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INFRARED DIAGNOSTIC REPORT

ABLE INSPECTION COMPANY

Post Office Box 820129

Houston, Texas 77282

(713) 465-0000

CLIENT:

PROPERTY SURVEYED:

EMAIL:

DATE:

In accordance with your instructions, and in your in presence, I made a limited visual examination and use of a FLIR System T620 Infrared Camera of the above referenced property. At the time of the visual inspection the home was occupied with furniture. The weather conditions were sunny and dry and approximately 91 degrees F at 12:30 pm. Interior temperature was 75 degrees F with 16 degrees F delta. Relative humidity exterior was 68 % and interior 53 %.

HOUSE DESCRIPTION

This building is two story structure with multiple bedrooms. This home generally faces south. The home is constructed of a wood frame with brick and wood. Interior walls and ceilings are constructed of painted plasterboard with wallpaper and tile. Interior floors are covered by carpet, tile, and hardwoods. Window frames are wood and metal type.

The age of the structure, as I understand it, is approximately 24 years old located in West University Place subdivision.

INTRODUCTION

Enclosed is your Infrared Inspection Report, photos and thermograms (electronic pictures/map of thermal energy). This Infrared inspection technique is a powerful, definitive and non-invasive means of monitoring and diagnosing the current condition of the building envelope (consisting of wall materials that separate the environmentally controlled interior from the outdoors) by examining this residence, with a non-contact Thermal Imaging System (T620) used to detect electromagnetic radiation.

This camera will “look” at heat. Heat is the transfer of energy from one object to another. We monitor this transfer by “measuring” the temperature of the object with infrared. Heat flows from a hot object to a cool object. Unexpected temperature changes may indicate design flaws, poor workmanship sub-standard building materials or damaged components. Excessive temperatures changes often exist just before material failure.

PURPOSE OF INSPECTION

The purpose of this IR inspection on this building envelope is to locate and document abnormal patterns of infrared radiation from the building envelope materials that can be or lead to potential problems:

- a) Conductive anomalies are usually caused by insufficient, improperly installed, damaged or water saturated insulation and/or structural building components.
- b) Convection anomalies are usually caused by cracks and holes that permit the uncontrolled movement of air across the building envelope.
- c) Qualitative gatherings will include information of the structure and building materials, location of anomaly, temperatures, relative humidity and weather condition and recording and presenting information. **Using a ExTech digital Psychrometer**
- d) Quantitative gatherings will include measuring temperatures of the observed patterns of infrared radiation, distance of camera from anomaly, emissivity, reflective and surface temperature. **Using a Multi pattern infrared Raytex thermometer**
- e) Inspections will be performed when environmental and physical conditions such as solar gain, rain, wind, surface and atmospheric moisture and heat transfer are favorable to gathering accurate data. This thermographer may recommend earlier morning or later evening infrared diagnostic to obtain “signature” IR images of suspect areas, which will include additional fees of travel and time.

LIMITATIONS OF LIABILITY

Inspector will not be responsible for the movement of furniture, wall hangings, stored boxes, personal items or other objects that may prevent thermographer from inspecting interior and exterior surfaces.

Because this is a limited non-destructive inspection, we make no guarantee, express or implied, that our observations and reporting offer conclusive evidence that no installation discrepancies or moisture anomalies exist, or that any documented problems found are all-inclusive. Client will take full responsibility for consequences resulting from actions taken, or not taken, as a result of information provided by this thermographer and company.

This inspection company, its employees and any divisions shall not be liable for non-visual defects, unseen defects, mold identification and hidden mold propagation, unspecified defects or hidden damage and conditions existing on the subject property and hereby disclaims any liability or responsibility thereof. All parties concerned, agree to hold harmless and indemnify, this thermographer and inspection company involved with any liabilities that may result.

Thermal imaging produces images of invisible heat energy from objects and systems in the home. This can usually, but not always identify and document, heat/cooling loss and air infiltration in walls, ceilings, floors, windows & doors, moisture intrusion, malfunctioning radiant heat, missing/damaged/wet insulation, electrical faults, plumbing leaks, and duct faults at the time of the inspection.

These can all be recorded in vivid color images using Thermography. Anomalies found in temperature/thermal differentiations while performing the thermal image scan will be shown to the client at the time they are identified and will be shown in a written report if said report was requested by the client at the time of making the appointment for the scan. Thermal images can only be taken of areas that are **readily accessible** to the thermographer without endangering the thermographer or causing harm to the building or its components. (Note: furniture, artwork, wall coverings, under floors and thru concrete and tile, curtains, storage items are not moved by the thermographer.)

Any photo images provided at the time of this inspection are intended to assist the client in the understanding of certain defects or conditions as noted during this inspection. However, these photos **do not** represent every technical concern reported from this inspection, and the photos provided should only be considered as a supplement to the final report, with the final written inspection report taking precedence over any photos provided.

THERMOGRAPHERS TEST EQUIPMENT

FLIR System Non-Invasive T620 Infrared Camera:

Powerful 640x480 pixel array and provides 307,200 picture elements in each image.

Temperature is one of the first observable parameters to indicate the health of a component, building, system, or process. We utilize state-of-the-art, fully-radiometric, infrared camera technology to provide superior imaging quality in displaying temperature variations and to help you accurately evaluate non-optimal conditions before failure occurs. Because thermal imaging (infrared thermography) is a highly-effective, non-contact, non-destructive testing method, it is used for a wide range of applications.

Although infrared is not detectable by the human eye, an infrared camera can convert this infrared radiation to a visible image that allows us to evaluate thermal variations across an object or scene. This non-invasive, non-destructive testing method is known as Infrared Thermography. During an infrared inspection, components are analyzed and equipment performance is evaluated in a real operating environment.

This allows us to see distinctive heat patterns and provides us with a powerful, versatile, and highly accurate diagnostic method for uncovering a wide range of problems before damage or failure occurs.

Tramex Wet Wall Non-Invasive Moisture Detector (dielectric meter):

Detects moisture by transmitting alternating (radio frequency) signal through most materials. As water concentration increases so does the "capacitance" of this signal. By measuring this signal, the "relative" moisture content can be read. This Instrument can also identify water pathways and areas of entrapped water within a roof construction. This technique is based on the ability of a material to store electrical energy.

This involves placing this moisture meter on the surface of the wall, ceiling or floor to send a safe electrical current into these materials without penetrating the particular membrane. If the material is wet, the dielectric properties of the material would produce a higher reading than it would if the material were dry.

Delmhorst Moisture Probe "Invasive" Detector (conductance meter):

Detects moisture by measuring the ionic conductance between two electrodes. Pins and probes used are of ¼", 4" and 6" to assist in penetrating into substrate wood and other building material.

These testing equipment are "tools" to assist in locating and measuring temperatures in many different building materials. There are times in which these tools can give "false reading" or no readings at all, due to unusual wall finishes and interior materials, electric wiring, other metals etc. Positive readings do not always represent a problem, nor does negative readings necessarily represent there is **not** a problem.

DEFINITIONS AND EXPLANATIONS FOR RESIDENTIAL IMAGING

1. Non-invasive exam: means a visual exam of the interior of the building using an infrared camera which does not involve any marring or destruction of any surfaces within the building. An infrared camera measures heat variables and can "see" what the naked eye cannot see – behind walls, ceilings, some floor coverings, roofs, etc. The camera produces colorful images showing temperature differences without harming any object or surface. These temperature (radiant) differences can indicate small cracks and crevices that cause drafts, insulation that has settled or is missing, moisture intrusion from the exterior or plumbing leaks, potential electrical problems, etc.

2. Safely & Readily Accessible: means areas that are easily and safely available for thermographer and camera during the thermal scanning process without the potential for harm to the building, its components, contents, or to the thermographer. While the thermographer will make every reasonable attempt to scan all areas, the determination of whether an area is safe and readily accessible is at the discretion of the thermographer.

Client has the right to move their personal property at their own discretion (in their own home), if doing so will result in a more thorough scan. These items might include draperies around window casings, storage covering walls & floors of a closet, a sofa covering most of an exterior wall, etc. However, due to bonding and insurance restrictions, the thermographer is not allowed to move personal property and cannot be held liable if client moves something which then causes damage to the object being moved or to the surrounding area. In homes that are being scanned for a client who is owner of the property, no items can be moved by the client or by the thermographer.

Areas considered Inaccessible:

Access to attic or basement crawl spaces which are too small for the thermographer to pass through safely.

Basement crawl spaces that are less than 24" in height.

Attic areas without flooring to walk on safely or basement crawlspaces which are wet or muddy.

The interior of electrical panel boxes whose cover plates are painted shut or rusted to the point of breakage.

Areas concealed behind appliances and large pieces of furniture.

Areas above a "dropped ceiling" if there are no tiles that can safely be removed and replaced without damage.

3. What Thermography cannot do:

While the camera can detect areas of moisture, it cannot detect if mold (or the type of mold) is present.

Window, wall and floor coverings (concrete, tile, stone, brick) may prevent accurate assessment of these areas by the camera.

It cannot detect toxic substances, materials or environmental hazards such as radon, lead, asbestos, airborne particulates, etc. It cannot detect the presence of mildew, fungus, animal or insect infestation.

FURTHER TESTING (DESTRUCTIVE) INVESTIGATION

We are performing non-invasive survey to minimize damages to your home. However, there may be times when "destructive" measures (small probes less than 1/4" diameter with 4-6 inch forks) will be suggested to further evaluate an area or areas for necessary confirmation on water content in the substrate.

It is difficult to determine the structural integrity of this building material without this probing (Delmhorst meter utilized) and holes will be filled with a quality sealant. This test will not be performed without written waiver from you.

CUSTOMER ASSIGNMENT

Client has experienced water leakage on ceiling of Family room from master shower above. Client had this shower renovated with a new "pan membrane" approximately two years ago. Client desires to know what is cause of this leak and in addition a "slow drain" during use of this shower.

CURRENT FINDINGS

During initial examination of the family room wall, inspector located a small moist water anomaly on ceiling and wall between family room and breakfast room. Inspector operated 2nd level Master shower fixture in normal mode and water "back-up" quickly due to a "restricted drain".

There was some minor amount of additional moisture detected on ceiling from the standing water in this shower. Inspector covered drain and allowed no more than 1" of water to stand in this shower to allow a "head test" to this shower.

In approximate 20 minutes water started dripping out of light fixture onto the hardwood floors, confirming a "defective" shower pan.

SUMMARY AND RECOMMENDATIONS FOR REPAIR

This Inspector has tested many showers over 35 years and it is in our opinion that:

- the master shower tile be removed along the floor, the curb, the bench and 3-4 tiles from bottom at perimeter walls
- examine the installation of this shower pan (commonly vinyl) especially at "corners" and examine for the installation of premade "corner-stops"
- Examine the bench and type of frame material used (wood not favorable)
- Due to a restricted drain system, the drain piping should also be "completely removed" especially the P trap assembly and any other bends that can cause restrictions
- Choice of shower pan membranes such as vinyl, lead and others are available and should be carefully reviewed by homeowner

VISIBLE PHOTO IMAGES AND IR THERMOGRAMS

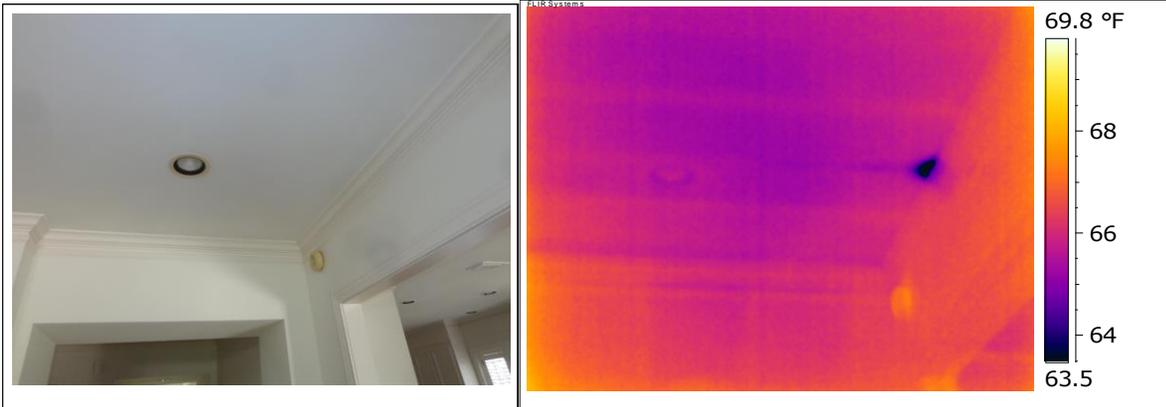


Image taken during initial visit with moisture on upper right ceiling of family room under master shower above

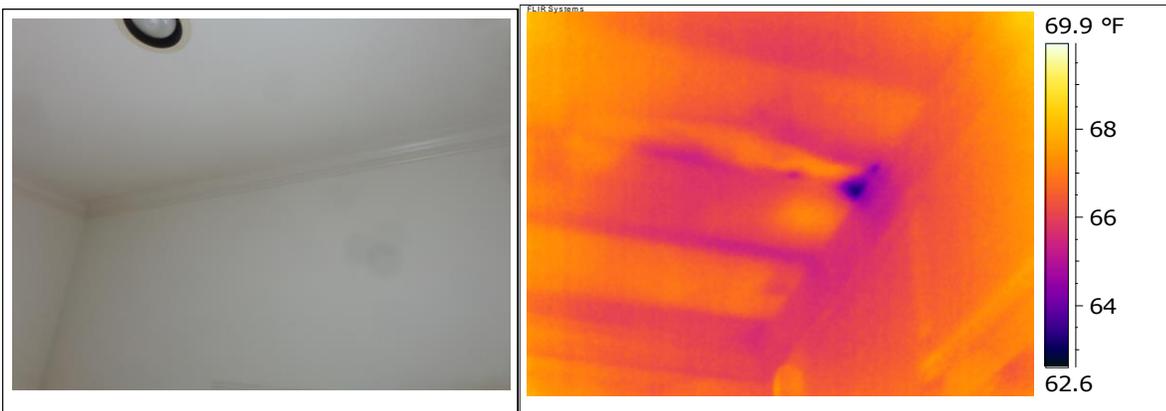


Image of additional moisture on ceiling of family room with some restricted water in master shower

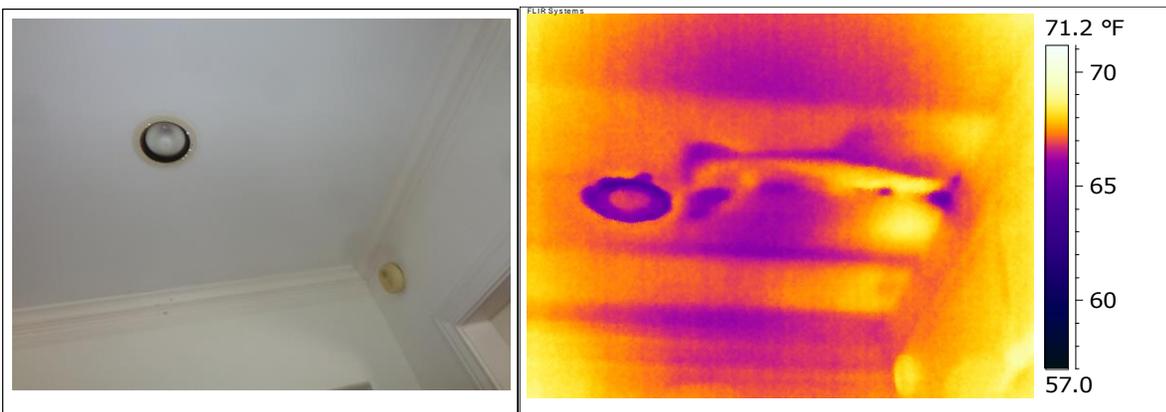
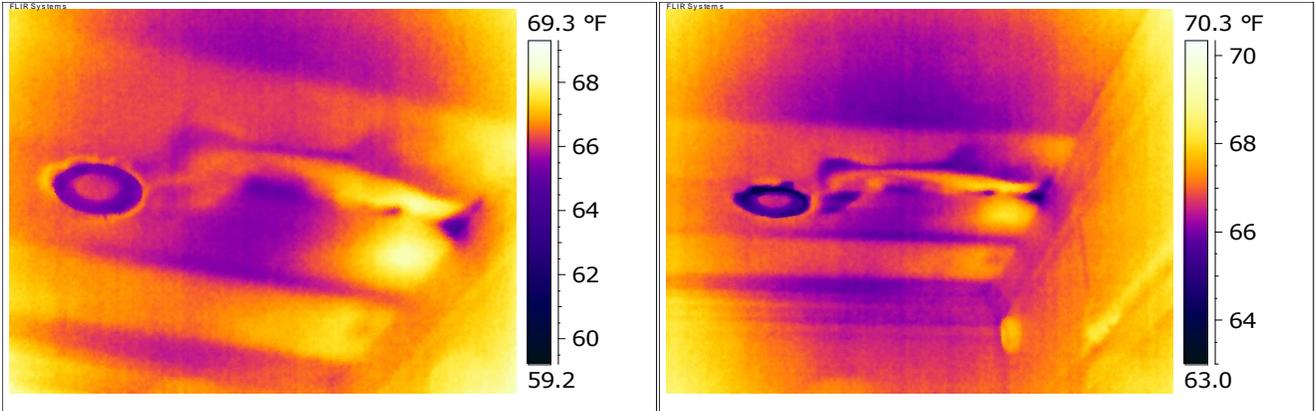


Image of excessive moisture on ceiling after 20 minute water head test to the master shower and drippings of water off recess light



Additional images of moisture and water on ceiling under master shower after 20 minute head test

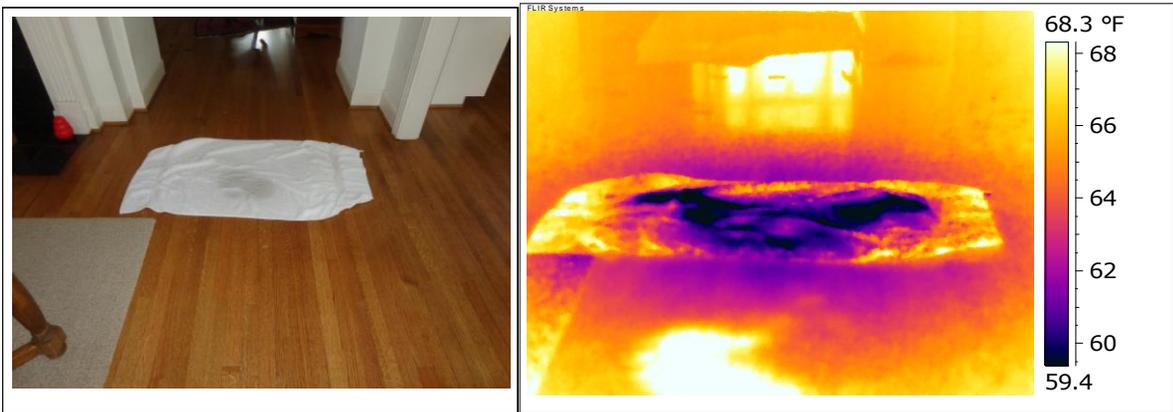


Image of water on towel on top of hardwood flooring from master shower leak



Restricted water at shower drain / water head test with covered drain

REPAIR FOLLOW-UP/YEARLY EXAMINATIONS

A repair follow-up examination should be conducted within six - twelve months after completion of the repairs to assess the effectiveness of the moisture modifications. This is extremely important. Annual inspections should also be scheduled to ensure that your building envelope system remains dry.

Testing and maintaining your home on a regular basis is the best way to prevent costly repairs associated with moisture damage. Also, should you decide to sell your home, annual inspections and maintenance documentation will be a valuable selling tool, providing evidence to show that your home has been examined and maintained on a regular basis by a reputable and qualified firm.

Thank you for choosing **ABLE INSPECTION COMPANY** to perform this important Infrared evaluation inspection for you. After reviewing this narrative report carefully, if you have any questions regarding this examination or opinions of this thermographer, please contact our office.

Very truly yours,

ABLE INSPECTION COMPANY

Inspecting Homes Since 1976

Larry J. Malloy

Larry J. Malloy
Registered Professional Building Inspector
License No. 332 TREC
Certified Termite & Pest Applicator
Licensed No. 28713 TDA
Certified Infrared Building Science Thermographer
Licensed No. 26559 ITC
Certified Infrared Level II Thermographer
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