



Inspection Report

T. Smith

Property Address:

115 E. Ogden
Naperville IL



1261 Dunbarton Dr

Insight Property Services, Inc

Joe Konopacki
#450-0004227 exp. 11/2010
115 E. Ogden Ave. Ste#117-128
Naperville, IL 60563
630-878-4192



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Date: 1/1/2013	Time: 2:54:30 PM	Report ID: HI - 11-012
Property: 115 E. Ogden Naperville IL	Customer: T. Smith	Real Estate Professional:

Comment Key or Definitions

The following definitions of comment descriptions represent this inspection report. All comments by the inspector should be considered before purchasing this home. Any recommendations by the inspector to repair or replace suggests a second opinion or further inspection by a qualified contractor. All costs associated with further inspection fees and repair or replacement of item, component or unit should be considered before you purchase the property.

Inspected (IN) = I visually observed the item, component or unit and if no other comments were made then it appeared to be functioning as intended allowing for normal wear and tear.

Not Inspected (NI) = I did not inspect this item, component or unit and made no representations of whether or not it was functioning as intended and will state a reason for not inspecting.

Not Present (NP) = This item, component or unit is not in this home or building.

Repair or Replace (RR) = The item, component or unit is not functioning as intended, or needs further inspection by a qualified contractor. Items, components or units that can be repaired to satisfactory condition may not need replacement.

Standards of Practice:

BPI Building Performance Institute

In Attendance:

Homeowner

Type of building:

Single Family (2 story)

Weather:

Light Wind, Cold, Cloudy

Ground/Soil surface condition:

Damp

Precipitation in last 3 days:

Yes

General Summary



Insight Property Services, Inc

**115 E. Ogden Ave. Ste#117-128
Naperville, IL 60563
630-878-4192**

Customer

T. Smith

Address

115 E. Ogden
Naperville IL

This Summary is not the entire report. The complete report may include additional information of concern to the customer. It is recommended that the customer read the complete report.

2(A). Initial

2.5.A Worst Case Depressurization using the home's mechanical ventilation equipment

Unsafe

Atmospherically vented water heaters, like the one here, are susceptible to exhaust spillage because they do not create a strong draft. A strong negative pressure (ie. air being sucked into the return ducts at the open filter slot) can draw air down the water heater flue causing its exhaust to spill into the home. We created a Worst Case Depressurization of **-5.8 Pa** by using the home's exhaust fans & air handler and closing certain doors. This should be within the limit of **-5 Pa**, but **the Worst Case Depressurization exceeded the allowable limit**. This means that natural draft appliances have a greater probability of spilling exhaust gasses into the home. A follow-up Combustion Safety Test should be completed after any air sealing work or changes to the mechanical or ventilation systems.

2.6.A Water Heater Spillage Test

Unsafe

(1) **Spillage Test Results:** A spillage test was conducted on the water heater. According to BPI Technical Standards, combustible appliances may spill fumes for up to 60 seconds on start up. **Your water heater vent spilled beyond 60 seconds and "Failed" the spillage test.** Under this Worst Case Scenario the spillage did stop at 1.5 minutes. Improving the design of the exhaust piping should alleviate this condition.

2.18.A Chimney, Flue & Vent Piping (gas water heaters or heat systems)

Unsafe

Increasing the vertical rise of the water heater exhaust line, at least 8", would help foster greater draft pressure. The vertical pipe can be increased in length as long as the horizontal section maintains a 1/4" per foot rise.

2(A). Initial

Also, the water heater should join the furnace exhaust with a 'Y' fitting nearer to the vertical section. The Y fosters better upward flow and decreases the chances of exhaust back drafting - only if the furnace & water heater connect at the branches of the Y and both flow toward the main exhaust riser.

2.20.A Smoke Detector

Unsafe

The average service life of a smoke detector is 10 yrs. Be sure to replace batteries yearly and replace the units entirely after 10 years. Recommend one smoke detector per floor and one within 15 feet of the bed rooms.

2.21.A CO Detector

Unsafe

The average service life of a carbon monoxide detector is 2-3 yrs. Be sure to replace batteries yearly and replace the units entirely after 3 years. Recommend one CO detector near each CO source (water heater/ furnace, kitchen) and one within 15 feet of the bed rooms.

3. Heating / Cooling Performance

3.0 Heating Performance

Repair or Replace

The furnace is 16 years old and is 80% efficient. Considering the relative tightness of the home, upgrading the furnace is the next best opportunity for decreasing the home's gas bill. It is recommended this unit be upgraded to a sealed combustion, 96% efficient or greater unit with an integrated HRV for continuous, balanced fresh air ventilation. A qualified HVAC contractor should perform Manuals J & S calculations to determine the heating & cooling load of the home and proper size of the furnace & AC **after air sealing and insulating have been completed.**

Update: The furnace has been replaced with a new sealed combustion unit. This replacement resolves

3.1 Cooling Performance

Repair or Replace

The air conditioner is at least 15 years old, of an estimated life span of 20 yrs. The unit would benefit from regular cleaning and service. Consider upgrading the air conditioner along with the furnace to see reduced utility bills.

3.2 Water Heater Performance

Repair or Replace

The existing water heater is 15 years old and is beyond the typical life span of 12-15 years. Expect to replace this unit within the next few years. Recommend the unit be upgraded to a power vented or sealed combustion unit. These are more energy efficient and they eliminate combustion safety risks due to exhaust spillage.

4(A). Initial

4.6.A Exhaust Fans (bathroom, dryer, etc.) and venting

Action Recommended

(1) The dryer vent piping is damaged, is kinked, is too long and can trap lint at sags, and also has a long vertical section with 90 degree turns which can trap lint at the elbows. Vent pipes should be cleaned

4(A). Initial

regularly if they are longer than normal (10 feet or more) or vented vertically, and should use the most direct route to the exterior. Replace and re-route the exhaust line with flexible or solid **metal** pipe.

(2) The bath fan flow for the Master bath is 41cfm & the 2nd floor bathroom is 32cfm. Considering these bathrooms are used for showering and generate significant moisture, recommend both units be upgraded to a high-quality, quiet (<1.5 sones), 80+cfm exhaust fan.

Both 2nd floor fans are currently run into the soffit where the in-flowing air currents carry moisture back into the attic. The new fans should be exhausted to the outdoors by way of insulated ducting through roof or wall mounted, dampered vents.

5. Exterior Moisture Management

5.0 Roof Covering and Penetrations

Repair or Replace

The roof ridge vents appear to be in poor condition and should be replaced. The mesh material that is supposed to allow ventilation while protecting the attic space from pests and the elements is missing or damaged in most places. Water damage in the living room is likely the result of accumulated snow blown into the exposed ridge which then melted onto the attic floor (living room ceiling) below. The damaged area was inspected within the attic for moisture, but no moisture was present at the time of inspection.

5.1 Flashings, Gutters and Drainage

Repair or Replace

(1) The gutters are in fair condition and seem to be managing rain water as effectively as can be expected. Additional downspouts are highly recommended to alleviate the load in certain areas. A large amount of the water shed off the second floor runs to the lower front garage roof where it is routed all the way to the east end before being able to drain. Similarly, the water from the second story on the north end is overspilling the gutter when diverted to the first story roof.

Redirecting the downspout on the southeast corner of the second story roof from the garage to the ground would help distribute the amount of water on the east side of the second story or more evenly.

Similarly, on the west side of the second story roof, the existing downspout should be directed to a drain line that runs under the entry sidewalk to a pop-up away from the home.

Lastly, the downspout on north end of the second story should divert water directly to the ground rather than dumping its water onto the living room roof and relying on that gutter to carry the extra load.

5.2 Grading not directing water away from structure

Repair or Replace

There is a negative slope at the front, rear and sides of home and can cause or contribute to water intrusion or deterioration. I recommend correcting landscape to drain water away from home.

Recommend a qualified individual repairs the slope of the grade, so that all water flows away from the homes foundation to prevent any flooding, or damage to the home.

5.3 Foundation/Slab showing evidence of ground water intrusion

Repair or Replace

(1) Visible signs of water intrusion in the basement are present from water stains on the wall at the baseboard. Water intrusion if not corrected can lead to other problems including mold and cause excessive moisture to floor system that can lead to deterioration and increased repair cost. It is recommend to monitor closely and repair as needed. It is not clear whether or not water damage has been addressed or is still occurring in the northwest corner.

6. Air Control Layers

6.0 Recessed lights (regarding safely insulating, air sealing or replacing with IC Rated)

Repair or Replace

An airtight box, made of either drywall, duct board or foam board, seals air leaks around a heat-producing recessed light fixture. The box should be large enough to leave a 4" space on all sides to allow heat from the fixture to dissipate.

6.1 Air seal the attic top plates, electrical and plumbing penetrations

Repair or Replace

As the framing in a home dries over the years, the top plates of both interior and exterior walls allow large amounts of air to leak from the wall cavity and up into the attic. Recommend that these areas be sealed with a 2-part foam spray.

Penetrations in the form of plumbing penetrations, electrical conduit, boxes and fixtures should be exposed and sealed before additional insulating. Attention should also be paid to the duct in the attic - seal all joints and where ducts/registers pass through the 2nd floor ceiling at the attic.

6.2 Seal/Insulate Attic Access

Repair or Replace

The attic hatch should be air sealed and insulated. The casing should be fastened securely to the ceiling and caulked at all corners & seams. Weather strip should be installed where the cover sits on the casing. The cover should have 8" of foam board fastened to the top, resulting in an R-40 assembly.

6.4 Thermal bypasses (between floors)

Repair or Replace

(1) The stud cavity serving as a chase for the bathroom plumbing is a major air by-pass from the attic to the basement allowing cold air to fall and warm air to escape. Recommend the opening around the pipes be sealed with foam board and 1-part foam where the pipes leave the conditioned space. The area where the attic walls meet the attic ceiling should also be sealed to halt air flow between the wall cavities and the attic. This will also keep insulation from falling down into the walls, if/when the attic is insulated.

6.5 Rim Joist insulation and air sealing perimeter of floor system

Repair or Replace

Recommend sealing the exterior rim joists of the home with 1" foam board should be cut to fit between the floor, foundation, and joists and sealed with 1-part foam.

6.6 Frame wall insulation (open to attic)

Repair or Replace

Any vertical walls exposed to attic spaces should be insulated to an R-38, just like the horizontal surfaces. Fiber glass insulation does not perform as rated unless it is enclosed on all six sides. As long as the batt insulation fits properly within a stud space they may be left in place and simply covered over with foam board - taped at the seams and sealed at the perimeter. 2" 'Thermax' foam board would add R-10 to the walls and the foil face would serve to reflect radiant heat from the hot roofs in the summer and keep the heat in during the cold winter months.

6.9 Windows: Air leakage, seals and caulking

Repair or Replace

Minor air leakage was detected around the casing of the window frames. Recommend sealing these gaps with a clear, high quality, paintable caulk.

6.10 Seal and insulate wall switch and outlet boxes

Repair or Replace

Moderate leakage was detected from switches & outlets and may be eliminated by air sealing electrical penetrations in the attics. Should any leaks remain, they may be sealed at the outside fixture or by caulking the electrical box to the drywall and installing foam pads before replacing the wall plates.

7. Thermal Layer

7.0 Recommended additional attic insulation

Repair or Replace

The attics currently have about an R-25-30 and could be increased to at least an R-38, although an R - 50-60 would be best. **This should be done after air sealing and attic ventilation and before resizing and replacing the furnace.**

7.1 Floor Insulation (over crawlspace or cantilever)

Repair or Replace

Cantilevered floor sections are often a significant source of air leakage because they are often insulated without first being air sealed. Air sealing the cantilever floor section will allow the insulation in that area to perform more effectively. During the blower door test, cold air was drawn into the home through the floor, highlighting the effects that air penetration has on reducing the value of the insulation.

The most effective way to air seal & insulate (if needed) this area is to remove the material below the cantilever to expose the floor & adjacent wall framing and seal with foam board and/or 1 or 2-part foam as necessary to create a continuous air barrier between the 1st floor wall, floor and 2nd floor wall.

7.3 Exterior door condition/integrity

Repair or Replace

Exterior doors are in fine working order. Recommend adding weather strip and threshold sweep to the garage door in order to seal the garage space from the living space. Pollutants and contaminants from the garage are considered dangerous and should not be introduced into the home's conditioned air.

Building Analysts are not required to report on the following: Life expectancy of any component or system; The causes of the need for a repair; The costs of corrections; Any component or system that was not observed; The presence or absence of pests such as wood damaging organisms, rodents, or insects; or Cosmetic items, underground items, or items not permanently installed. Building Analysts are not required to: Offer warranties or guarantees of any kind; Calculate the strength, adequacy, or efficiency of any system or component; Enter any area or perform any procedure that may damage the property or its components or be dangerous to the Building Analyst or other persons; Operate any system or component that is shut down or otherwise inoperable; Operate any system or component that does not respond to normal operating controls; Disturb insulation, move personal items, panels, furniture, equipment, plant life, soil, snow, ice, or debris that obstructs access or visibility; Determine the presence or absence of any suspected adverse environmental condition or hazardous substance, including but not limited to mold, toxins, carcinogens, noise, contaminants in the building or in soil, water, and air; Determine the effectiveness of any system installed to control or remove suspected hazardous substances; Predict future condition, including but not limited to failure of components.

Prepared Using HomeGauge <http://www.HomeGauge.com> : Licensed To Insight Property Services, Inc.

2(A) . Initial

Styles & Materials

CAZ Location (s):

Basement

Outside Temperature:

70 degrees F

Minimum Draft Pressure:

-1 pascals

CAZ Depressurization Limit (BPI Table):

-15 pascals

Worst Case CAZ Depressurization:

-7.2 pascals

Water Heater Temperature at Steady State:

\${G10} degrees F

Water Heater CO ppm at Steady State:**Heat System Temperature at Steady State:****Heat System CO ppm at Steady State:**

Items

2.5.A Worst Case Depressurization using the home's mechanical ventilation equipment

Unsafe

Atmospherically vented water heaters, like the one here, are susceptible to exhaust spillage because they do not create a strong draft. A strong negative pressure (ie. air being sucked into the return ducts at the open filter slot) can draw air down the water heater flue causing its exhaust to spill into the home. We created a Worst Case Depressurization of **-5.8 Pa** by using the home's exhaust fans & air handler and closing certain doors. This should be within the limit of **-5 Pa**, but **the Worst Case Depressurization exceeded the allowable limit**. This means that natural draft appliances have a greater probability of spilling exhaust gasses into the home. A follow-up Combustion Safety Test should be completed after any air sealing work or changes to the mechanical or ventilation systems.

2.6.A Water Heater Spillage Test

Unsafe

- (1) **Spillage Test Results:** A spillage test was conducted on the water heater. According to BPI Technical Standards, combustible appliances may spill fumes for up to 60 seconds on start up. **Your water heater vent spilled beyond 60 seconds and "Failed" the spillage test.** Under this Worst Case Scenario the spillage did stop at 1.5 minutes. Improving the design of the exhaust piping should alleviate this condition.
- (2) The water heater started to draft appropriately shortly after the one minute benchmark.

2.18.A Chimney, Flue & Vent Piping (gas water heaters or heat systems)

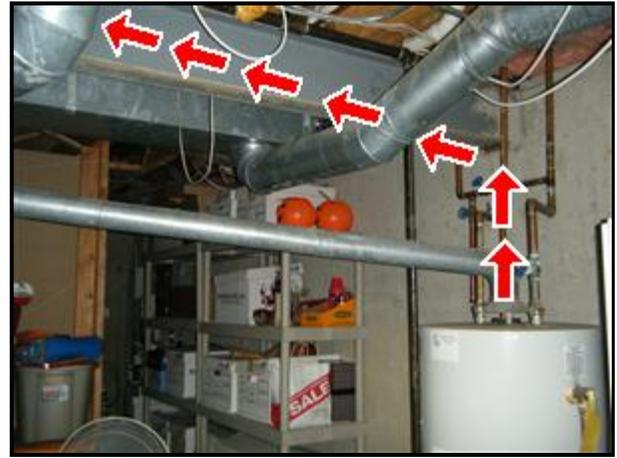
Unsafe

Increasing the vertical rise of the water heater exhaust line, at least 8", would help foster greater draft pressure. The vertical pipe can be increased in length as long as the horizontal section maintains a 1/4" per foot rise.

Also, the water heater should join the furnace exhaust with a 'Y' fitting nearer to the vertical section. The Y fosters better upward flow and decreases the chances of exhaust back drafting - only if the furnace & water heater connect at the branches of the Y and both flow toward the main exhaust riser.



2.18.A Picture 1 Proposed Water Heater Vent



2.18.A Picture 2 Proposed Water Heater Vent

2.20.A Smoke Detector

Unsafe

The average service life of a smoke detector is 10 yrs. Be sure to replace batteries yearly and replace the units entirely after 10 years. Recommend one smoke detector per floor and one within 15 feet of the bed rooms.



2.20.A Picture 1 Install Detectors

2.21.A CO Detector

Unsafe

The average service life of a carbon monoxide detector is 2-3 yrs. Be sure to replace batteries yearly and replace the units entirely after 3 years. Recommend one CO detector near each CO source (water heater/ furnace, kitchen) and one within 15 feet of the bed rooms.

2(B) . Follow Up

Styles & Materials

CAZ Location (s):	Outside Temperature:	Minimum Draft Pressure:
CAZ Depressurization Limit (BPI Table):	Worst Case CAZ Depressurization:	Water Heater Temperature at Steady State:
Water Heater CO ppm at Steady State:	Water Heater Draft Pressure Reading:	Heat System Temperature at Steady State:
Heat System CO ppm at Steady State:	Heat System Draft Pressure Reading:	Gas Oven Maximum CO ppm:
Gas Oven Max CO Time (minutes):	Gas Oven CO ppm at Steady State:	Gas Oven Temperature at Steady State:

Items

2.0.B Baseline CO (outside main entrance of home)

2.1.B Measurement of CO (ppm) upon entering home

2.2.B Combustion appliance minimum required Draft Pressure

This test is conducted indoors but is based on the outside temperature and determines a minimum draft test limit for the venting capability of the combustible appliances inside at the CAZ (Combustion Appliance Zone). The Minimum draft test limit used on this home at time of inspection is **#{B3} (Pa)**.

2.3.B CAZ Depressurization limit

The Depressurization Limit of your Combustion Appliance Zone (CAZ) is **#{B6} Pa**. This number is determined by the type or types of combustion appliances in your home and how they are currently vented. Using BPI Standards (Building Performance Institute), the number given (in units of air pressure called Pascal or Pa) is the maximum depressurization allowed in the combustion appliance zone under a worst case scenario. The Building Analyst, using the home's exhaust fans, air handler and doors, created a scenario that generated the most negative pressure possible near the gas appliances in order to determine if your appliances will continue to remove their toxic exhaust to the outdoor air, or if they will spill exhaust and CO back into your home.

2.4.B CAZ Base Pressure (WRT outside)

2.5.B Worst Case Depressurization using the home's mechanical ventilation equipment

2.6.B Water Heater Spillage Test

2.7.B Water Heater Draft Test

2.8.B Water Heater CO at Steady State

2.9.B Heat System Spillage Test**2.10.B Heat System Draft test****2.11.B Heat System CO at Steady State****2.12.B Combination Spillage Test****2.13.B Summary: Did this home pass the BPI Combustion Appliance Safety Test?****2.14.B Gas Oven Max CO (ppm at time interval)**

Your oven outputs high levels of CO upon startup and reaches a maximum of **#{G2} ppm** about **#{G3} minutes** into its warm up cycle. Recommend having the burners cleaned and adjusted by a qualified appliance repair technician and retested for CO output at startup. In the mean time, do not open the oven while it's warming up as this will prolong the period of high CO production as well as increase CO exposure levels.

2.15.B Gas Oven CO test at Steady State (ppm)**2.16.B Gas Meter/Pipe leaks (outside)****2.17.B Gas Meter/Pipe leaks (inside)****2.18.B Chimney, Flue & Vent Piping (gas water heaters or heat systems)****2.19.B Duct Leakage Effecting CAZ Pressures (Filter Covers, Return/Supply Grills, Leaks, etc)****2.20.B Identify any fire hazards and/or VOC pollutants in the CAZ****2.21.B Change gas dryer vent pipe to metal (solid, flexible)****2.22.B Smoke Detector**

The average service life of a smoke detector is 10 yrs. Be sure to replace batteries yearly and replace the units entirely after 10 years. Recommend one smoke detector per floor and one within 15 feet of the bed rooms.

2.23.B CO Detector

The average service life of a carbon monoxide detector is 2-3 yrs. Be sure to replace batteries yearly and replace the units entirely after 3 years. Recommend one CO detector near each CO source (water heater/furnace, kitchen) and one within 15 feet of the bed rooms.

3. Heating / Cooling Performance

Styles & Materials

Number of Heat Systems (excluding wood):

One

Heating System Brand (Model & Age):

AMERICAN STANDARD

Model #; Age(MFR Date) : AUH2B08DA9V3VAC ; mfr. 11/2010

Heating System AGA Venting category:

Sealed Combustion (gets air from outside)

Ductwork:

Non-insulated

Water Heater Manufacturer (Model # & Age):

BRADFORD WHITE

Model #; Age(MFR Date) : M1TW50S6FBN; mfr.

Cooling Equipment Type:

Split system - forced air

Number of Operable Fireplaces:

One

Heating System Type(s):

Forced Air

Heating System Efficiency (AFUE):

90%-100%

Filter Type:

Disposable

Water Heater Location:

Basement

Water Heater Capacity:

50 Gallon (2-3 people)

BTU : 40,000

Cooling Equipment Energy Source:

Electricity

Types of Fireplaces:

Vented gas logs

Insert

Heating System Energy Source(s):

Natural gas

Heating System Capacity (Btu):

BTUs : Input 80,000 Btu; Output: 72,000 Btu

Filter Size:

16x25

Water Heater Power Source:

Gas (quick recovery)

Water Heater AGA Venting category:

Open Combustion (gets air from the CAZ)

Central Air Manufacturer:

CARRIER

Model # : 38CKB042300; mfr. 1996

Items

3.0 Heating Performance

Repair or Replace

The furnace is 16 years old and is 80% efficient. Considering the relative tightness of the home, upgrading the furnace is the next best opportunity for decreasing the home's gas bill. It is recommended this unit be upgraded to a sealed combustion, 96% efficient or greater unit with an integrated HRV for continuous, balanced fresh air ventilation. A qualified HVAC contractor should perform Manuals J & S calculations to determine the heating & cooling load of the home and proper size of the furnace & AC **after air sealing and insulating have been completed.**

Update: The furnace has been replaced with a new sealed combustion unit. This replacement resolves



3.0 Picture 1 Furnace

3.1 Cooling Performance

Repair or Replace

The air conditioner is at least 15 years old, of an estimated life span of 20 yrs. The unit would benefit from regular cleaning and service. Consider upgrading the air conditioner along with the furnace to see reduced utility bills.



3.1 Picture 1 Air Conditioner

3.2 Water Heater Performance

Repair or Replace

The existing water heater is 15 years old and is beyond the typical life span of 12-15 years. Expect to replace this unit within the next few years. Recommend the unit be upgraded to a power vented or sealed combustion unit. These are more energy efficient and they eliminate combustion safety risks due to exhaust spillage.



3.2 Picture 1 Water Heater



3.2 Picture 2 Exhaust Spillage

4(A) . Initial

Styles & Materials

Conditioned Space Volume (ft3):
27,121 Cubic Feet

Conditioned Space Floor Area (ft2):
2,740 Square Feet

Blower Door Diagnostics:
Measurement at CFM50=
1,535
Air Changes per hour
ACH50= 3.4
LBL "N"-Factor= 15
Natural Air Changes per
hour= 0.23 CFMn
Hours per Air Change =
4.41 hours

MVR Minimum Ventilation Requirement ASHRAE 62- 1989:

MVR Minimum Ventilation Requirement ASHRAE 62.2- 2007:
Option 1: CFM Fan Flow using MVG 27 CFM

Attic Ventilation:
Gable vents
Soffit Vents
Ridge vents

Range Hood Exhaust:
Exhausts To Outside

Total Mechanical Exhaust Capacity CFM:
Mechanical Exhaust Capacity = 103 cfm
Extra Info : 3 bath fans, 1 hood vent

Items

4.6.A Exhaust Fans (bathroom, dryer, etc.) and venting

Action Recommended

(1) The dryer vent piping is damaged, is kinked, is too long and can trap lint at sags, and also has a long vertical section with 90 degree turns which can trap lint at the elbows. Vent pipes should be cleaned regularly if they are longer than normal (10 feet or more) or vented vertically, and should use the most direct route to the exterior. Replace and re-route the exhaust line with flexible or solid metal pipe.



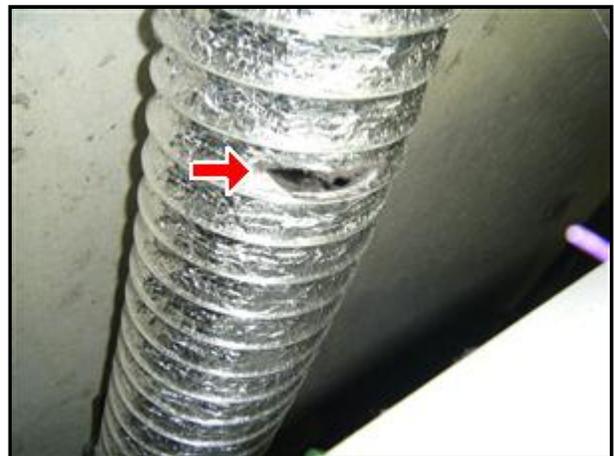
4.6.A Picture 1 Dryer Vent (Part 1)



4.6.A Picture 2 Dryer Vent (Part 2)



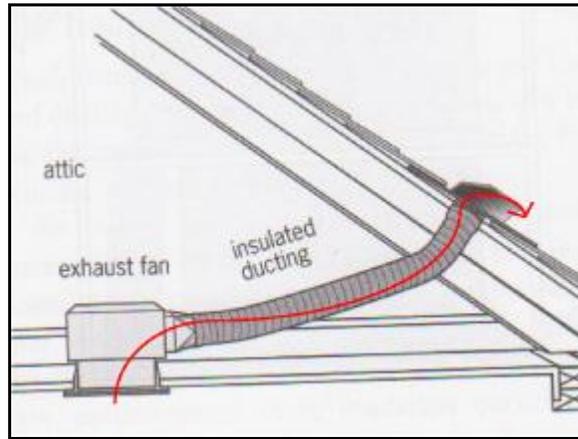
4.6.A Picture 3 Dryer Vent (Part 3)



4.6.A Picture 4 Dryer Vent Damaged

(2) The bath fan flow for the Master bath is 41cfm & the 2nd floor bathroom is 32cfm. Considering these bathrooms are used for showering and generate significant moisture, recommend both units be upgraded to a high-quality, quiet (<1.5 sones), 80+cfm exhaust fan.

Both 2nd floor fans are currently run into the soffit where the in-flowing air currents carry moisture back into the attic. The new fans should be exhausted to the outdoors by way of insulated ducting through roof or wall mounted, dampered vents.



4.6.A Picture 5

4(B) . Follow UP 110909

Styles & Materials

Conditioned Space Volume (ft3):

Conditioned Space Floor Area (ft2):

Blower Door
Diagnostics:

MVR Minimum Ventilation
Requirement ASHRAE 62- 1989:

MVR Minimum Ventilation
Requirement ASHRAE 62.2- 2007:

Attic
Ventilation:

Range Hood Exhaust:

Total Mechanical Exhaust Capacity
CFM:

Items

4.0.B Rough outline of Air/Thermal boundary

The "Thermal Boundary" of your home is what separates the conditioned air inside from the outside air, attic or crawlspace. Typically the thermal boundary is made up of an air control layer (like gypsum board) and a thermal control layer (insulation). A thermal boundary has 6 sides (top, bottom, front, back and two sides). Anywhere along the thermal boundary that is not aligned properly (meaning air control layer or thermal control layer, missing or not in tact) energy loss can occur. Energy loss (money) can be heating or cooling and can be significant as breaks in the thermal boundary can allow air leaks through house pressures and heat flow through conduction. It is important to preserve the thermal boundary and air seal and insulate when remodeling.

4.1.B Home Air Leakage measurement (CFM@50)

The blower door measured **99 CFM50** of air being pulled in through air leaks in your home's Building Envelope. This air is coming in through gaps, cracks, cavities in and around the components that make up the home's Building Envelope (which is typical of all homes that have not been air sealed). A conversion calculation was done to estimate your home's "Natural" Air Changes per Hour of **11 ACHn**. The entire

volume of air in you home is exchanged approximately once every $\{G12\}$ hour(s). The goal is 1 air change every 3 hours or .35 ACHn.

4.2.B Minimum Ventilation Requirement (MVR) - Safety Concerns

MVR for this building = $\{C22\}$ cfm of continuous air flow

The Minimum Ventilation Requirement (MVR) is a number of cubic feet per minute (cfm) of air the building needs to be safe and habitable for the occupants. It is derived from a formula based on several factors such as the volume of the home; number of occupants, geographic area, exposure to wind etc. and the larger cfm number is used as the MVR. A home can be sealed as tight as possible as long as you have continuous mechanical ventilation of at least the minimum CFM as described above.

The home has $\{C13\}$ cfm of exhaust capacity among all the bath fans. However, running these fans for ventilation will contribute to exhaust spillage at the water heater.

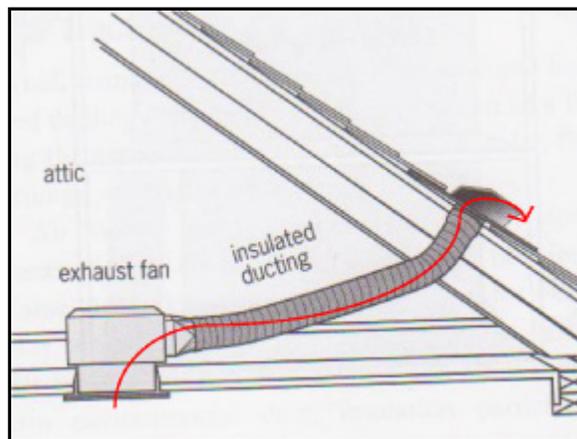
4.3.B Air Sealing and Mechanical Ventilation

4.4.B Room Pressure Test (leaks to outside) during Blower Door test

4.5.B Room Pressure test with Air handler

4.6.B Exhaust Fans (bathroom, dryer, etc.) and venting

There is no exhaust fan in the bathroom. It is recommended that every bathroom have a high-quality, quiet (<1.5 sones), 80+cfm exhaust fan installed. These fans should be exhausted to the outdoors by way of insulated ducting through a roof mounted, dampered vent.



4.6.B Picture 1

4.7.B Exhaust hood for gas cooktops/stove and vented to the outside

4.8.B Vermiculite Found in Attic

4.9.B Modify Attic Ventilation

4.10.B Pests In Attic

4.11.B Other Safety Items

5. Exterior Moisture Management

Styles & Materials

Viewed roof covering from:
Ground

Roof Covering:
Architectural

Roof Covering Color:
Dark

Chimney (exterior):
Vinyl siding

Siding Style:
Lap

Siding Material:
Vinyl

Foundation:
Poured concrete

Items

5.0 Roof Covering and Penetrations

Repair or Replace

The roof ridge vents appear to be in poor condition and should be replaced. The mesh material that is supposed to allow ventilation while protecting the attic space from pests and the elements is missing or damaged in most places. Water damage in the living room is likely the result of accumulated snow blown into the exposed ridge which then melted onto the attic floor (living room ceiling) below. The damaged area was inspected within the attic for moisture, but no moisture was present at the time of inspection.



5.0 Picture 1



5.0 Picture 2

5.1 Flashings, Gutters and Drainage

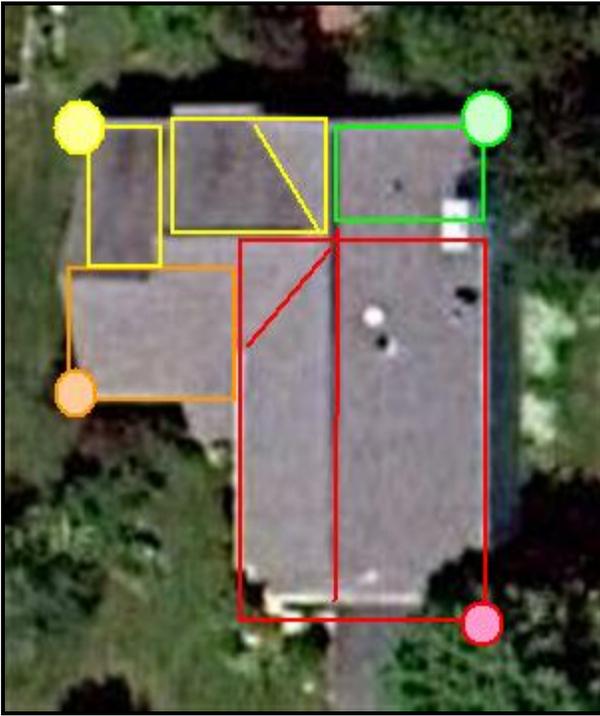
Repair or Replace

(1) The gutters are in fair condition and seem to be managing rain water as effectively as can be expected. Additional downspouts are highly recommended to alleviate the load in certain areas. A large amount of the water shed off the second floor runs to the lower front garage roof where it is routed all the way to the east end before being able to drain. Similarly, the water from the second story on the north end is overspilling the gutter when diverted to the first story roof.

Redirecting the downspout on the southeast corner of the second story roof from the garage to the ground would help distribute the amount of water on the east side of the second story or more evenly.

Similarly, on the west side of the second story roof, the existing downspout should be directed to a drain line that runs under the entry sidewalk to a pop-up away from the home.

Lastly, the downspout on north end of the second story should divert water directly to the ground rather than dumping its water onto the living room roof and relying on that gutter to carry the extra load.



5.1 Picture 1 Current Downspout Drainage



5.1 Picture 2 Proposed changes



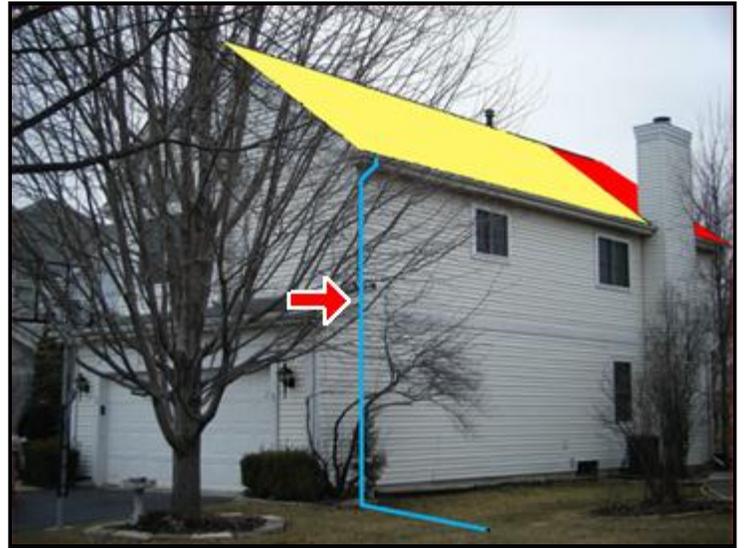
5.1 Picture 3 Water Stain from Gutter Spillage



5.1 Picture 4

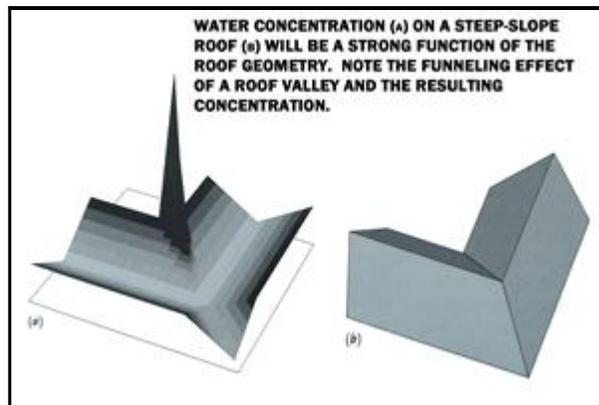


5.1 Picture 5



5.1 Picture 6

(2) Valley roof sections not only carry a large amount of water, but that water is funneled down to a point. As shown in the diagram, the eave of the valley concentrates all the water from an entire corner of roof section to a single point. That point where roof sections are joined becomes a critically important area of water management.



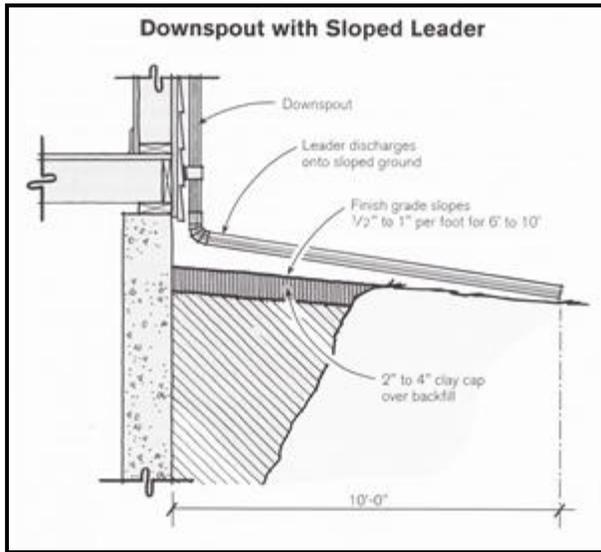
5.1 Picture 7 Valley Water Concentration

5.2 Grading not directing water away from structure

Repair or Replace

There is a negative slope at the front, rear and sides of home and can cause or contribute to water intrusion or deterioration. I recommend correcting landscape to drain water away from home.

Recommend a qualified individual repairs the slope of the grade, so that all water flows away from the homes foundation to prevent any flooding, or damage to the home.



5.2 Picture 1 Recommended Grading



5.2 Picture 2 NW Corner Not Directing Water Away

5.3 Foundation/Slab showing evidence of ground water intrusion

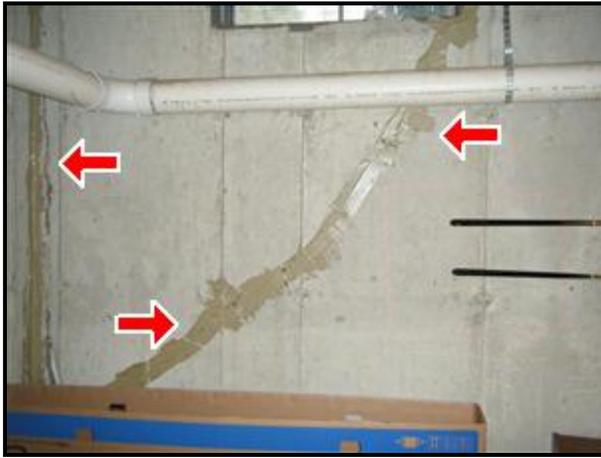
Repair or Replace

(1) Visible signs of water intrusion in the basement are present from water stains on the wall at the baseboard. Water intrusion if not corrected can lead to other problems including mold and cause excessive moisture to floor system that can lead to deterioration and increased repair cost. It is recommend to monitor closely and repair as needed. It is not clear whether or not water damage has been addressed or is still occurring in the northwest corner.



5.3 Picture 1 Water Damage (NW Corner)

(2) The structural cracks in the foundation wall at the front of both sides of the home have been previously addressed. The previous repair made to the wall appears adequate. No repairs to the foundation walls are needed or foreseen at this time. The main concern, however, is to prevent further damage by eliminating the source of the water intrusion. It is recommend that you monitor periodically for further damage. Typical cracks may need periodical sealing.



5.3 Picture 2 Sealed Cracks



5.3 Picture 3 Water Intrusion

6. Air Control Layers

Styles & Materials

Ceiling Materials:
Drywall

Wall Material:
Drywall

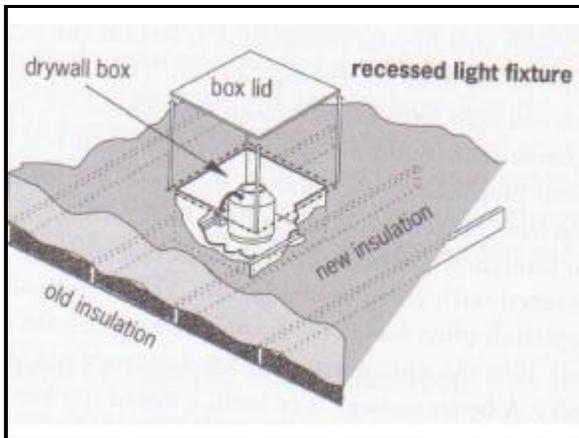
Floor Material:
Concrete Slab (Lower Level)

Items

6.0 Recessed lights (regarding safely insulating, air sealing or replacing with IC Rated)

Repair or Replace

An airtight box, made of either drywall, duct board or foam board, seals air leaks around a heat-producing recessed light fixture. The box should be large enough to leave a 4" space on all sides to allow heat from the fixture to dissipate.



6.0 Picture 1 Air Sealed Can Light



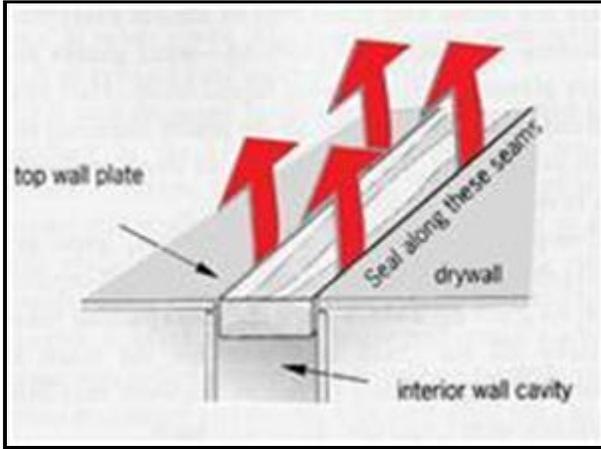
6.0 Picture 2 Dirty Insulation around Can Light

6.1 Air seal the attic top plates, electrical and plumbing penetrations

Repair or Replace

As the framing in a home dries over the years, the top plates of both interior and exterior walls allow large amounts of air to leak from the wall cavity and up into the attic. Recommend that these areas be sealed with a 2-part foam spray.

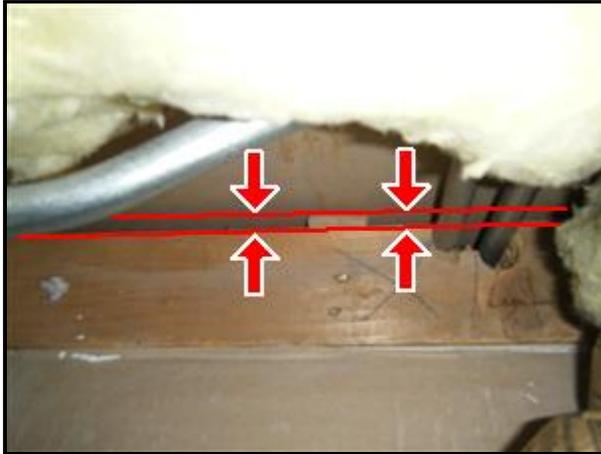
Penetrations in the form of plumbing penetrations, electrical conduit, boxes and fixtures should be exposed and sealed before additional insulating. Attention should also be paid to the duct in the attic - seal all joints and where ducts/registers pass through the 2nd floor ceiling at the attic.



6.1 Picture 1 Top Plate Leakage



6.1 Picture 2 Dirty Insulation at Top Plate



6.1 Picture 3 1/2" Top Plate Gap

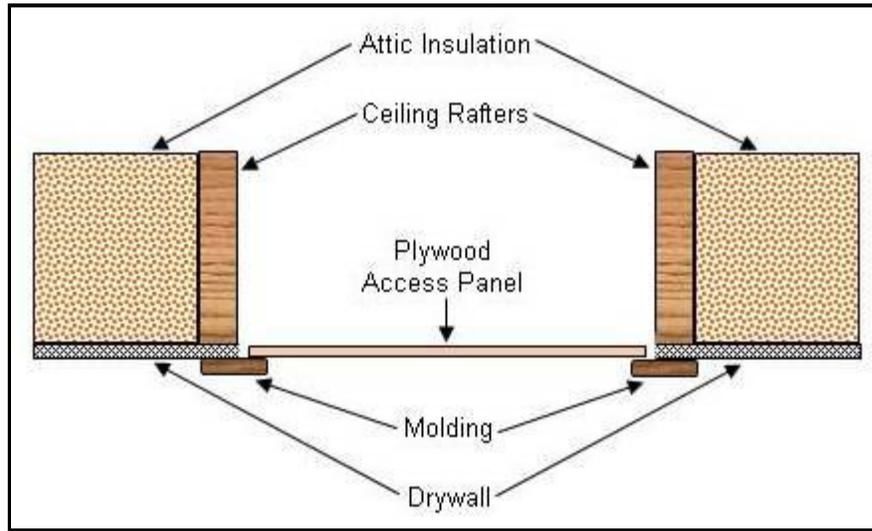


6.1 Picture 4 Air Seal Here

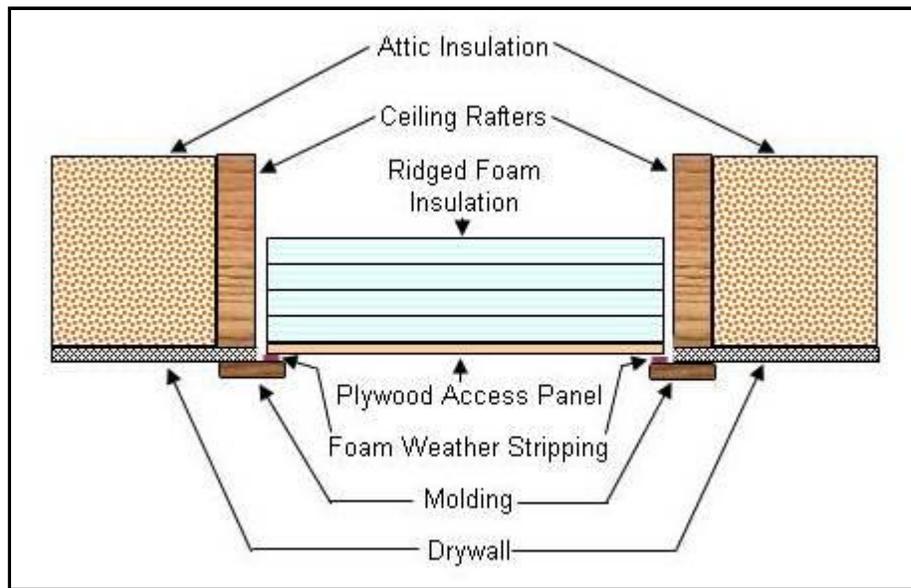
6.2 Seal/Insulate Attic Access

Repair or Replace

The attic hatch should be air sealed and insulated. The casing should be fastened securely to the ceiling and caulked at all corners & seams. Weather strip should be installed where the cover sits on the casing. The cover should have 8" of foam board fastened to the top, resulting in an R-40 assembly.



6.2 Picture 1 Uninsulated Before



6.2 Picture 2 Insulated After



6.2 Picture 3 Dust Along Access Edge

6.4 Thermal bypasses (between floors)

Repair or Replace

(1) The stud cavity serving as a chase for the bathroom plumbing is a major air by-pass from the attic to the basement allowing cold air to fall and warm air to escape. Recommend the opening around the pipes be sealed with foam board and 1-part foam where the pipes leave the conditioned space. The area where the attic walls meet the attic ceiling should also be sealed to halt air flow between the wall cavities and the attic. This will also keep insulation from falling down into the walls, if/when the attic is insulated.

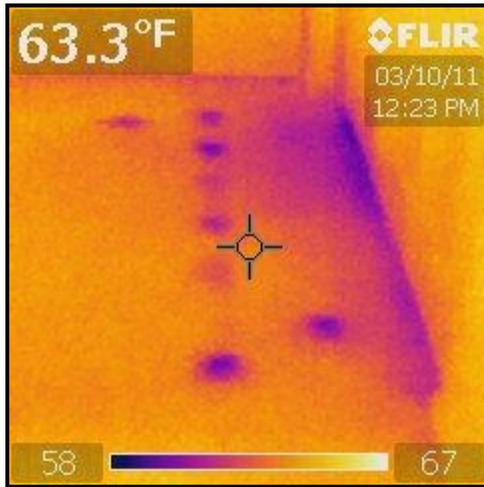


6.4 Picture 1

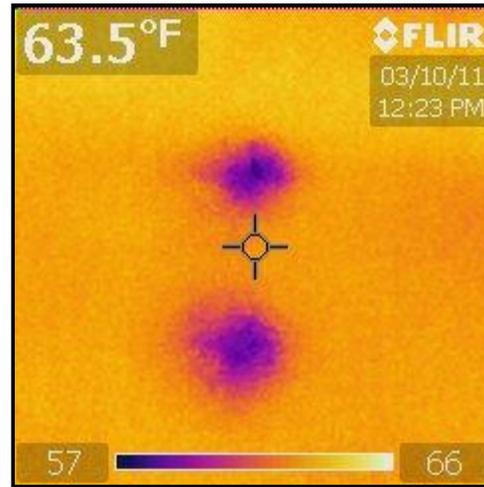
(2) There is a thermal connection between the garage and the master bedroom. This is occurring because of the metal framing hardware (joist hangers ?) that are connected to the cold unconditioned garage space. This hardware is acting as a heat "drain", transmitting the warmth of the floor to the colder garage. There is also air leakage through the floor framing from the small attic area below the garage roof, toward the center of the master bedroom.

The air leakage may be stopped by removing the drywall from below the small garage roof attic and air sealing the wall/floor connection.

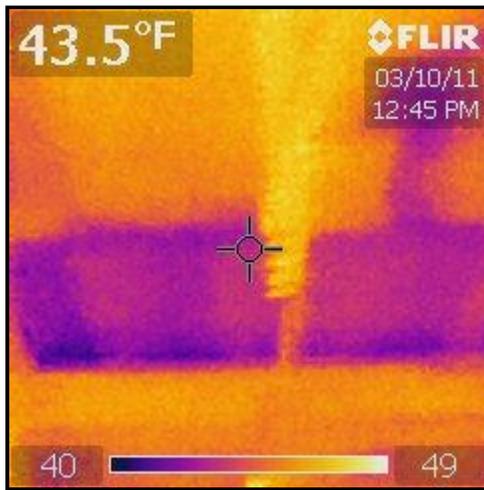
The heat 'drains' from the framing hardware are creating cold spots about 4-6 degrees cooler than the rest of the floor. It may not be cost effective to address this issue. It would require installing foam board below the floor framing (a thermal break to the hardware) and then drywall to create the required flame resistant surface required in a garage. However, should the garage ceiling/floor framing need to be exposed in the future, installing foam board before replacing the drywall, would then be cost effective.



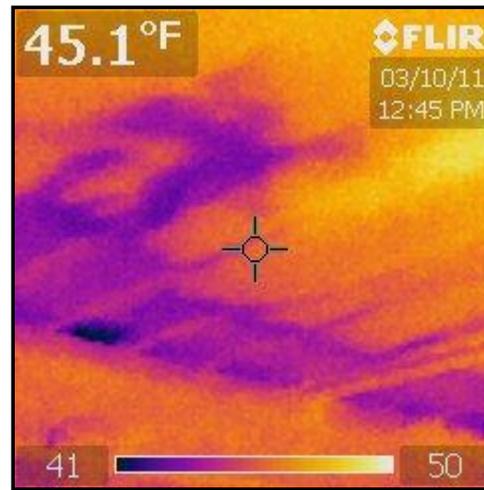
6.4 Picture 2 Master Bedroom Cold Spots



6.4 Picture 3 Cold Spot Close-Up

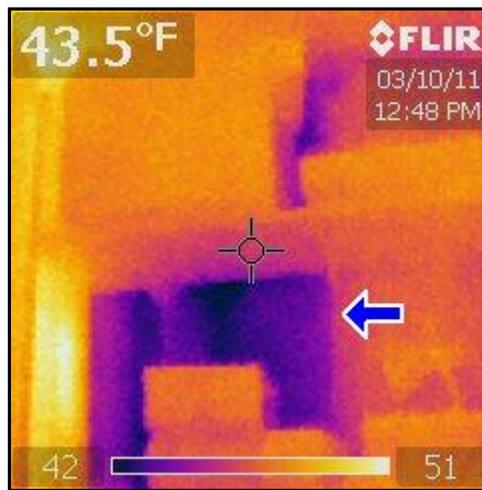


6.4 Picture 4 Garage ceiling



6.4 Picture 5 Garage ceiling

(3) There seems to be an air bypass following a heat duct that travels to the 2nd floor through the wall cavity in the garage at the NE corner. This area should be sealed where it passes through to the attic.



6.4 Picture 6 NE corner of garage

6.5 Rim Joist insulation and air sealing perimeter of floor system

Repair or Replace

Recommend sealing the exterior rim joists of the home with 1" foam board should be cut to fit between the floor, foundation, and joists and sealed with 1-part foam.



6.5 Picture 1 Air Sealed Rim Joist

6.6 Frame wall insulation (open to attic)

Repair or Replace

Any vertical walls exposed to attic spaces should be insulated to an R-38, just like the horizontal surfaces. Fiber glass insulation does not perform as rated unless it is enclosed on all six sides. As long as the batt insulation fits properly within a stud space they may be left in place and simply covered over with foam board - taped at the seams and sealed at the perimeter. 2" 'Thermax' foam board would add R-10 to the walls and the foil face would serve to reflect radiant heat from the hot roofs in the summer and keep the heat in during the cold winter months.



6.6 Picture 1 Master Bedroom Ceiling



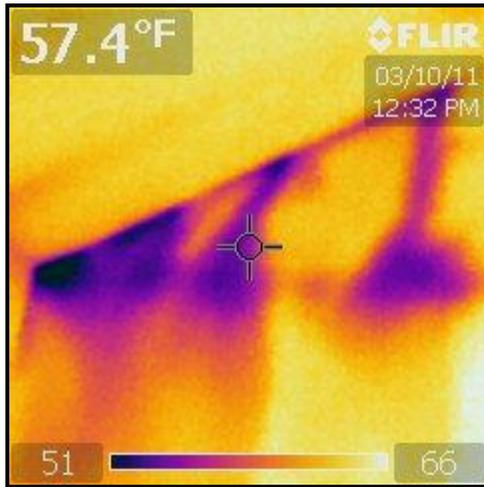
6.6 Picture 2 Falling Insulation on Master Bedroom Vault



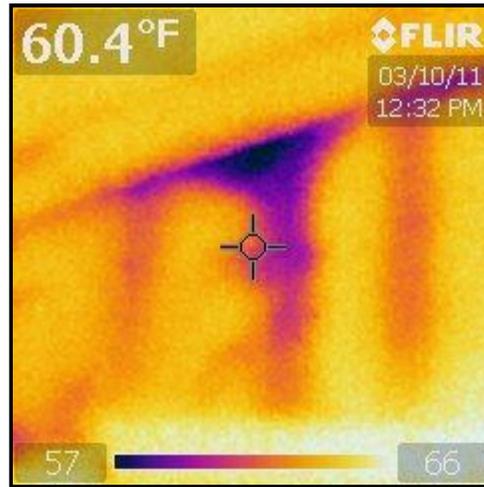
6.6 Picture 3 Non-secure Insulation



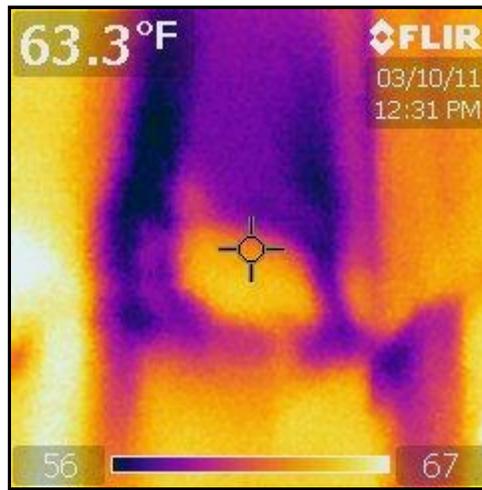
6.6 Picture 4 Better, Still Incomplete at Framing



6.6 Picture 5 Master Bathroom SE Vault Wall



6.6 Picture 6 Master Bathroom SE Vault Wall middle



6.6 Picture 7 Master Bathroom SE Vault Wall high side corner

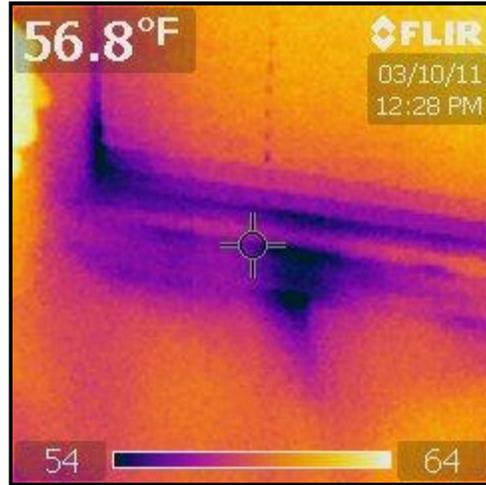
6.9 Windows: Air leakage, seals and caulking

Repair or Replace

Minor air leakage was detected around the casing of the window frames. Recommend sealing these gaps with a clear, high quality, paintable caulk.



6.9 Picture 1 Seal Designed Gaps



6.9 Picture 2 Window Casing Leakage

6.10 Seal and insulate wall switch and outlet boxes

Repair or Replace

Moderate leakage was detected from switches & outlets and may be eliminated by air sealing electrical penetrations in the attics. Should any leaks remain, they may be sealed at the outside fixture or by caulking the electrical box to the drywall and installing foam pads before replacing the wall plates.

7. Thermal Layer

Styles & Materials

Attic Insulation/Effective R-Value:

- Blown Batt
- Fiberglass
- R10-15
- R 20-25

Floor System Insulation R-Value:

NONE

Window Types:

- Double pane
- Double-hung
- Sliders
- Fixed Frame
- Vinyl

Exterior Entry Doors (non-glass portion):

- Wood solid core 1 3/4" R- Value 3.03
- Metal insulated (Average) R-value 7

Glass Doors (part of windows):

- Sliding Glass Doors

Items

7.0 Recommended additional attic insulation

Repair or Replace

The attics currently have about an R-25-30 and could be increased to at least an R-38, although an R - 50-60 would be best. **This should be done after air sealing and attic ventilation and before resizing and replacing the furnace.**



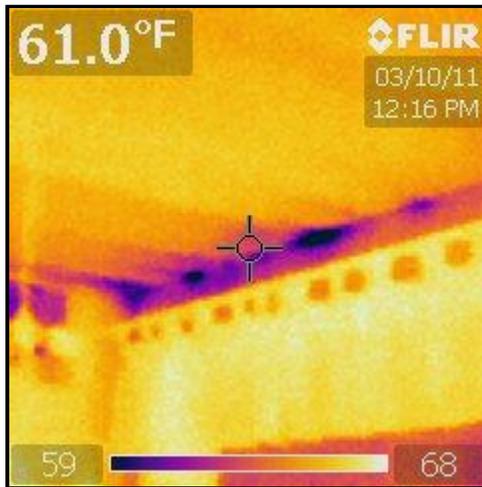
7.0 Picture 1

7.1 Floor Insulation (over crawlspace or cantilever)

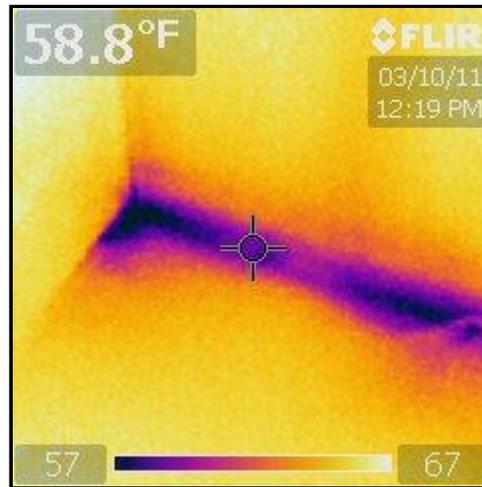
Repair or Replace

Cantilevered floor sections are often a significant source of air leakage because they are often insulated without first being air sealed. Air sealing the cantilever floor section will allow the insulation in that area to perform more effectively. During the blower door test, cold air was drawn into the home through the floor, highlighting the effects that air penetration has on reducing the value of the insulation.

The most effective way to air seal & insulate (if needed) this area is to remove the material below the cantilever to expose the floor & adjacent wall framing and seal with foam board and/or 1 or 2-part foam as necessary to create a continuous air barrier between the 1st floor wall, floor and 2nd floor wall.



7.1 Picture 1 Under Cantilever



7.1 Picture 2 Above cantilever floor/walls leakage

7.3 Exterior door condition/integrity

Repair or Replace

Exterior doors are in fine working order. Recommend adding weather strip and threshold sweep to the garage door in order to seal the garage space from the living space. Pollutants and contaminants from the garage are considered dangerous and should not be introduced into the home's conditioned air.



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