2015 IECC 402.1. Additionally, and perhaps more importantly, the back of the uninsulated metal case will be in direct contact with the paper backing of the drywall. This will result in mold growth due to condensation of moisture on the metal contacting the paper backing.

#### WIRING

Wiring serving the electric water heater must be protected by a conduit as per NEC 334.15(B): Protection from Physical Damage. Cable shall be protected from physical damage where necessary by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, or other approved means. Where passing through a floor, the cable shall be enclosed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, or other approved means extending at least 150 mm (6 in.) above the floor.

#### TPR DRAIN LINE

The discharge piping serving the Temperature and Pressure Relief (TPR) Valve for the water heater must terminate, via an air gap, at an exterior location as per IRC P2803.6.1.

#### LOCATION/PROTECTION

Water heaters should NEVER be installed outside the building in North Central Texas. They are then subject to freezing and possible damage. While most units are equipped with internal mechanisms that protect the units themselves from freezing, the piping and valves connected to them are subject to freeze.

Your "builder" may tell you that you can just leave the water running at the faucets during cold weather. This is bullshit. If you plumbing freezes during the North Central Texas winters it must, of course, be an "act of god" for which your builder cannot be held responsible. This is just more bullshit. The supply piping and water heater require insulation in order to protect them from freeze damage as per IRC P2603.6 and/or the PEX manufacturer. P2603.6 Freezing. In localities having a winter design temperature of 32°F (0°C) or lower as shown in Table R301.2(1) of this code **(NOTE: Quinlan lies in a climatic design winter temperature area of 22° F., i.e. it freezes every Winter - who knew?)**, a water, soil or waste pipe shall not be installed outside of a building, in exterior walls, in attics or crawl spaces, or in any other place subjected to freezing temperature unless adequate provision is made to protect it from freezing by insulation or heat or both. Water service pipe shall be installed not less than 12 inches (305 mm) deep and not less than 6 inches (152 mm) below the frost line.

COMMENTARY: Water, soil or waste pipes must be protected from freezing, whether installed inside or outside the building. Where pipe installation occurs in an exterior wall or unheated space, such as a crawl space or attic, adequate protection must be provided in the form of insulation or heat or both. Where the temperature of the air surrounding the insulation remains low for a significant period, insulation alone will not provide adequate protection from freezing without the addition of heat. In such conditions, the water in the pipe will freeze regardless of the amount of insulation used. Conditions differ significantly between occupied and unoccupied buildings because of heat added in occupied buildings for the comfort of the

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occupants. When a building remains vacant for an extended period, heat from another source must be supplied to offset heat loss.

Where piping is not directly adjacent to heated spaces in a building, electric resistance heat tapes or cables can be used to supply heat to the piping. Some types of heat tapes should not be used on piping in concealed spaces as the tapes can burn out and require replacement. Plastic piping requires self-limiting type heat tape to prevent overheating of the pipe.

Hose bibbs, wall hydrants, and tankless water heaters located on the exterior wall must be protected from freezing when installed in areas subject to freezing temperatures. This protection can be accomplished by installing devices such as freezeproof hose bibbs that locate the valve seat within the heated space and allow residual water within the hydrant to drain after the valve is closed.

In areas with cold Winter weather builders must exercise care in installing tankless water heaters on exterior walls. Even water heaters installed indoors could be prone to cold weather complications. Most manufacturer warranty's do not cover damage caused by freezing.

However, many manufacturers, such as Rinnai and Rheem have built-in some type of freeze protection which allows the unit to protect itself when temperatures fall below freezing.

Rinnai tankless water heaters have two lines of defense to protect them from cold weather and prevent freezing. The primary protection for a Rinnai heater, is the addition of ceramic heaters which are placed on the heat exchanger and other internal parts, as well as water lines. These ceramic heaters fire-up when the temperature drops into the low 30's and prevent the internal parts from freezing.

If the ceramic heaters fail for any reason, or the temperature drops too fast, a secondary freeze protection method is also built-in. This system utilizes a sensor inside the unit which determines if the tankless is below freezing. If the sensor is triggered it'll automatically turn the unit on for a few seconds and continue to cycle the heater on-and-off until the threat of freezing has past.

Both of these methods provide freeze protection to the Rinnai unit as long as both electrical power and gas is available to the unit. Be sure to check your owners manual for details on your specific tankless.

But, even with built-in freeze protection, if you ever lose power your tankless will be left defenseless to the cold temperatures and could freeze without proper insulation.

Installing a set of freeze protection solenoid valves is an excellent way to give you peace of mind during the cold winter weather. These valves automatically drain the water from your tankless unit if there's ever a power outage.

Freeze protection solenoid valves are sometimes called drain down solenoid valves or "normally open" drain down solenoid valves. They're designed to always be open and require an electrical current to keep the valve closed. When there's a power outage, the valves automatically open and release the water within the tankless water heater.

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#### CLEANING TANKLESS WATER HEATERS

All tankless water heaters must be cleaned on a regular basis, in most cases annually. This should be done by a plumber. If you choose to do it yourself, follow the manufacturer's instructions. See: <https://www.youtube.com/watch?v=8-ts7XuvS48>

#### WATER HEATER UNIT 2 - GARAGE TANK TYPE

##### WIRING

Wiring serving the electric water heater must be protected by a conduit as per NEC 334.15(B): Protection from Physical Damage. Cable shall be protected from physical damage where necessary by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, or other approved means. Where passing through a floor, the cable shall be enclosed in rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, or other approved means extending at least 150 mm (6 in.) above the floor.



The electrical cable splice in this unit is not contained within the internal junction box as required.

The conduit supplying the electrical power this unit is required by NEC to be both properly terminated at a covered junction box and to have anti-short bushings installed at all terminations.

The water heater is not grounded as required.

#### TESTING NOTICE

The manufacturers of all water heater temperature and pressure relief (TPR) valves require that these valves be professionally tested on a periodic basis (usually every three years). No certificate or proof of this required testing was observed at the water heater(s) or at the home and none was provided to this inspector by the owner, his agent, the client, or his agent. In the absence of proof of required servicing of this essential safety device(s) you are strongly urged to have this (these) valve(s) replaced prior to the end of any time limits associated with the

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purchase of this home. Failure to do so could result in devastating property and/or personnel damage.

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**D. Hydro-Massage Therapy Equipment**

*Comments:*

There is no hydro-massage therapy equipment present.

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**E. Other**

*Comments:*

N/A

**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.*

**Important Information: Any type of appliance past its manufacturer's limited warranty is likely to fail soon. The length of a warranty may indicate the appliance's quality or lack thereof. Appliances are not immune to failure without notice. Most major kitchen appliances come with a one-year warranty.**

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**A Dishwashers**

*Comments:*

**DISHWASHER**

The dishwasher is an older unit. While replacement is not needed right away, it would be wise to budget for a new dishwasher. In the interim, a higher level of maintenance can be expected.

The dishwasher must be better secured and or aligned in the base cabinet niche.

**SPECIFIC LIMITATIONS:** The dishwasher contained dishes at the time of this inspection which prevented a thorough inspection of the interior of the unit. You are strongly urged to have this unit inspected once the unit is empty and prior to closing escrow on this home.

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**B. Food Waste Disposers**

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*Comments:*

FOOD WASTE DISPOSER

The food waste disposer appears to be in satisfactory condition.

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**C. Range Hood and Exhaust Systems**

Type of Unit: Updraft Designed to be Vented

*Comments:*

RANGE HOOD

The range hood fan vent duct must be repaired so as to discharge to the building exterior terminating at an approved dampered hood as per IRC M1503.1 General. Range hoods shall discharge to the outdoors through a single-wall duct. The duct serving the hood shall have a smooth interior surface, shall be air tight and shall be equipped with a backdraft damper. Ducts serving range hoods shall not terminate in an attic or crawl space or areas inside the building.

The range hood light is inoperative. If the bulbs are not blown, the fixture and circuit require further investigation.

The range hood requires cleaning.

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**D. Ranges, Cooktops, and Ovens**

*Comments:*

ELECTRIC RANGE

This unit is an older unit. You are advised to budget for a new unit in the future.

The electric range has been lacking maintenance somewhat.

The oven light in the electric range is inoperative and requires repair. If the bulb is not blown the fixture and circuit require further investigation.

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.

An approved manufacturer designed and tested anti-tip bracket, which is required by UL858, was not observed installed to prevent frontal tip-over and essential to the safe operation of the range. THIS UNIT IS UNSAFE TO USE AND SHOULD NOT BE USED BY ANYONE UNTIL THE ANTI-TIP BRACKET IS INSTALLED.

Anti-tip brackets are metal devices designed to prevent freestanding ranges from tipping. They are normally attached to a rear leg of the range or screwed into the wall behind the range, and

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are included by in all installation kits. A unit that is not equipped with these devices may tip over if enough weight is applied to its open door.

A range that tips over can crush, scald, or burn anyone caught beneath. Of the incidents that resulted in death, most of the victims were children. A small child may stand on an open range door in order to see what is cooking on the stovetop and accidentally cause the entire unit to fall on top of him or her, along with whatever hot items may have been cooking on the stovetop. The elderly, too, may be injured while using the range for support while cleaning.

See:

<http://www.cpsc.gov/en/Regulations-Laws--Standards/Voluntary-Standards/Topics/Free-Standing-Kitchen-Ranges/>

<http://www.chron.com/news/houston-texas/houston/article/Family-sues-after-man-killed-by-stove-in-4671109.php>

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**E. Microwave Ovens**

*Comments:*

There is no built-in microwave oven unit present.

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**F. Mechanical Exhaust Vents and Bathroom Heaters**

*Comments:*

**BATHROOM EXHAUST FANS**

The fan ducts have not been installed in strict accordance with the manufacturer's installation instructions or ASHRAE 62.2. Unnecessary 180° bends and excessively long runs in the ducts will significantly decrease the fan performance standards to below what is required by IRC 303.3 X, M1507, and ASHRAE 62.2. This requires repair.

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**G. Garage Door Operators**

*Comments:*

There is no garage door operator present.

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**H. Dryer Exhaust Systems**

*Comments:*

SPECIFIC LIMITATIONS: We cannot and do not remove clothes dryers that block access to the dryer duct and we are unable to view inside the duct as to its condition. If the terminus of

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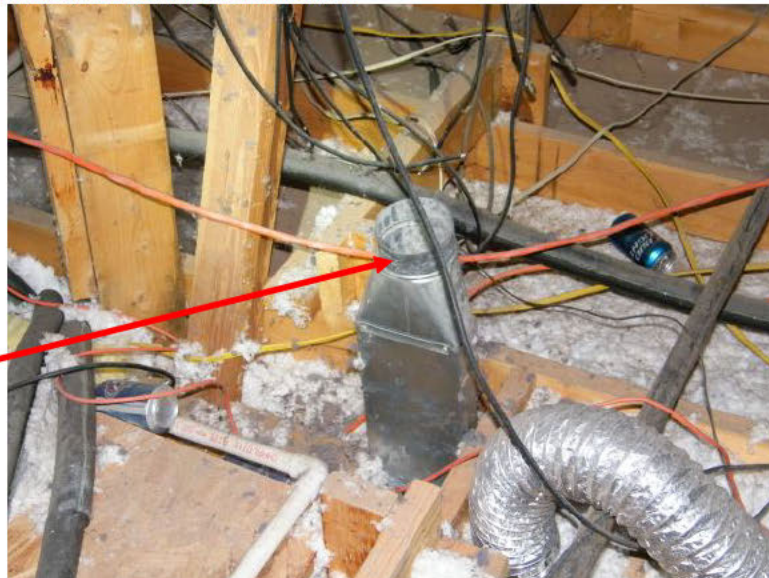
the duct is at the roofline we are usually unable to ascertain if the terminus roof cap has a gravity damper or ascertain the condition of said damper.

The dryer duct run vertical up a concealed wall was not observed with a placard (sign or label) stating the length of the dryer duct as required by IRC 1502.4.5: "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 (1829mm) of the exhaust duct connection."

You are strongly urged to have this dryer duct professionally serviced by an HVAC contractor who installs, services, and cleans dryer ducts prior to the end of any time periods associated with the purchase of this home. Failure to do so may result in lint-induced fire.

#### DRYER VENT (DUCT)

The clothes dryer duct was not observed to be properly terminated as it was vented into the attic. The clothes dryer duct must be vented to the building exterior as per M1502.3 Duct termination. Exhaust ducts shall terminate on the outside of the building. Exhaust duct terminations shall be in accordance with the dryer manufacturer's installation instructions. If the manufacturer's instructions do not specify a termination location, the exhaust duct shall terminate not less than 3 feet (914 mm) in any direction from openings into buildings. Exhaust duct terminations shall be equipped with a backdraft damper. Screens shall not be installed at the duct termination.



Dryer vents  
in attic.

The clothes dryer exhaust discharge must terminate outdoors because of the high levels of moisture, combustible lint and, for gas-fired units, combustion products in the exhaust. If discharged indoors, such exhaust could present a health and fire hazard, could cause structural damage and deterioration of building material and could contribute to the growth of mold and fungus. The exhaust also contains highly combustible clothes fibers and, in the case of gas-fired units, products of combustion.

☐ ☒ ☒ ☐

I. Other

Report Identification: [REDACTED]

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I NI NP D

Inspection Item

Comments:

N/A

## ADDENDUM: REPORT OVERVIEW

If you've come away from the reading of this report regarding your new home with a feeling of surprise or disappointment due to the number of items marked as "deficient", please consider the following:

The International Residential Code allows for what is commonly referred to as "grandfathering". That is, the house can legally be occupied without the owner being responsible for making on-going changes to comply with newer versions of the building code as they are adopted. Another phrase to describe this situation is "pre-existing and non-compliant conditions".

*"IRC R102.7 Existing structures.*

*The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the International Property Maintenance Code or the International Fire Code, or as is deemed necessary by the building official for the general safety and welfare of the occupants and the public."*

The Texas Real Estate Commission, which licenses home inspectors, makes the following statement in its publication OP-I, TEXAS REAL ESTATE CONSUMER NOTICE CONCERNING RECOGNIZED HAZARDS:

*Each year, Texans sustain property damage and are injured by accidents in the home. While some accidents may not be avoidable, many other accidents, injuries, and deaths may be avoided through the identification and repair of certain hazardous conditions. Examples of such hazards include:*

- improperly installed or missing ground fault circuit protection (GFCI) devices for electrical receptacles in garages, bathrooms, kitchens, and exterior areas;*
- improperly installed or missing arc fault protection (AFCI) devices for electrical receptacles in family rooms, dining rooms, living rooms, parlors, libraries, dens, bedrooms, sunrooms, recreations rooms, closets, hallways, or similar rooms or areas;*
- ordinary glass in locations where modern construction techniques call for safety glass; • the lack of fire safety features such as smoke alarms, fire-rated doors in certain locations, and functional emergency escape and rescue openings in bedrooms; • excessive spacing between balusters on stairways and porches;*
- improperly installed appliances;*
- improperly installed or defective safety devices; and*
- lack of electrical bonding and grounding.*

*To ensure that consumers are informed of hazards such as these, the Texas Real Estate Commission (TREC) has adopted Standards of Practice requiring licensed inspectors to report these conditions as "Deficient" when performing an inspection for a buyer or seller, if they can be reasonably determined.*

*These conditions may not have violated building codes or common practices at the time of the construction of the home, or they may have been "grandfathered" because they were present prior to the adoption of codes prohibiting such conditions. While the TREC Standards of Practice do not require inspectors to perform a code compliance*

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*inspection, TREC considers the potential for injury or property loss from the hazards addressed in the Standards of Practice to be significant enough to warrant this notice.*

*Contract forms developed by TREC for use by its real estate licensees also inform the buyer of the right to have the home inspected and can provide an option clause permitting the buyer to terminate the contract within a specified time. Neither the Standards of Practice nor the TREC contract forms requires a seller to remedy conditions revealed by an inspection. The decision to correct a hazard or any deficiency identified in an inspection report is left to the parties to the contract for the sale or purchase of the home.*

Though not specifically required by the Texas Real Estate Commission, Aaron's Home Inspections attempts to compare the construction of the houses we inspect with the "ideal house" that is constructed in strict accordance with the current building codes, presently the 2006 International Residential Code and the 2008 National Electrical Code. The reasons for this are as follows: (1) As of January 1, 2002, all municipalities in the State of Texas with populations in excess of 5,000 must adopt the International Residential Code as their building standard. 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 and the National Electrical Code, regardless of incorporation or population. This code not only pertains to new construction, but also to the ". . . alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories in height with separate means of egress and their accessory structures." (2) The purpose of the model code is to ". . . provide minimum requirements to safeguard life or limb, health and public welfare." Our reports do not presume to address all code-related issues in any given house, but rather aim to provide building code information concerning the items on which we report. We have found this information to be useful to homeowners, homebuyers, and the workers who may be summoned to repair the issues noted. (3) The Texas Real Estate Commission (TREC) requires its property inspector licensees to report all "recognized hazards" as in need of repair. Any situation that is covered in a building code, which only addresses areas of construction in which "life, limb, health and public welfare" are at risk, constitutes a "recognized hazard". Therefore home inspections are, at least in part, for all practical purposes code inspections.

Because homebuilders in the State of Texas are not licensed 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 available time to perform thorough inspections of houses as they are being constructed. This results in a situation where the minimal building code standards are 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 existing 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 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 manufacturer's installation instructions. Additionally, the house would be built in accordance with a multitude of other references and standards in existence that specify best practice scenarios for all facets of residential constructions. (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. For an existing home, the residence would have been meticulously maintained by the homeowners through the services of licensed and qualified professionals in every field.

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Inspection Item

Even if the "ideal builder" were to build the "ideal house", both the normal atrophy of construction materials and subsequent deferred maintenance on the part of nearly every homeowner would likely spoil the picture of the "perfect home". Due in great part to the builders' lack of ability to educate homebuyers, today's homeowners tend to treat their houses a bit like their automobiles: as disposable commodities. The tendency nowadays is for people to move every five years. With no expectation of any appreciable degree of occupancy comes a decreased, if not nonexistent, feeling of obligation to maintain.

Having said these things, it might at first blush, seem unreasonable to attempt to hold houses to such a high standard. We believe this is the only way for you to get a clear and concise overall picture of the house's condition and the improvements that could be made over time to both enhance the building's performance and possibly increase its value in the marketplace.

SEE: <http://www.texasinspector.com/files/Luxury-vs-Safety-Upgrades.pdf>

### THE HOUSE IN PERSPECTIVE

This is an average quality 13 year old (approximate age) home. Numerous improvements are needed. As with all homes, ongoing maintenance is also required. While the improvements that are recommended in this report are typical for a home of this age and location, the number of improvements is unusual.

This house has been built in a vernacular fashion without compliance with recognized building standards. Many items are not installed or not properly installed. The house has been poorly maintained and will require much effort and expense in order to bring it into minimal code compliance to allow for occupant safety and comfort. You are strongly urged to consult with a licensed and bonded general contractor to apprise you of the many repairs required and to provide you with a price for making these repairs prior to the end of anytime periods associated with the purchase of this home.

NOTE: For the purpose of this report, it is assumed that the house faces north.

### THE SCOPE OF THE INSPECTION

All components designated for inspection in accordance with the rules of the TEXAS REAL ESTATE COMMISSION (TREC) are inspected, except as may be noted by the "Not Inspected" or "Not Present" check boxes. Explanations for items not inspected may be in the "TREC Limitations" sections within this report.

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.

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 pre-inspection contract for a full explanation of the scope of the inspection.

### WEATHER CONDITIONS DURING INSPECTION

Dry weather conditions prevailed at the time of the inspection. The estimated outside temperature was 85 degrees F. Occasional rain has been experienced in the days leading up to the inspection.

## ADDENDUM: RADON INFORMATION

### EPA Radon Risk Information

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

I	NI	NP	D	Inspection Item
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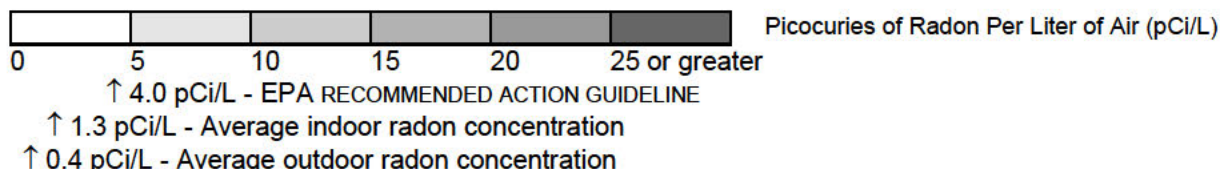
Fifty-five percent of our exposure to natural sources of radiation usually comes from radon. Radon is a colorless, tasteless, and odorless gas that comes from the decay of uranium found in nearly all soils. Levels of radon vary throughout the country. Radon is found all over the United States and scientists 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

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 your 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.

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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.

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### 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.

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>

Also See: <https://candysdirt.com/2019/02/28/higher-radon-levels-found-in-some-north-texas-homes-neighborhoods-fracking-to-blame/>

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## ADDENDUM: MOLD AND MOISTURE

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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.

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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://health.uconn.edu/occupational-environmental/academics-and-research/cph-new/hitec-ii-project/work-environment/indoor-air-quality/>

Mold assessment must be performed by a licensed technician and must be abated by a licensed abatement company. See: <https://www.tdlr.texas.gov/mld/mld.htm>

### 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.

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Inspection Item

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 remediators 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.

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)

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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 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

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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.

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

Report Identification: [REDACTED]

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D=Deficiency

I NI NP D

Inspection Item

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 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 loose 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:

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- (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.

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 from 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.

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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 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: CARBON MONOXIDE INFORMATION

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## What is carbon monoxide (CO) and how is it produced in the home?

CO is a colorless, odorless, toxic gas. It is produced by the incomplete combustion of solid, liquid and gaseous fuels. Appliances fueled with gas, oil, kerosene, or wood may produce CO. If such appliances are not installed, maintained, and used properly, CO may accumulate to dangerous levels.

### What are the symptoms of CO poisoning and why are these symptoms particularly dangerous?

Breathing CO causes symptoms such as headaches, dizziness, and weakness in healthy people. CO also causes sleepiness, nausea, vomiting, confusion and disorientation. At very high levels, it causes loss of consciousness and death.

This is particularly dangerous because CO effects often are not recognized. CO is odorless and some of the symptoms of CO poisoning are similar to the flu or other common illnesses.

### Are some people more affected by exposure to CO than others?

CO exposures especially affect unborn babies, infants, and people with anemia or a history of heart disease. Breathing low levels of the chemical can cause fatigue and increase chest pain in people with chronic heart disease.

### How many people die from CO poisoning each year?

In 1989, the most recent year for which statistics are available, there were about 220 deaths from CO poisoning associated with gas-fired appliances, about 30 CO deaths associated with solid-fueled appliances (including charcoal grills), and about 45 CO deaths associated with liquid-fueled heaters.

### How many people are poisoned from CO each year?

Nearly 5,000 people in the United States are treated in hospital emergency rooms for CO poisoning; this number is believed to be an underestimate because many people with CO symptoms mistake the symptoms for the flu or are misdiagnosed and never get treated.

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## How can production of dangerous levels of CO be prevented?

Dangerous levels of CO can be prevented by proper appliance maintenance, installation, and use:

### Maintenance:

- A qualified service technician should check your home's central and room heating appliances (including water heaters and gas dryers) annually. The technician should look at the electrical and mechanical components of appliances, such as thermostat controls and automatic safety devices.
- Chimneys and flues should be checked for blockages, corrosion, and loose connections.
- Individual appliances should be serviced regularly. Kerosene and gas space heaters (vented and unvented) should be cleaned and inspected to insure proper operation.
- CPSC recommends finding a reputable service company in the phone book or asking your utility company to suggest a qualified service technician.

### Installation:

- Proper installation is critical to the safe operation of combustion appliances. All new appliances have installation instructions that should be followed exactly. Local building codes should be followed as well.
- Vented appliances should be vented properly, according to manufacturer's instructions.
- Adequate combustion air should be provided to assure complete combustion.
- All combustion appliances should be installed by professionals.

### Appliance Use:

Follow manufacturer's directions for safe operation.

- Make sure the room where an unvented gas or kerosene space heater is used is well ventilated; doors leading to another room should be open to insure proper ventilation.
- Never use an unvented combustion heater overnight or in a room where you are sleeping.

### Are there signs that might indicate improper appliance operation?

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Yes, these are:

- Decreasing hot water supply
- Furnace unable to heat house or runs constantly
- Sooting, especially on appliances
- Unfamiliar or burning odor
- Increased condensation inside windows

**Are there visible signs that might indicate a CO problem?**

Yes, these are:

- Improper connections on vents and chimneys
- Visible rust or stains on vents and chimneys
- An appliance that makes unusual sounds or emits an unusual smell
- An appliance that keeps shutting off (Many new appliances have safety components attached that prevent operation if an unsafe condition exists. If an appliance stops operating, it may be because a safety device is preventing a dangerous condition. Therefore, don't try to operate an appliance that keeps shutting off; call a service person instead.)

**Are there other ways to prevent CO poisoning?**

Yes, these are:

- Never use a range or oven to heat the living areas of the home
- Never use a charcoal grill or hibachi in the home
- Never keep a car running in an attached garage

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## Can Carbon Monoxide be detected?

Yes, carbon monoxide can be detected with CO detectors that meet the requirements of Underwriters Laboratories (UL) standard 2034.

Since the toxic effect of CO is dependent upon both CO concentration and length of exposure, long-term exposure to a low concentration can produce effects similar to short term exposure to a high concentration.

Detectors should measure both high CO concentrations over short periods of time and low CO concentrations over long periods of time - the effects of CO can be cumulative over time. The detectors also sound an alarm before the level of CO in a person's blood would become crippling. CO detectors that meet the UL 2034 standard currently cost between \$35 and \$80.

**Where should the detector be installed?**

CO gases distribute evenly and fairly quickly throughout the house; therefore, a CO detector should be installed on the wall or ceiling in sleeping area/s but outside individual bedrooms to alert occupants who are sleeping.

**Aren't there safety devices already on some appliances? And if so, why is a CO detector needed?**

Vent safety shutoff systems have been required on furnaces and vented heaters since the late 1980s. They protect against blocked or disconnected vents or chimneys. Oxygen depletion sensors (ODS) have also been installed on unvented gas space heaters since the 1980s. ODS protect against the production of CO caused by insufficient oxygen for proper combustion. These devices (ODS and vent safety shutoff systems) are not a substitute for regular professional servicing, and many older, potentially CO-producing appliances may not have such devices. Therefore, a CO detector is still important in any home as another line of defense.

**Are there other CO detectors that are less expensive?**

There are inexpensive cardboard or plastic detectors that change color and do not sound an alarm and have a limited useful life. They require the occupant to look at the device to determine if CO is present. CO concentrations can build up rapidly while occupants are asleep, and these devices would not sound an alarm to wake them.

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For additional information, write to the U.S. Consumer Product Safety Commission, Washington, D.C., 20207, call the toll-free hotline at 1-800-638-2772, or visit: <https://www.cpsc.gov/Safety-Education/Safety-Education-Centers/Carbon-Monoxide-Information-Center/CO-Alarms>

<https://www.tdi.texas.gov/fire/fmcoalarms.html>

## 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.

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.

## 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

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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: <https://www.cpsc.gov/s3fs-public/5022.pdf>

## **ADDENDUM: Warning Concerning Roof and Wall Sheathing with Integral Radiant Barriers – Radiant Barrier Sheathing (RBS)**

Evidence suggests that house fires can be caused by the aluminum foil in radiant barrier sheathing (RBS) becoming energized by electricity from various sources. These include, but are not limited to contact by damaged electrical cables or fixtures with the RBS, contact of gas- and wood-fueled appliance vents with the RBS, HVAC ducts, and lightning, which is apparently attracted to the RBS.

You are strongly urged to insure that all electrical wiring and fixtures are not in direct contact with the RBS and to have a lightning arrester system designed and installed, in strict accordance with the latest published version of NFPA 780 Standard for The Installation of Lightning Protection Systems and NEC 250.106, by a licensed master electrician or licensed professional electrical engineer with extensive experience in the design and installation of residential lightning arrester systems on your home prior to the end of any time periods associated with the purchase of the home. This also applies if you already own the home whether for occupancy or other purposes. This is critical and represents a very real fire and life safety issue that requires immediate improvement.

See:

<https://www.propertycasualty360.com/2012/06/12/subrogation-and-lightning-induced-radiant-barrier/?slreturn=20200008115000>

<http://lightning.org/>

<http://www.tlpinc.com/services/residential-light-commercial-systems.html>

<https://www.astm.org/Standards/C1743.htm>

## **ADDENDUM: GROUND FAULT CIRCUIT INTERRUPTER (GFCI) DEVICES**

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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 milliamps, death can occur if the duration is longer than 15 percent of the heart's cycle. At 10 milliamps, you can't let go, and respiratory paralysis can occur. At 30 milliamps, you go into ventricular fibrillation and death. Remember, we are talking about milliamps. 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 milliamps and within milliseconds. Having the advanced equipment to thoroughly and accurately test your circuits can save lives.

**WARNING:** Sever 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 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

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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](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 year<sup>1</sup>. 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 for 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 "arcing 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.

<https://www.cpsc.gov/s3fs-public/5133%281%29.pdf>

### **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:

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**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.**

The International Residential Code requires that service lines such as plumbing, electrical, water, condensate, cable, 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 ¼ inches in height where it meets the decking. The proper place for the line to have been run and secured is at least 2 ½ 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 ¾ 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**

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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.

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.

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For more information, visit:

<https://www.nfpa.org/Public-Education/Fire-causes-and-risks/Top-fire-causes/Electrical/Tamper-resistant-electrical-receptacles>

<https://www.youtube.com/watch?v=9mXr9tMx7wI>

## ADDENDUM: Lightning and Surge Arrester Systems

Lightning creates voltage surges in all of the following ways. Lightning can directly strike on your house. It can hit the overhead power line which enters your house, the transformer that feeds the underground power line, or a main power line that is blocks away from your home. Lightning can come into contact with branch circuitry wiring in the walls of your house. It can strike an object near your home such as a tree or the ground itself and cause a surge. Damaging voltage surges can even be created by cloud to cloud lightning in the vicinity of your home. A sufficiently charged cloud passing over your home can similarly induce a voltage surge.

Voltage surges can also be caused by standard on and off switching activities of electric motors or pieces of equipment like air conditioner, freezer or refrigerator compressors. These types of surges can be created by large motorized equipment at a neighboring building, or by a business or manufacturing facility some distance from your house. These also occur during voltage dips and spikes in the power supply coming from the utility company. These surges are dangerous and usually silent. They can occur with little or no warning.

When a voltage surge is created, it seeks to equalize itself and it wants to do it as quickly as possible. These things seemingly have little patience. The surges will do whatever it takes to equalize or neutralize themselves, even if it means short-circuiting all of your expensive electronic equipment.

The method of providing optimal protection for your equipment is rather simple. Create a path for the voltage surge (electricity) to get to and into the ground outside your house as quickly as possible. This is, in most cases, a very straightforward task.

The first step is easy. Create a proper grounding system for your household electrical system. The majority of homes do not have a proper grounding system. Many homes have a single grounding rod and /or a metallic underground water pipe which are part of the electrical grounding system. In most cases, this is inadequate. The reason can be easily explained. Imagine placing a two-inch fire hose into your kitchen sink and opening the nozzle to the fully on position. I seriously doubt that the drain in your sink could handle this amount of water. Your grounding system would react in precisely the same way to a immense voltage surge. Just as the water splashes out of the sink, the electricity jumps from the grounding system and looks for other places to go. Frequently it looks for the delicate microchips in your pricey electronic devices. They offer a path of least resistance.

Voltage surges desire to be directed to the grounding system, and when they do, they would like to get into the ground around your house as quickly as possible. You can accomplish this by driving numerous grounding rods into undisturbed soil around your house. These rods must be Underwriter's Laboratories (UL)-approved and connected by a continuous heavy gauge solid copper wire which is welded to each grounding rod. This solid copper wire starts on the grounding buss bar inside of your electrical panel and ends at the last grounding rod. You should avoid using clamps. Over time, the connection at the clamp can corrode or loosen, thus creating tremendous resistance. This will act as a hindrance to the electricity attempting to enter into the ground around your home.

The grounding rods should be at least six feet apart from one another, and more widely spaced is preferable. They should be located in soil which readily accepts electricity. Moist clay soils such as are found through most of the DFW Metroplex are very desirable. Rocky, sandy, or soils with gravel generally have high resistance factors. Electricity has difficulty dissipating into these media. Resistance readings must be in the range of 10 to 30 ohms. The lower the better.

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The second step in household surge protection is to install a lightning arrester (surge protector) inside of your electric service panel. These devices can be extremely successful in intercepting large voltage surges which travel in the electric power lines. These devices capture the voltage surges and 'bleed' them off to the grounding wire which we just mentioned. If for some reason you do not have a large enough grounding conductor (wire), or enough or properly spaced ground rods, the arrester cannot perform as intended. It must be able to send the surge rapidly to the ground outside of your house. Almost every manufacturer of circuit breakers makes one to fit inside their panel. If not, there are many on the market that can easily be installed in the wall adjacent to the distribution panel. They must be installed by a licensed professional electrician in order to insure that the warranty they carry is not voided.

The final step in this plan is to install 'point of use' surge suppression devices. Often you will see these called 'transient voltage surge suppressors'. These are your last line of defense. They are capable of only stopping the leftover voltage surge which got past the grounding system and the lightning arrester. They cannot protect your electronic devices alone or unaided. They must be used in conjunction with the grounding system and the lightning arresters. You are strongly urged not to be lulled into a false sense of security if you merely use one of these devices!

The 'point of use' surge suppression devices are available in various levels of quality. Some are much better than others. What differentiates them are several aspects. Generally speaking, you look to see how fast their clamping speed is. This is their response time. Also, look to see the limit of a voltage surge they will suppress. Be certain that the device has a 500 volt maximum UL rated suppression level. Insure that it has an indicator, either visual or audio (preferably both), which lets you know if it is not working. The superior units offer both, in case you install the device out of sight. Observe if it offers a variety of modes with respect to protection. For example, does the device offer protection for surges which occur between the 'hot' and neutral, between 'hot' and ground, as well as between neutral and ground. There is a major difference! Check to see if it monitors the normal sine waves of regular household current. Surges can cause irregularities in these wave patterns. Good transient surge suppression devices 'dispose of' these voltage spikes. Finally, check the joule rating. Attempt to locate a device which has a joule rating of 140 or more. Electrical supply houses, both brick and mortar and online often are the best place to look for these high quality devices.

Some devices can also protect your communications equipment at the same time. This is quite important for those individuals who have computer modems. Massive voltage surges can come across phone lines as well. These surges can enter your computer through the telephone line. Don't forget to protect this line as well. Also, be sure the telephone ground wire is tied to the upgraded electrical grounding system.

An added layer of protection would be the installation of a lightning arrester system. Secondary class lightning arrestors are designed to protect most homes and businesses from lightning strikes, and are required by most electrical codes, according to, Inc., an electrical power protection company.

These arrestors cause high voltage overages to go to ground, though they do not remove all the over voltage from a surge. Secondary class arrestors offer the least amount of protection to electrical systems, and typically do not protect solid state technology, or anything that has a microprocessor. They should be used in conjunction with the devices listed above.

You are strongly advised to consult with a licensed master electrician or licensed professional electrical engineer prior to embarking on improvement of your home's grounding system.

See:

[http://www.arresterworks.com/pdf\\_file/what\\_is\\_an\\_arrester.pdf](http://www.arresterworks.com/pdf_file/what_is_an_arrester.pdf)

## ADDENDUM: Electrical Extension Cords

### Safety Guidelines for Flexible Electrical Cords

Promulgated by the Texas Real Estate Commission (TREC) P.O. Box 12188, Austin, TX 78711-2188,  
(<http://www.trec.state.tx.us>).

(512) 936-3000  
REI 7-5 (Revised 05/4/2015)

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**Note:** For the purposes of this document, a **power strip** is defined as a multi-outlet adapter with a flexible cord-and-plug attachment and an over-current device (breaker). Some power strips also have a master on/off switch and some have a surge suppressor.

The National Electrical Code (NFPA-70) has specific requirements for the use of flexible cords and cables. No exception is made for the use of a flexible cord that contains an over-current protection device (such as a power strip or surge protector) instead of a traditional plain extension cord. As per NEC 400.8 any flexible cord or cable, whether it is the actual power cord from the electronic device, an extension cord, or the cord of a power strip, can NOT be used:

1. As a substitute for the fixed wiring of the structure
2. Where run through holes in walls ceilings or floors
3. Where run through doorways, windows or similar openings
4. Where attached to building surfaces
5. Where concealed behind building walls, ceilings, or floors.

Except for temporary wiring (as provided for in the National Electrical Code, NFPA-70/NEC 590.3) cord-and-plug connection of equipment is not permitted to be energized from extension cords.

Extension cords are not legal substitutes for the NEC-compliant fixed wiring of a structure such as a receptacle outlet. Power strips are classified as temporary devices and, as such, should never be permanently mounted to any facility surface. Notice the fine print on the package where it explains that the keyholes on the back are for temporary hanging of the power strip.

### Safety Guidelines for Use of Power Strips and Extension Cords

1. Laboratory instrumentation and fixed equipment that you cannot lift yourself should be plugged directly into the wall outlet. Exceptions will only be made for equipment that needs a surge suppressor. In this case, the surge suppressor should be mounted to the outlet with the protected device directly plugged in.

2. Power strips must meet the following criteria:

a. Use only surge protectors or power strips that have an internal circuit breaker. These units will trip the breaker if the power strip is overloaded or shorted to prevent overheating.

b. Power strips should have a plastic external case rather than a metal one. Homemade extension cords employing metal outlet boxes (example shown below) are NOT acceptable.

2.b.i. Not Acceptable - Homemade



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c. Frayed or strained cords are NOT permitted.

d. The surge protector or power strip should always have either a polarized plug with one of the blades being larger than the other one, or a three-prong grounded plug. Never use a three-to-two prong adapter to power the unit. Never cut off the grounding prong of a 3-prong plug.

2.d.i. Not Acceptable – Missing Ground Prong



e. Only UL 1363, 1449 2nd edition, or 46D0 approved power strips (those with over-current testing) should be used on campus. Just because it is UL rated does not mean that it is approved.

f. "Flexible" use power strips should have a cord of no more than 6 feet in length. Power strips with cord longer than 6 feet are classified by code as power strip with extension cord. Longer length extension cords are only for "temporary" use only.

3. All Uses:

a. There should only be one surge protector or power strip plugged into a single duplex electrical outlet.

3.a.i. Example: NOT Acceptable

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3.a.ii. Example: Allowable

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b. Do NOT plug a surge protector or power strip into an existing surge protector or power strip. This practice is called "daisy-chaining" or "piggy-backing" and can create a serious hazard.

c. Power strips should not be overloaded. Most are rated for 15A. This equates to approximately 1500 watts of power connected to the device.

d. Surge protectors, power strips, and/or extension cords are NOT a substitute for permanent wiring.

e. Do NOT locate a surge protector or power strip in any area where the unit would be covered with carpet, furniture, or any other item that will limit or prevent air circulation.

f. Do NOT staple, tack, or tape a surge protector or power strip.

4. **Personal computer use:** Personal computers and their accessories can be plugged into a power strip. It is recommended for the protection of the equipment that the power strip have surge protection. If possible, the approved power strip should be elevated off the ground. It should never be permanently mounted to a building surface.

5. Bench top use of power strips on "wet" laboratory benches will be permitted only under the following conditions:

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- a. There must be GFCI protection via 1 of the following 3 methods:
  - i.. Install GFCI rated breakers for a laboratory bench area and use a UL rated surge protector.
  - ii. Install a GFCI rated outlet and use a surge protector.
  - ii. Use a GFCI rated surge protector for laboratory use operations
- b. The power strip should be hung on mounting screws above the bench top.
6. Power strips are never acceptable for the following uses unless GFCI equipped:
  - a. Aquariums
  - b. To power any water pumping equipment
  - c. Use in a damp location
  - d. Use in a cold room
  - e. Use near a sink or other source of water.
7. Use of extension cords and/or power strips in an area that may contain flammable vapors (e.g. solvent storage room, paint cabinet) is never permitted even with GFCI. These environments require specially rated, intrinsically safe power equipment to prevent explosions.
8. Equipment with a heating element should not be connected to a power strip. This includes:
  - a. Hot plate
  - b. Water bath
  - c. Heat gun
  - d. Coffee pot
  - e. Toaster oven

### Extension Cord Construction

Multiple outlet adapters ("octopus adapters") are not permitted.

Multiple strip outlets that are fused for the wire size of the connecting cord, are allowed when needed to power electronic devices.

Flexible extension cords shall contain a ground wire and shall be constructed from type S, hard usage material. When cords are used with heating appliances, a type HS cord is required.

At least 14-gauge wire is required in a flexible cord servicing a current draw of more than 7 amps.

### Extension Cord Use and Maintenance

Extension cords shall not be used as a substitute for permanent wiring.

Extension cords shall not be used on stationary equipment or equipment drawing more than 15 amps, such as refrigerators, centrifuges, or power tools.

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Extension cords shall not run through, behind or in walls, ceilings or floors or other concealed space. Nor shall they be run in or through ventilation ducts.

Do not place extension cords under carpets, under doors, or other locations that subject the cord to abrasion or other damage.

Avoid creating a tripping hazard; do not place extension cords across walkways or doorways.

Discard extension cords with broken wires or damaged insulation; splicing or taping is not allowed.

Where hazardous atmospheres may exist, due to the presence of flammable gases or vapors or explosive dusts, extension cords shall not be used.

The combined length of the appliance cord and extension cord that is used on very portable equipment, such a floor scrubber, projectors and hand tools, shall not exceed 105 feet.

### General Safety Considerations

Uncoil long cords when in use, to avoid overheating.

Replace a short appliance cord with a longer one when appropriate.

Consider the proximity of electrical outlets when locating furniture. For example, move the furniture closer to the outlet, rather than using a 50-foot extension cord to bridge a 2-foot gap.

Select a cord with proper insulating materials if there will be exposure to moisture, oil or other chemicals.

At each use, visually check the cord insulation, plug and connector for damage.

<https://www.cpsc.gov/s3fs-public/5032.pdf>

## 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 every 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.

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- 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.

## ADDENDUM: PEX Supply Plumbing

PEX (cross-linked Polyethylene) water pipes were observed in this home. This piping system is specifically excluded from this report, though active leaks observed will be reported. 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 and Zurn PEX]

### 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.

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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 termiticides.

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."

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.

#### **Rodent Damage**

PEX in attics or elsewhere is highly susceptible to damage by rodents.

#### **Lack of UV Resistance**

PEX formulations vary, but most cannot be exposed to UV for more than 60 days; some as long as 6 months. After these periods the plastic begins to deteriorate, leaching hazardous chemicals into the water. Every ventilated attic subjects the PEX installed there to at least some indirect UV.

**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**

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**personal responsibility of due diligence.**

<https://www.pexuniverse.com/problems-pex-pipe-and-how-prevent-and-fix-them>

<https://www.plasticpipefailure.com/pex-problems>

<https://www.classaction.org/pex-plumbing-lawsuit>

## **ADDENDUM: AUTOMATIC WATER SHUT-OFF DEVICES**

Automatic water shutoff devices are available that constantly monitor all water coming into the home and detect any unusual flow to help minimize flood or leak damages. Described by Popular Science as “the circuit breaker for your home’s plumbing system,” the FloLogic System™ is an automatic water shutoff system that constantly monitors all water coming into the home and detects any unusual flow. If water flow exceeds a preset limit, the System automatically shuts off the water and sounds an alarm. The System does all of this from a single point in the water main, serving as a first line of defense against water damage.

The FloLogic System consists of a flow sensor and user interface that controls a motor-driven ball valve. The System can also be connected to any home security system, alerting your monitoring service when a leak is detected.

In the “Home” mode, the System is pre-programmed to allow up to 30 minutes of uninterrupted water flow before the shutoff valve is activated. The “Away” mode allows 30 seconds of uninterrupted flow. Both modes can easily be reprogrammed to correspond with your personal water use patterns. For information - <http://www.flologic.com/Automatic-Water-Shutoff-System.html> NOTE: This is merely an example, and not a product endorsement. We do not endorse products. Other brands are available.

DynaQuip Controls – WaterCop® Automatic Water Shutoff System

To order online please visit [www.watercop.com](http://www.watercop.com)

To order by phone call (800) 545-3636.

FirstSmart Sensor Corp. – FloodStopper™ System

Phone: (800) 660-1522 <http://www.getfloodstop.com/>

FloLogic, Inc. – The FloLogic System™

Call toll-free 1-877-FloLogic (1-877-356-5644) <http://www.flologic.com/>

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GreenField Direct – PipeBurst Pro™

Phone: (800) 246-LEAK (5325) <http://www.pipeburstpro.com/>

E-mail: [info@greenfelddirect.com](mailto:info@greenfelddirect.com)

Water Security Solutions - Water Security Options & Guidance

Phone: (888) 356-5644 <http://www.wssus.com/products/leak-alarm-water-shutoff>

Clearing the confusion as multi-system suppliers and consultants for high rises and single family homes: WaterCop - FloLogic - Hydrocom - Leak Defense - Water Gard and more.

## ADDENDUM: SEWER BACKFLOW DEVICES

Sanitary sewers work by the force and principal of gravity. So wastewater flows in the direction of the natural slope of the pipe. This is the main reason that the sewer mains owned and maintained by the city are typically located between 10 and 15 deep. In many areas they are much deeper than that. Sewer backflow can be triggered by a number of different situations, some examples follow:

A blockage (in either a private or city sewer pipe) caused by tree roots, construction mishaps, plumbing system deterioration, Insufficient capacity due to residential growth, cracks in the pipe(s), a back-pitched drain system, or a surcharge due to heavy rain or a large snow melt.

In a home plumbing system, blockages are often caused by accumulation of grease, hair, and any physical obstruction in the pipe. It may even include napkins, diapers, cigarette butts, toilet paper, construction debris, and more. When your sewer pipe is blocked, wastewater has no chance of flowing in the right direction, hence backflow. But the most serious and damage causing sewer backflow conditions occur when a public sewer system becomes surcharged.

### SEWER SURCHARGE

Proper building and plumbing design can prevent backwater. If the backflow comes from your city sewer, the most common culprit is a flood or any massive amount of water either from rain or a snow melt. Failure of a sump pump can also possibly lead to sewer backflow, but nowhere near as severe as that of a public sewer surcharge. Because the backflow contains wastewater from many different unsanitary sources (after all, it is a public sewer), it does not only damage properties, but also create severe health hazards. You have no control over the functionality of a city sewer system, but you can prevent backflow by adding a sewer backflow valve device to your own plumbing system.

### SEWER BACKFLOW VALVE DEVICES

There are three main types of sewer backflow valves. The price range to purchase and install can vary greatly, depending on the valve. And the effectiveness of the valve can likewise vary greatly. Each sewer backflow valve has its own attributes, which must be considered carefully before installation.

### SEWER BACKWATER VALVES

Sewer Check Valve: As sewer valves go, a check valve is the least expensive, and the type most often installed. A check valve does not prevent backwater 100%, so it is ideal for short-term backups lasting less than a full day. Like all sewer valves, once the flapper closes, water use inside the building must be limited.

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When a public sewer backup recedes, the check valve will automatically allow the waste water from your home to escape, and run out to the public sewer. A check valve should be cleaned once a year to ensure the flap opens and closes fully.

Automatic Flood Gate Valve: An automatic flood gate valve is the most sophisticated and 100% effective way to stop waste water and the damage associated with it. An automatic flood gate valve works on air pressure, and (as its name implies) is fully automatic. Once closed, its stainless steel knife edge stops backwater 100% over prolonged periods of time. Like all specialized plumbing devices, this device should be installed by none but Licensed Plumbers, with the manufacturers instructions followed closely.

If installed incorrectly not only will it not work properly, but the product warranty will be void. Because an automatic flood gate valve is larger than the typical sewer backwater valve (mainly due to the air chamber), the installation must be considered and planned out carefully.

Manual Sewer Gate Valve: A manual sewer valve, as its name implies, must be opened and closed manually. That means one must anticipate when a backwater condition will arise. And likewise, one must know when the backwater has receded. While a dependable device, the chance of misuse and backwater damage occurring regardless, make sit a device for only very particular situations.

You are strongly urged to have a licensed master plumber inspect you DWV plumbing system and recommend the right valve for you in order to prevent damage to your home at great expense to you.

## **ADDENDUM: Thermal Pane (Insulated Glass Unit) Fogging**

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:

(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://windowmedics.com/defog.html>

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

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

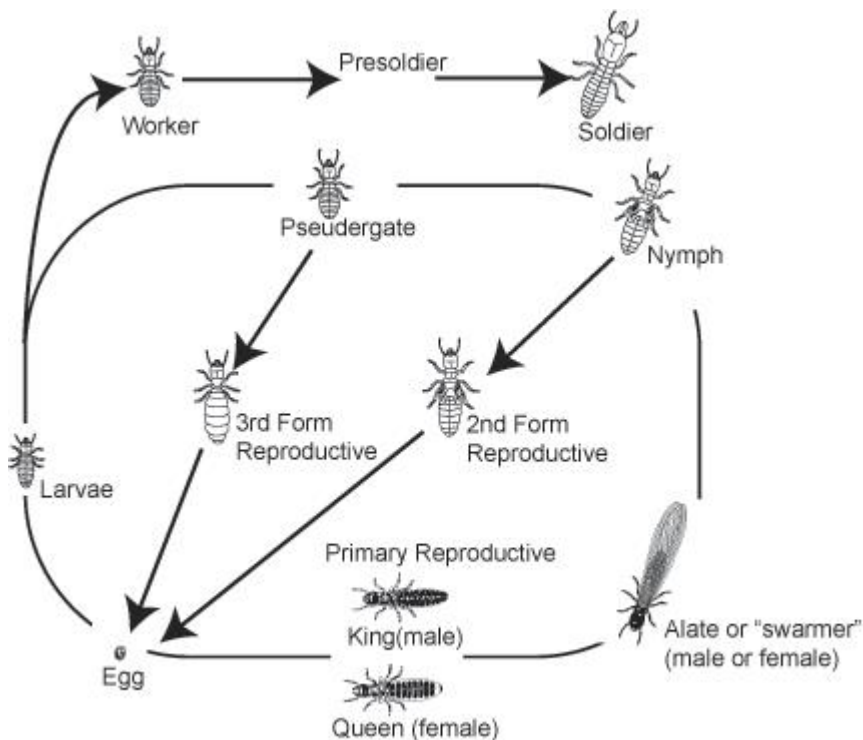
Subterranean termites are the most destructive insect pests of wood in the United States. They cause billions of dollars in damage each year and have a negative impact on a family's most valuable possession - the home.

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.



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

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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.

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

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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

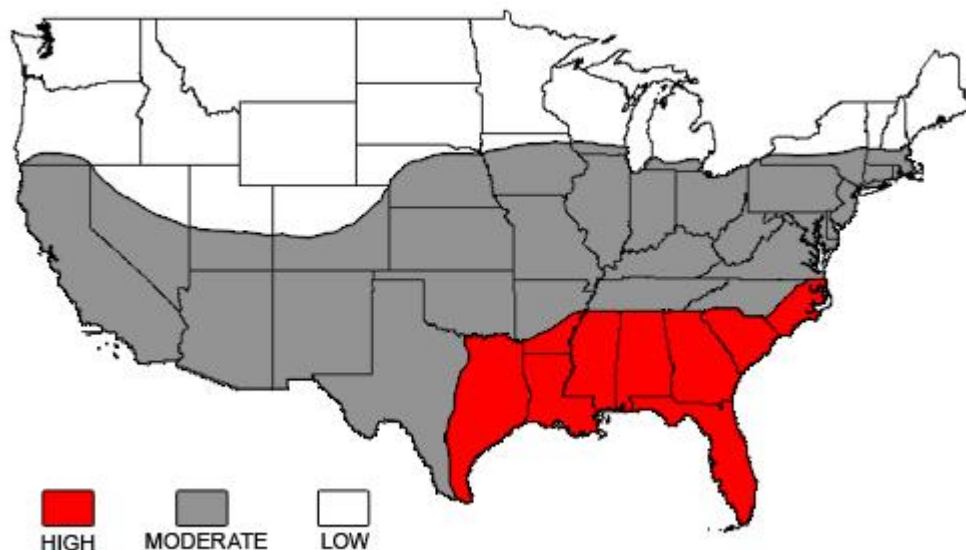
Subterranean termite damage is usually confined to the soft, spring-growth of wood. Termite tunnels and galleries tend to follow the wood grain and are lined with mud or may have a pale, spotted appearance resulting from soft fecal material plastered on tunnel surfaces. Moisture sources may cause wood 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.

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.



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

## ADDENDUM: (Some of) the Real Truth about Home Warranty Companies

A home warranty may be a good idea when buying an existing home, especially if the home has aging mechanical equipment such as water heaters, furnaces, air conditioners, et al. However, you must be certain that your expectations are in line with reality. Home warranty companies are notoriously difficult to deal with, especially for homeowners with misconceptions about what their home warranty will and will not cover.

What is a home warranty? First of all, it is not really a warranty, but rather a service policy. For X amount of your money the company promises to have its often unskilled subcontractors repair any covered system or appliance in your home during the period of coverage. Not all systems are included. Some systems that are not included under the standard policy may be added at additional cost.

Does this sound more like insurance than a warranty? That's because it is insurance, and not a warranty. How do insurance companies make money? They do so by denying claims.

Begin with the fine print in the contract. The devil is always in these details. Many conditions that will immediately cause a claim denial are pre-existing conditions, improper installation, abuse, etc. Most of the contracts I have read, and I have read many, are written in such a nebulous fashion that attorneys have problems interpreting them. Obviously, they are written this way for a reason. Like the old X-Files tagline "Deceive, Inveigle, Obfuscate", they want you venturing into this relationship with them completely unaware and with open wallet. So, at the risk of repeating myself, **read the fine print**.

Denials will come from many fronts. Some of the most common are:

- (1) System or item failure due to lack of maintenance or regular servicing.
- (2) System component mismatches such as air conditioner coil components.
- (3) Item not covered. For example, if you opt for refrigerator coverage, may components of the unit are not covered, such as door handles, ice makers, et al.
- (4) Preexisting conditions.

In the State of Texas these types of companies are not, for some unknown (but understandable if you really think about it) reason, regulated by the Texas Department of Insurance. Instead, they are regulated the Texas Real Estate Commission. Go figure. That's Austin, TX for you – 20 square miles surrounded by reality. For this reason, information about these companies can be found at: <https://www.trec.texas.gov/residential-service-companies>

[https://www.washingtonpost.com/lifestyle/home/will-a-home-warranty-bring-you-peace-of-mind-maybe-not/2019/04/22/12d65356-5627-11e9-8ef3-fbd41a2ce4d5\\_story.html](https://www.washingtonpost.com/lifestyle/home/will-a-home-warranty-bring-you-peace-of-mind-maybe-not/2019/04/22/12d65356-5627-11e9-8ef3-fbd41a2ce4d5_story.html)

<https://www.angieslist.com/articles/why-home-warranties-are-no-guarantee.htm>

Angie's list reports that home warranty companies secured the infamous number 1 position in the number of complaints filed in 2011:

Angie's List 2011 Most Complained-About Companies

1. Home warranty companies
2. Internet service providers
3. Banks/Credit unions
4. Property management companies

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5. Auction services
6. Boating sales and service
7. Mattress sales
8. Mobile and landline phone providers
9. Wedding professionals – bridal and tuxedo shops, planners
10. Travel agencies

How to think all of this through?

1. Do you have aging systems and equipment in your home that are not still under a manufacturer's warranty? If yes, then maybe a home warranty is for you.
2. Get copies of the contracts from the companies you are considering and **READ THE FINE PRINT** (that's the third and last time I will say this). If you do not understand everything in the contract, ask questions and get answers from the company. Ask if the company does pre-coverage inspections. If not, why not?
3. Check the companies out on [Angie's List](#), the [Better Business Bureau](#), [Rippoff Report](#), and anywhere else you can think of.
4. Ask your friends about any experiences they may have had with these companies.
4. Ask your real estate agent. Agents often have a lot of experience with these firms.
5. Ask yourself if you are bordering on having a Type-A personality, the type you will need when dealing with these companies. If you are non-confrontational and/or prefer to avoid conflict, a home warranty may not be for you. You may be better off budgeting and setting aside funds for future repairs and replacements.

## ADDENDUM: SELLER REPAIRS AND TREATMENTS

If the seller in a resale contract uses a handyman or unlicensed contractor for anything that requires a licensed contractor he sets himself up for litigation, unless the buyer has agreed in advance to allow this ill-advised practice. The use of a handyman is allowed as long as the task does not require a license (this includes licensing required by the municipalities and not just the state) AND the handyman is "commercially engaged in the trade of providing such repairs or treatments". So, no seller self-repairs, no quick fixes by the yard man, and no drunk uncle Rube Goldberg bailing wire and duct tape affairs . . .

From the [TREC Resale Contract](#):

F. COMPLETION OF REPAIRS AND TREATMENTS: Unless otherwise agreed in writing: (i) Seller shall complete all agreed repairs and treatments prior to the Closing Date; and (ii) all required permits must be obtained, and repairs and treatments must be performed by persons who are licensed to provide such repairs or treatments or, if no license is required by law, are commercially engaged in the trade of providing such repairs or treatments. At Buyer's election, any transferable warranties received by Seller with respect to the repairs and treatments will be transferred to Buyer at Buyer's expense. If Seller fails to complete any agreed repairs and treatments prior to the Closing Date, Buyer may exercise remedies under Paragraph 15 or extend the Closing Date up to 5 days if necessary for Seller to complete the repairs and treatments.

## ADDENDUM: MAINTENANCE ADVICE

### Upon Taking Ownership

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*After taking possession of a new home, there are some maintenance and safety issues that should be addressed immediately. The following checklist should help you undertake these improvements:*

☐ **Complete all of the improvements recommended in this inspection report.**

- ☐ Obtain, read, and completely familiarize yourself with the manufacturer's installation instructions, owner's manuals, and care manuals of all materials and systems of which this house is comprised. Do not assume that, because you have seen or owned similar systems or materials, that you are familiar with the proper operation and maintenance of those present in this house. Incomplete and/or improper understanding is imprudent and hazardous.
- ☐ Inquire of the previous owner regarding any alterations which have been made to the property during his/her ownership, or which he/she is aware of, and obtain all pertinent documentation, e.g. building permits, contractor invoices, et al.
- ☐ Change the locks on all exterior entrances, for improved security.
- ☐ Check that all windows and doors are secure. Improve window hardware as necessary. Security rods can be added to sliding windows and doors. Consideration could also be given to a security system.
- ☐ Install interconnected smoke detectors on each level of the home. Ensure that there is a smoke detector in and outside all sleeping areas. Replace batteries on any existing smoke detectors and test them. Make a note to replace batteries again in one year.
- ☐ Create a plan of action in the event of a fire in your home. Ensure that there is an operable window or door in every room of the house. Consult with your local fire department regarding fire safety issues and what to do in the event of fire.
- ☐ Examine driveways and walkways for trip hazards. Undertake repairs where necessary.
- ☐ Examine the interior of the home for trip hazards. Loose or torn carpeting and flooring should be repaired.
- ☐ Undertake improvements to all stairways, decks, porches and landings where there is a risk of falling or stumbling.
- ☐ Review your home inspection report for any items that require immediate improvement or further investigation. Address these areas as required.
- ☐ Install rain caps and vermin screens on all chimney flues, as necessary.
- ☐ Investigate and familiarize yourself with the location of the main shut-offs for the plumbing, heating and electrical systems. If you attended the home inspection, these items would have been pointed out to you. If not, they will be identified in this report.

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## Regular Maintenance

### EVERY WEEK

- ☐ Check that the soil around the perimeter of the house is clinging tightly to the edge of the foundation. If there is any space between the soil and the concrete, the soil is too dry and you should increase the frequency with which you water. The foremost cause of foundation failure in the Metroplex is lack of soil moisture control and maintenance by homeowners. Periods of dry weather occur in all seasons. Inspect this item weekly.

### EVERY MONTH

- ☐ Test all smoke alarms, as per NFPA, according to the system manufacturer's instructions.
- ☐ Check that fire extinguishers are fully charged and not out-of date. Re-charge or replace as necessary.
- ☐ Replace heating/cooling air filters.
- ☐ Inspect and clean humidifiers and electronic air cleaners.
- ☐ Test the Temperature and Pressure Relief Valve(s) on the Water Heater(s) for proper operation. Replace if defective.
- ☐ Clean gutters and downspouts. Ensure that downspouts are secure, and that the discharge of the downspouts is appropriate. Remove debris from window wells.

Report Identification: [REDACTED]

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

I	NI	NP	D	Inspection Item
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- ☐ Carefully inspect the condition of shower enclosures. Repair or replace deteriorated grout and caulk. Ensure that water is not escaping the enclosure during showering. Check below all plumbing fixtures for evidence of leakage.
- ☐ Repair or replace leaking faucets or showerheads.
- ☐ Secure loose toilets, or repair flush mechanisms that become troublesome.
- ☐ Operate all of the doors in the house to insure that none is sticking or binding at the jams. Door frames out of square is an indication of excessive foundation movement.

### SPRING AND FALL

- ☐ Examine the roof for evidence of damage to roof coverings, flashings and chimneys.
- ☐ Look in the attic (if accessible) to ensure that roof vents are not obstructed. Check for evidence of leakage, condensation or vermin activity. Level out insulation if needed.
- ☐ Trim back tree branches and shrubs to ensure that they are not in contact with the house.
- ☐ Inspect the exterior walls and foundation for evidence of damage, cracking or movement. Watch for bird nests or other vermin or insect activity.
- ☐ Survey the basement and/or crawl space walls for evidence of moisture seepage.
- ☐ Look at overhead wires coming to the house. They should be secure and clear of trees or other obstructions.
- ☐ Ensure that the grade of the land around the house encourages water to flow away from the foundation.
- ☐ Inspect all driveways, walkways, decks, porches, and landscape components for evidence of deterioration, movement or safety hazards.
- ☐ Clean windows and test their operation. Improve caulking and weather-stripping as necessary. Watch for evidence of rot in wood window frames. Paint and repair window sills and frames as necessary.
- ☐ Test all ground fault circuit interrupter (GFCI) and arc fault circuit interrupter (AFCI) devices, as identified in the inspection report. If these devices do not trip or reset properly, they should be replaced immediately.
- ☐ Shut off isolating valves for exterior hose bibs in the fall, if below freezing temperatures are anticipated. Also disconnect and store all water hoses during cold weather.
- ☐ Have a licensed pesticide applicator inspect for evidence of wood-destroying insect activity. Eliminate any wood/soil contact around the perimeter of the home.
- ☐ Test the overhead garage door opener, to ensure that the auto-reverse mechanism is responding properly. Clean and lubricate hinges, rollers and tracks on overhead doors.
- ☐ Replace or clean exhaust hood filters.
- ☐ Clean, inspect and/or service all appliances as per the manufacturer's recommendations.
- ☐ Have the heating, cooling and water heater systems cleaned and serviced.

### ANNUALLY

- ☐ Replace smoke detector batteries.
- ☐ Have chimneys professionally inspected and cleaned. Ensure that rain caps and vermin screens are secured.
- ☐ Examine the electrical panels, wiring and electrical components for evidence of overheating. Ensure that all components are secure. Flip the breakers on and off to ensure that they are not sticky.
- ☐ If the house utilizes a well, check and service the pump and holding tank. Have the water quality tested. If the property has a septic system, have the tank inspected (and pumped as needed).
- ☐ Have the home inspected by a licensed wood-destroying insect specialist (Certified Applicator). Preventative treatments may be recommended in some cases.
- ☐ Have the water heater anode rods inspected by a licensed plumber once the unit(s) are out of warranty.

Report Identification: [REDACTED]

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I NI NP D

Inspection Item

- ☐ Inspect all gas appliance vents as per the manufacturer's instructions.
- ☐ Have all backflow prevention devices professionally inspected as per Texas law.

**EVERY TWO YEARS**

- ☐ Have the water heater anode rods inspected by a licensed plumber while the unit(s) are still under warranty.

**EVERY THREE YEARS**

- ☐ Remove, inspect and replace, if necessary, water heater temperature and pressure relief valves.