Energy Evaluation & Diagnostic Audit

100 South Maple Somewhere Indiana

Inspection Date:
8 October 2013

Prepared For:
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Report Number:
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Table of Contents

YOUR ENERGY EVALUATION

You should feel comfortable in your own home. However, your home may have construction or design defects that cause you to use extra energy in an attempt to maintain that comfort. You can improve the comfort of your home and lower your energy consumption at the same time. Our goal is to help you understand and prioritize the energy and comfort improvements possible in your home.

Energy Efficiency
It is our goal to identify specific areas where we can reduce your energy consumption. We tend to focus on the fundamentals first. By fully understanding how the building works as a system, we can identify areas of improvement that can have the biggest impact.

Indoor Air Quality
Many of the same factors that impact energy efficiency also impact air quality. By making your house operate properly as a system, we can reduce dust, mold, allergens, VOCs and other indoor air pollutants. In this report, we will identify humidity issues, pressure imbalances and other drivers that can lead to poor air quality.

Comfort
There is no reason to be uncomfortable in the building. Those cold and hot rooms are the result of design and/or construction flaws. Comfort issues are integrally tied to air quality as well as efficiency. A properly functioning building will consistently be at a comfortable temperature, which will also reduce humidity, and improve the efficiency of your heating systems.

Follow this link for some common energy tips: http://www.energystar.gov/index.cfm?fuseaction=popuptool.atHome

The ***Energy Evaluation*** is a visual inspection of the property to help identify potential energy improvements. Those improvements will be listed throughout this section of the report for your consideration. As with all building systems, and particularly with energy-saving systems, materials tend to degrade and become less effective over time. Insulation settles, caulking cracks, and air infiltration and thermal loss become problematic and thus more difficult to prevent. You should consider all appropriate energy improvements to your home as direct and efficient methods to reduce energy costs.
Typically the most cost effective improvements are related to reducing the air changes in the building and improving the air duct delivery system related to the Heating and Cooling equipment. Air infiltration and duct leakage diagnosis is not possible without a Diagnostic Audit. It is possible for any building, no matter what age, to be in need of air sealing measures. Without this diagnostic testing, no assumptions can be made or recommendations given in regards to air leakage or building tightness for this dwelling.

If you have elected to have a ***Diagnostic Audit*** performed air sealing and duct sealing opportunities will be identified. During a diagnostic audit we employ sophisticated diagnostic equipment to detect the causes of the building's performance related problems. This systematic approach removes all the usual guesswork involved with contracting and allows us to quickly and accurately address the building performance issues. The Report summarizes test results and explains technical terms and concepts. Additionally a cost effective work scope is developed with estimates that could be implemented by an approved ***Weatherization Pro*** ***Contractor***. Rebate information may also be included from utilities that service your home.

The ***Weatherization Pro*** ***Contractor*** network has worked with Sherlock Homes and Utility companies providing weatherization services in Indiana, Illinois and Kentucky. These Building Performance Institute trained contractors have completed over 4,000 projects over the past 5 years.

Regardless of which type of Energy Evaluation you choose a representative from Sherlock Homes will be in contact with you to discuss the report and its results.

For an additional fee Sherlock Homes can ***manage the weatherization process*** for you. Fees for this process vary but generally are less than $300.00. When this service is selected a 20% reduction in Seasonal Loads is guaranteed provided certain criteria are met. Details are available at http://sherlockhomes.cc/

Energy Evaluation & Diagnostic Audit Overview

THE CONDITIONS AT THE TIME OF INSPECTION

Home Type:	☑Site Built	☐Modular	☐Mobile	
Weather Conditions:	☑Clear	☐Snow	☐Rain	☐Overcast
Outside Temperature:	65 to 70 Degrees			
Building Is:	☑Occupied	☐Vacant		
Soil Conditions:	☐Wet	☑Damp	☐Snow Covered	☐Dry
Present at Inspection:	☐Owner	☐Tenant	☐Landlord	☑Other
Building Faces:	☐North	☐South	☐East	☑West

Type of Energy Evaluation Performed: ☐Visual Energy Evaluation Only

☑Visual Energy Evaluation & Diagnostic Audit

CONVENTIONS USED IN THIS REPORT

For your convenience, the following conventions have been used in this report.

Major Concern: a system or component which is considered significantly deficient. Significant deficiencies are likely a source for high energy consumption and should be corrected as soon as possible.

Safety Issue: denotes a condition that is unsafe and in need of prompt attention.

Repair: denotes a system or component which is considered deficient by today's standards and maybe a source for higher than expected energy use.

Improve: denotes a system or component that is performing its intended function, but its operation, and/or installation is less than ideal. Further evaluation and/or repairs maybe needed.

Monitor: denotes conditions present that are defective and/or have limited life expectancies, but have not and may not contribute to a significant defect energy loss at this time.

Environmental Concern: denotes a condition that may affect the health or well-being of the occupants.

SUMMARY OF POTENTIAL IMPROVMENTS

This Report recommends the following improvements for this dwelling:

- ☑**Air sealing.** **(Can only be accurately identified with Diagnostic Audit)**
- ☑**Air Duct sealing.** **(Can only be accurately identified with Diagnostic Audit)**
- ☑**Air seal rim joists** **(Can only be accurately identified with Diagnostic Audit)**
- ☑**Install Fresh Air Ventilation** **(Can only be accurately identified with Diagnostic Audit)**
- ☑**Water heater pipe insulation.**
- ☑**Insulate attic**
- ☐**Insulate floor cavities.**
- ☑**Insulate foundation wall**
- ☑**Insulate rim joists**
- ☐**Insulate ducts outside the thermal boundary**
- ☐**Replace water heater with Energy efficient water heater**
- ☐**Replace Furnace with Energy efficient furnace**
- ☐**Replace Cooling system with Energy efficient cooling system**
- ☑**Other**

PERFORMANCE GUARNTEE ELIGIBILITY

The building meets at least 4 of the 6 criteria below and is eligible for Sherlock Homes/Weatherization Pro Performance Guarantee. ☑**Yes** ☐**No**

Prior to Weatherization:

☑**Whole house leakage is 25% or more above the minimum ventilation rate.**

☑**4 or more air ducts with duct leakage above 2.0 Pascal's.**

☐**Attic insulation at or below R19.**

☑**Air barrier defined as the foundation wall and Rim Joist with foundation wall insulation at R0.**

☐**Air barrier defined as the sub floor with the floor cavity insulation and duct insulation at R0.**

☑**45% of the total load is seasonal**

Note: The Performance Guarantee guarantees a 20% improvement in seasonal loads provided:

1. An Energy Evaluation and Diagnostic Audit have been performed by Sherlock Homes.
2. Sherlock Homes Performs Weatherization Management Services. (Coordinates recommended weatherization services with an approved Weatherization Pro Contractor).
3. Sherlock Homes Performs a final audit to confirm installation of the recommended final work scope.

CONCERNS THAT SHOULD BE ADDRESSED PRIOR TO IMPLEMENTING ENERGY IMPROVMENTS

The list of items below in the inspector's opinion, constitute concerns that may prevent implementing energy improvements at this time. If items are listed you should seek further information and/or testing from a qualified professional. Implementing energy improvements related to any of the these conditions may be hazardous to the building and/or occupants.

- ☑**No Concerns observed**
- ☐**Excessive humidity levels within the home**
- ☐**Wet or Damp Crawl space or basement**
- ☐**Mold**
- ☐**Conditions present that could or are leading to moisture intrusion into the building**
- ☐**Mechanical equipment that fails worst case draft testing.** **(Can only be accurately identified with Diagnostic Audit)**
- ☐**Other**

ELEVATIONS OF HOME

FRONT

REAR

LEFT

RIGHT

Roof & Attic

DESCRIPTION OF ROOF & ATTIC

Sheathing Type:	☐Composite Board ☑Plywood ☐One-by ☐Spaced One By ☐Shake Shingles ☐Not Accessible
Roof Ventilation:	☐Ridge Vent ☑Soffit Vents ☑Gable End Vents ☑Power Attic Fan ☑Roof Bonnets ☐Other ☐Not Observed
Framing Type:	☑Rafters ☐Trusses ☐Not Accessible
Attic Viewed From:	☐Within Attic ☑Within Attic, Limited Access ☐Attic Access Only ☐Not Viewed
Attic View Limited By:	☑Cathedral Ceiling ☐No Attic Access ☐Low Attic ☑Insulation ☐Access Hole Too Small ☑Storage ☐Other

ROOF & ATTIC OBSERVATIONS

1. **The attic insulation appeared to be adequate and properly installed.** ☐Yes ☑No ☐Not Accessible

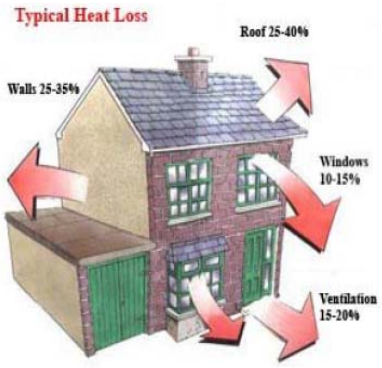
2. **Attic bypasses appeared to be adequately air sealed.** ☑Yes ☐No ☐Not Accessible

3. **The attic knee walls and joist cavities appeared to be adequately insulated and air sealed.** ☐Yes ☑No ☐N/A

Attic Insulating and Air Sealing

Proper amounts of insulation, installation quality, and adequate air-sealing generally represent the largest components of your heating load. To accurately analyze your building we utilize a combination of visual assessment and manual investigation, to track the movement of heat into, out of, and within your building. Proper air sealing throughout all accessible areas is the best place to start. Some insulation is always better than none; however insulation is inadequate if not accompanied by proper air sealing. The first order of business is to thoroughly air seal your building, after which increases the quantity and quality of insulation wherever possible will be cost-effective.

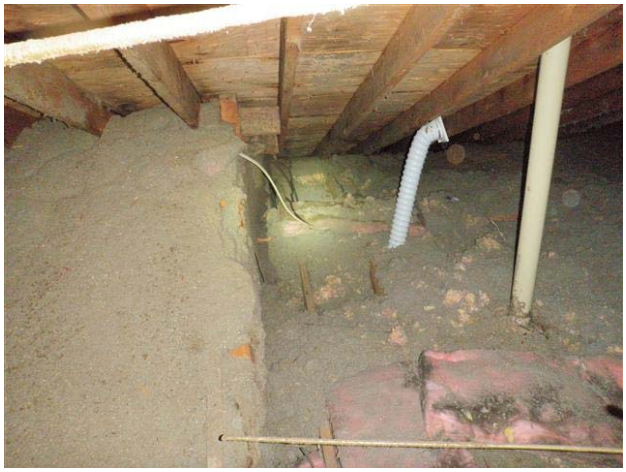
The pressure differentials in the table below tell you how connected the space identified is to the living space. Pressures closer to 0 are more connected to the inside, while pressures closer to 50 are more connected to the outside.



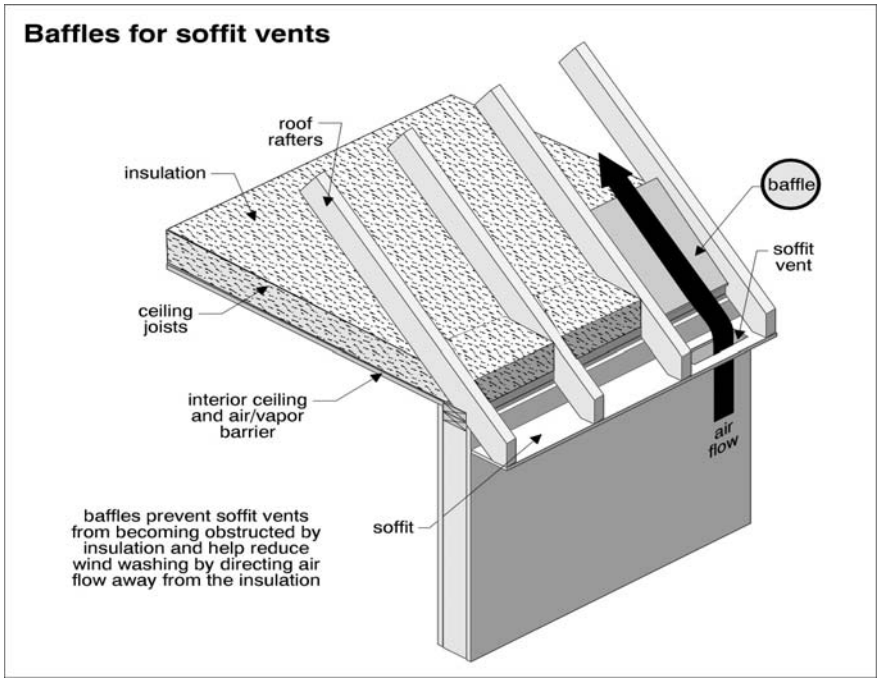
Attic/Ceiling Insulation	
Recommended R-Value	R-38 or Greater
Existing Insulation Type	☑**Fiberglass** ☐**Spray Foam** ☐**Vermiculite** ☑**Cellulose** ☐**Not Accessible** ☐**Other**
Existing Installation Quality	☐**Good** ☑**Average** ☐**N/A** ☐**Below Average** ☐**Poor** ☐**Not Accessible**
Approximate Existing Insulation R-Value	R20 to R30
Recommendation	**Insulate to R38**

RECOMMENDATIONS / OBSERVATIONS

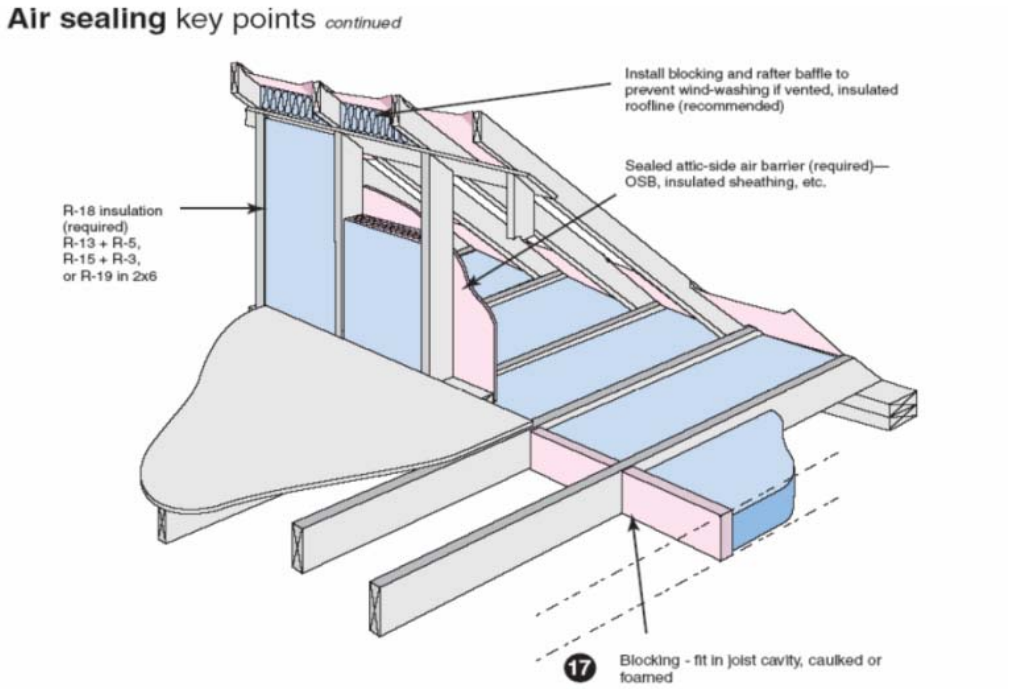
- **Improve:** There is an inadequate amount of insulation in the attic. The lack of insulation will contribute to energy loss and comfort complaints. Insulation levels are specified by R-value. R-value is a measure of insulation's ability to resist heat flow. The higher the R-value, the better the thermal performance of the insulation. The recommended level for most attics is to insulate to R-38 or about 10 to 14 inches, depending on insulation type.



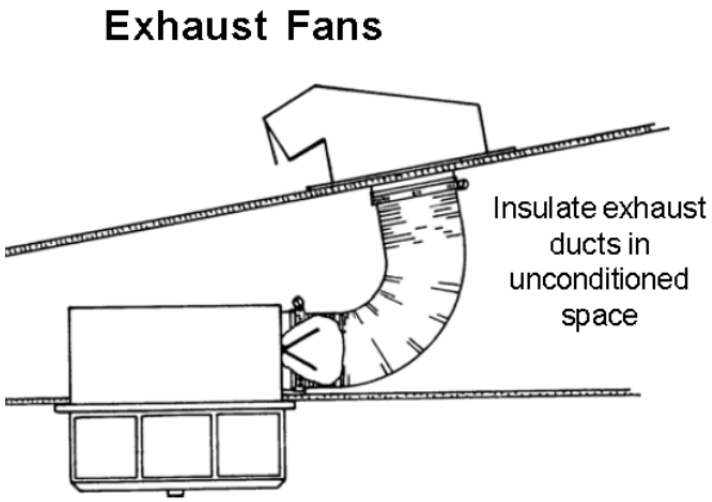
- **Improve:** The roof ventilation lacks wind baffles, (an air channel that directs air flow from the soffit or roof overhang into the attic without disturbing the attic insulation). The absence of wind baffles may cause the insulation to blow off the interior ceiling finish. This condition will contribute to energy loss and comfort complaints.

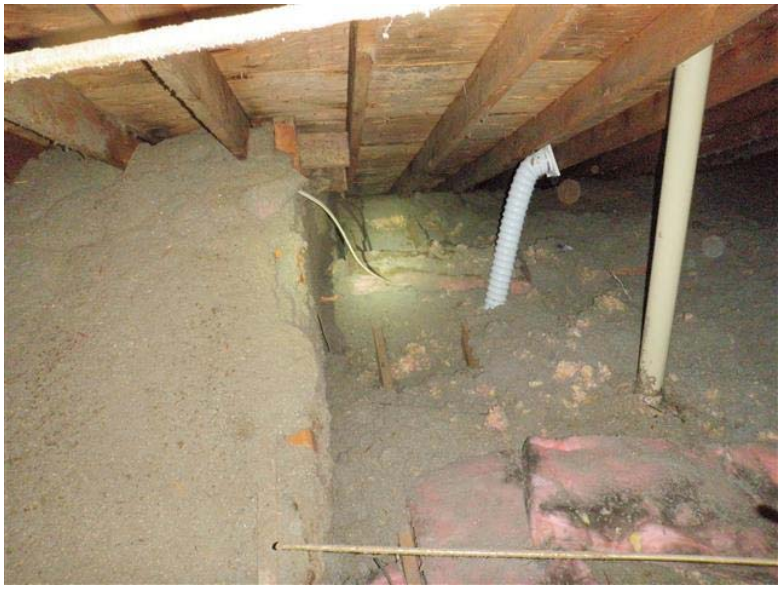


- **Improve:** The interior frame wall visible in the attic lacks an air barrier. An air barrier is any material that restricts the flow of air and can thereby serve to prevent air from leaking in and out of a building. In wall assemblies, the exterior air barrier is typically a combination of sheathing and either building paper, house wrap, or board insulation. The interior air barrier is often an interior finish, like gypsum board. A thermal barrier restricts or slows the flow of heat. This is accomplished through insulation including fiberglass batts, rock wool, blown cellulose, vermiculite, spray foam and rigid board insulation. Regardless of which material is used, insulation is not fully effective unless it is installed properly that is continuously aligned with a contiguous air barrier. Consideration should be given to adding an air barrier.



- **Improve:** The bathroom fan vent(s) exhaust into the attic. To avoid the potential for mold accumulation on the roof sheathing and/or excessive humidity levels in the attic, the bath fans should exhaust to a roof or soffit vent via an insulated hard pipe exhaust system.





Guttering & Drainage

DESCRIPTION OF GUTTERING & DRAINAGE

Guttering Type: ☑Aluminum ☐Galvanized ☐Copper ☐Vinyl ☐None

Guttering Viewed From: ☑Ground ☐Edge Of Roof ☐2nd Story Window ☐Other

GUTTERING & DRAINAGE OBSERVATIONS

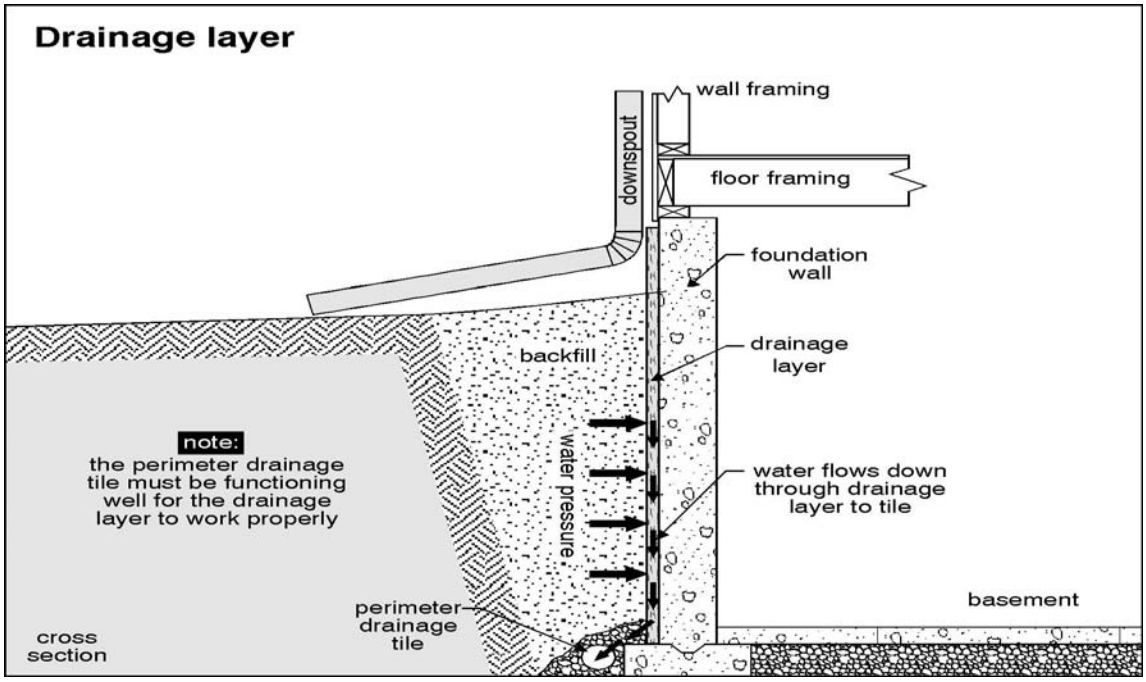
1. **The guttering and downspouts appear to be in good condition and capable of directing water runoff well away from the foundation walls.** ☐Yes ☑No ☐N/A

2. **The elevations around the home appear to slope well away from the foundation walls thereby minimizing potential water penetration into the basement and/or crawl space.** ☐Yes ☑No

RECOMMENDATIONS / OBSERVATIONS

- **Repair:** The guttering is dirty and needs to be cleaned to avoid spillage of roof water run-off next to the building. This water accumulation next to the building may contribute to water penetration into the basement or crawl space, can contribute to movement in foundation walls from hydrostatic pressure, and is conducive to termite infestation and other forms of wood destroying infestation.

- **Improve:** The patio or stoop has settled and now slopes toward the foundation wall. The resulting water accumulation next to the building, may contribute to water penetration into the basement or crawl space, can contribute to movement in foundation walls from hydrostatic pressure, and is conducive to termite infestation and other forms of wood destroying infestation.



Basement & Crawl Space

DESCRIPTION OF BASEMENT & CRAWL SPACE

Foundation Type: ☑Crawl Space ☐Basement ☐Slab ☐Combination

Viewed From: ☐Basement ☑Crawl Space ☐Foundation Reveal ☐N/A Home on Slab

Viewed Limited By: ☐Insulation ☐Storage ☐Finished Walls ☐Furnishings
☐Floor Coverings ☐Cabinets or Shelving ☐Appliances
☐Access Hole too Small ☐Standing Water ☐Vegetation
☐Snow ☐Close Proximity to Earth ☐Cluttered Conditions ☐Other

Basement/Crawl Space Drainage System: ☐Sump Pump ☐Foundation Drain ☐Crawl Space Drain
☐Floor Drain ☑None Observed ☐Not Viewed ☐Combination ☐Other

Ventilation Crawl space: ☑Foundation Vents ☐Basement Common Wall ☐Unvented ☐N/A

BASEMENT & CRAWL SPACE OBSERVATIONS

1. **The crawl space/basement appeared to be adequately insulated and air sealed.** ☐Yes ☑No

Foundation Wall Insulation	
Recommended R-Value Foundation Wall	**R-10 or Greater**
Existing Insulation Type	☐Fiberglass ☐Foam Board ☐Cellulose ☐Spray Foam ☑None ☐N/A ☐Not Accessible
Existing Installation Quality	☐Good ☐Average ☐N/A ☐Below Average ☐Poor ☐Not Accessible
Approximate R-Value	Less than R10
Recommendation	Insulate to R10

Rim Joist Insulation	
Recommended R-Value Rim Joists	**R-19 or Greater**
Existing Insulation Type	☐Fiberglass ☐Foam Board ☐Cellulose ☐Spray Foam ☑None ☐N/A ☐Not Accessible
Existing Installation Quality	☐Good ☐Average ☐N/A ☐Below Average ☐Poor ☐Not Accessible
Approximate R-Value	**R 0**
Recommendation	**Insulate & Air Seal to R19**

Floor Insulation	
Recommended R-Value Floor Cavity	**R-19 or Greater**
Existing Insulation Type	☐**Fiberglass** ☐**Foam Board** ☐**Cellulose** ☐**Spray Foam** ☑**None** ☐**N/A** ☐**Not Accessible**
Existing Installation Quality	☐**Good** ☐**Average** ☐**N/A** ☐**Below Average** ☐**Poor** ☐**Not Accessible**
Approximate R-Value	N/A
Recommendation	None

RECOMMENDATIONS / OBSERVATIONS

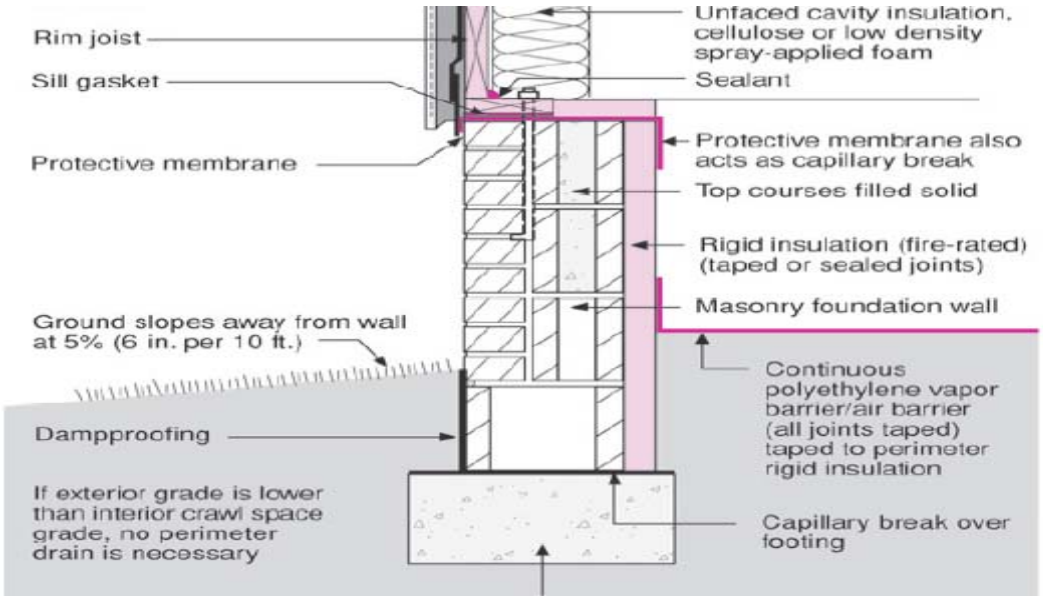
Note: The auditor will be determining the most effective way to insulate the crawl space or basement. This starts by determining the thermal boundary. The thermal boundary is where the insulation should be placed to be most effective. This could be the sub floor, and/or the foundation wall and rim joists.

Thermal Boundary has been defined by the auditor as the:

Foundation Wall & Rim Joist: Insulate Foundation Wall & Rim Joists

- **Improve:** Consideration should be given to conditioning the crawl space. Conditioning the crawl space allows air ducting from the HVAC system to be within conditioned space. This allows the HVAC system to operate more efficiently. Conditioning the crawl space is not recommended if the crawl space is wet or damp. The crawl space should be damp proofed before any effort is made to condition the crawl area.

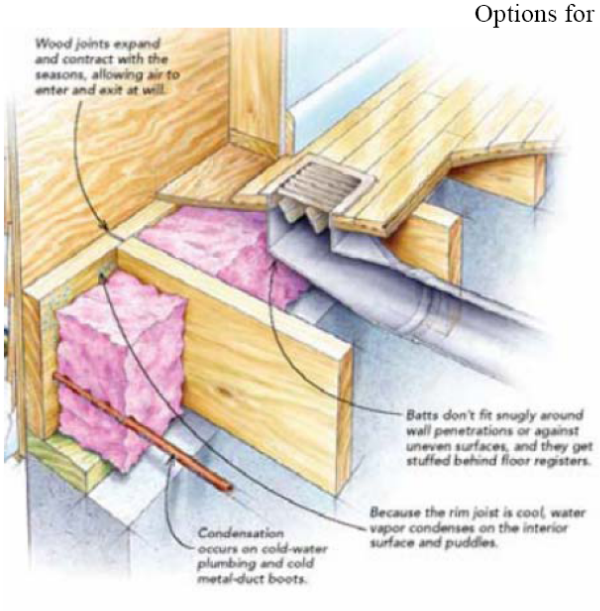
INFORMATION ABOUT CONDITIONED CRAWL SPACES

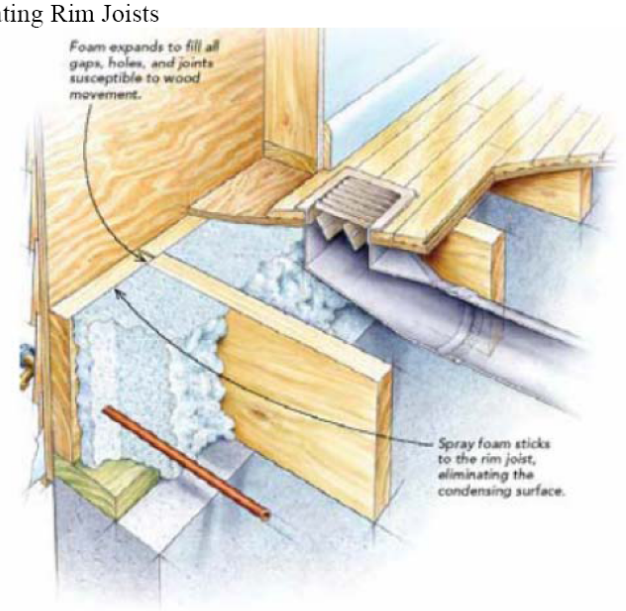


- **Improve:** The foundation wall insulation is missing, has fallen down and/or is in need of repair. At a minimum insulation should be present on the foundation wall areas above grade including the rim joists. Missing insulation can be the source for heat gain or heat loss.
  The rim joists and foundation wall should be insulated. It is recommended that at least an R-10 continuous insulation be present on the foundation wall. The current recommendation for rim joist insulation is an R-19.
  Consideration should also be given to air sealing the rim joists. The rim joists can be a significant source for air leakage in and out of the building.
  The diagram below depicts new construction. It may not be possible to install all measure shown.

- **Improve:** The rim joists are not air sealed or insulated. This could be a source for significant energy loss. Consideration should be given to air sealing the rim joists, and insulting the rim joists to R-19.

Options for insulating Rim Joists





2. Run a bead of acrylic caulk around each section of foam to form an airtight barrier. Fill gaps larger than 1/4 in. with expanding foam sealant.

- **Improve:** The crawl space access door is not insulated. You should consider insulating the crawl space door. This condition will contribute to energy loss and comfort complaints.

Air Leakage & Wall Insulation

DESCRIPTION OF INTERIOR FINISHES/WALL INSULATION

Wall/Ceiling Finish Material: ☑Drywall ☐Paneling ☐Lath & Plaster ☐Masonry ☐Stucco ☐Other

INTERIOR FINISHES & INSULATION OBSERVATIONS/COMPLETED AT 1ST SITE & DIAGNOSTIC AUDIT

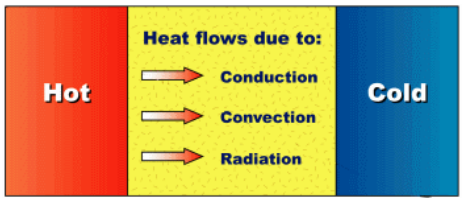
1. **Interior walls and ceiling finishes appear to show minimal evidence of air leakage.** ☑Yes ☐No

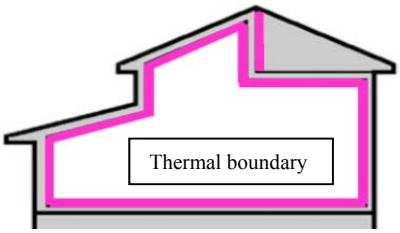
2. **Exterior walls appeared to be adequately insulated.** ☑Yes ☐No ☐Not Accessible

Wall Insulation	
Recommended R-Value Wall Cavity	**R-11 or Greater**
Observed Insulation Type	☐Fiberglass ☐Foam Board ☐Cellulose ☐Spray Foam ☐None ☑Not Observed
Estimated Installation Quality	☐Good ☐Average ☐Below Average ☐Poor ☑Not Observed
Estimated R-Value	R11 to R13
Recommendation	None

WALL INSULATION

Heat flows naturally from a warmer to a cooler space. In winter, the heat moves directly from all heated living spaces to the outdoors and to adjacent unheated attics, garages, and basements – wherever there is a difference in temperature. During the summer, heat moves from outdoors to the house interior. To maintain comfort, the heat lost in winter must be replaced by your heating system and the heat gained in summer must be removed by your air conditioner. Insulating ceilings, walls, and floors decreases the heating or cooling needed by providing an effective resistance to the flow of heat.





ENVELOPE LEAKAGE & INFILTRATION

The Blower Door test measures the leakiness of the building compared to the minimum ventilation rate, (MVR). Ideally the buildings leakage rate would be at or below the MVR. A higher number means that your building is draftier and uses/loses/wastes more energy. Envelope leakage can also affect other elements of your home such as indoor air quality and comfort. Refer to the table below for information regarding the buildings infiltration rate.
Envelope leakage is a major contributor to both high energy bills, and the inability to keep the building at a comfortable temperature. As heated air rises, it escapes out of holes in the building envelope, escaping into the attic and out of the building. This rising air creates low pressure in the lower part of the building which draws cold unconditioned air into the house from wherever the house is least sealed. When it is windy- which often coincides with those periods when heating is the most important- we see even greater rates of air change.

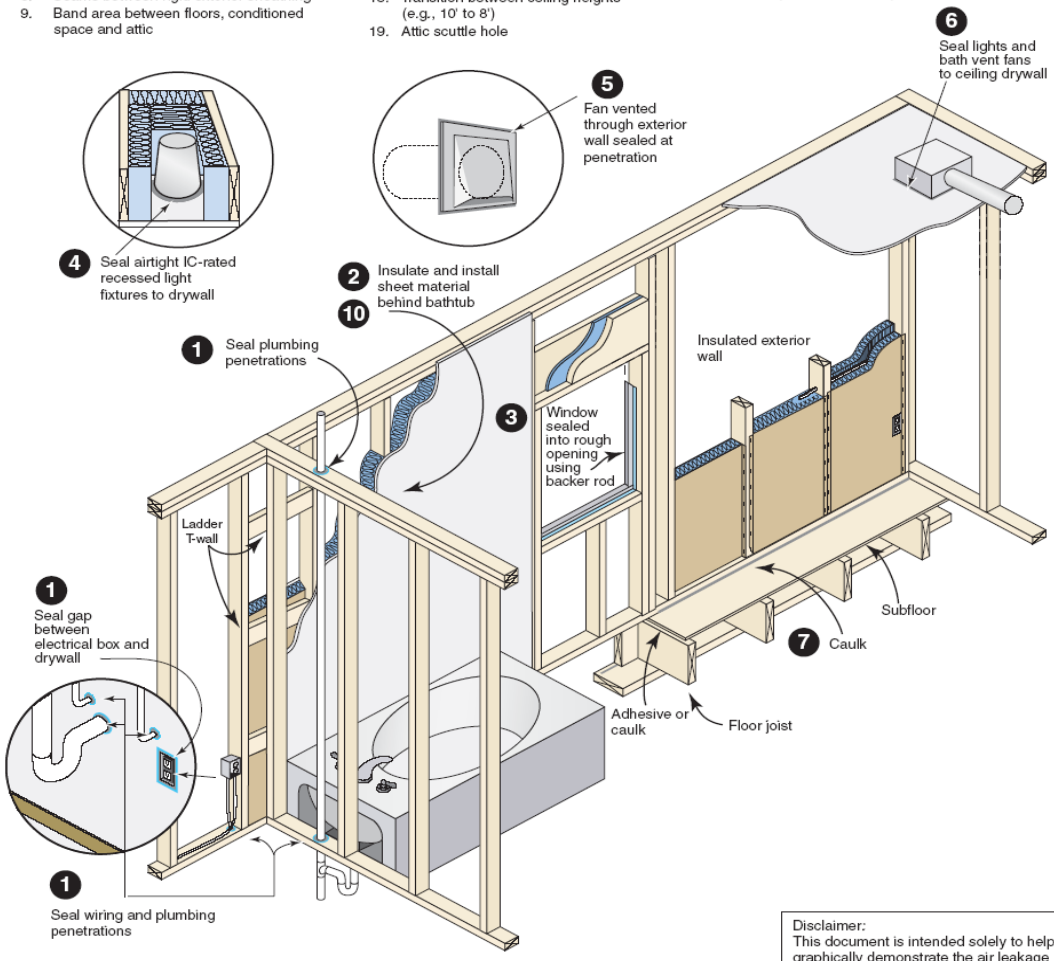
Replacement air is often drawn from unwanted areas such as crawlspaces, the garage, wall cavities, combustion appliance zones (CAZ), and chimneys. Air from these areas can increase moisture levels, bring dust and hazardous fumes into the living space, and cause a number of indoor air quality issues. Not only will tightening up the building decrease your heating load, it will also increase your building's efficiency and indoor air quality. Finding and eliminating sources of leakage will be the single most important challenge in the process of improving your building's comfort and efficiency. The areas we will achieve this most effectively include: air sealing, doors, and floor and ceiling joists accessible from the attic and crawlspace.

Table 2
Air Leakage & Pressure Differentials

Blower Door @ CFM 50	Auditor	Cont Interim	Cont Final	Final Auditor
List:	2914		0	
Pressure Differentials @CFM50 Taken At	Auditor	Cont Interim	Cont Final	Final Auditor
Attic	Not taken			
Crawl	41.2			
Knee Wall				
Bulk head				
Minimum Ventilation Rate	2,034		2,034	2,034
70 % MVR (lowest blower door reading can be)	1,424			
Opportunity for Improvement	1,490			
Contractors Final Improvement			1490	
Final Auditor Improvement				1490

Air sealing key points

1. Building envelope plate and wall plumbing and electrical penetrations
2. Tub/shower on outside or attic wall
3. Window and door rough openings
4. Airtight, IC-rated recessed lights and electrical fixtures exposed to attic
5. Exterior wall exhaust fan terminations
6. Ceiling mounted bath fans, speakers, etc.
7. Bottom plate and top plate
8. Seams between rigid exterior sheathing
9. Band area between floors, conditioned space and attic
10. Tub on exterior wall
11. Mechanical equipment and ductwork chases in attics, crawlspaces
12. Ceiling/crawlspace electrical boxes
13. Ceiling/crawlspace HVAC boots
14. Shower and tub drain line
15. Fireplace inserts
16. Attic kneewall doors
17. Joist cavities under attic kneewalls
18. Transition between ceiling heights (e.g., 10' to 8')
19. Attic scuttle hole
20. Attic pull-down stairs
21. Wall penetrations of mechanical combustion closets
22. Thresholds at mechanical combustion closet doors
23. Band joist exposed to exterior
24. Band area exposed to unconditioned space (such as basement or garage)
25. Exterior wall penetrations for refrigeration lines, condensate line, etc.



Disclaimer:
This document is intended solely to help graphically demonstrate the air leakage provisions of section 402.4 of the 2006 IECC. It does not cover all airsealing locations or techniques. Other code provisions may be applicable as well.

1

HUMIDITY AND MOISTURE

What relative humidity should I have in my home? Seems like a simple enough question. However, the answer can sometimes be difficult to understand. The key is not to be too low and not to be too high. High enough to be comfortable, but low enough to avoid moisture problems associated with mold, corrosion, decay, and condensation.

Unfortunately, determining the correct range depends on where the home is located (climate), how the home is constructed (the thermal resistance of surfaces determines surface temperatures), the time of year (the month or season determines surface temperatures), and the sensitivity of the occupants.

With regard to health, individual sensitivities and susceptibilities vary greatly, and it is typically very difficult to generalize with respect to relative humidity and health. Having said it is difficult to generalize, we will do so anyway. Keeping relative humidity in the 25 percent to 60 percent range tends to minimize most health issues – although opinions vary greatly.

Comfort is of course different than health. When relative humidity drops below 25 percent there have been some reports in the medical literature of eye irritation in office workers using computers. Breathing difficulties have been reported in some individuals when relative humidity drops below 15 percent due to the mucus linings of the respiratory system desiccating. However, there is no medical consensus in this regard.

Consensus among microbiologists gives the critical relative humidity for adverse biological activity to occur on building envelope surfaces to be 70 percent. Where a relative humidity above 70 percent occurs at surfaces, mold growth, dust mite growth, decay, corrosion, etc. can occur. Therefore, conditions should be maintained within a building such that the critical 70 (or higher) percent relative humidity at a building envelope surface does not occur. Due to climate differences, interior conditions which must be maintained to avoid the critical relative humidity at a surface vary from region to region and time of year. They also vary based on the thermal resistance of the building envelope.

In a mixed climate, during the heating season, interior moisture levels should be limited to 45 percent relative humidity at 70 degrees. This limits the relative humidity adjacent to the interior surface of exterior walls to below 70 percent for the typical thermal resistance found in most building assemblies in this climate zone.

The goal of a weatherization project is to reduce the air exchanges and improve the thermal characteristics of the building. It is critical that a well-designed moisture management strategy is maintained to prevent potential issues related to health and comfort.

		Humidity & Temperature in Your Home				
Location	**Relative Humidity % Please Select**	**Temperature F Pre-WX Please Select**	**Relative Humidity % Audit**	**Temperature F Pre-WX Audit**	**Relative Humidity % Final Audit**	**Temperature F Post WX Final Audit**
Outside Reference	Above 80%	70 to 80	60 to 70 %	60 to 70	Choose an item.	Choose an item.
Main Living Area	40 to 45 %	70 to 80	40 to 45 %	70 to 80	Choose an item.	Choose an item.
	☐Windows Open		☐Windows Open		☐Windows Open	

Windows & Doors

DESCRIPTION OF WINDOWS & DOORS

Window Type:	☑Wood	☐Metal	☐Vinyl	☐Clad	☐Combination	☐Other
Window Style:	☑Double Hung	☑Casement	☐Bi-pass	☐Hinged	☐Other	
Glass Type:	☐Single Strength	☑Thermo Seal		☐Storms	☐Combination	
Door Type:	☑Wood	☑Metal	☐Fiberglass	☐Vinyl	☐Clad	☐Combination

WINDOWS & DOORS OBSERVATIONS

1. **The windows & doors appear to show minimal air leakage.** ☑Yes ☐ No

RECOMMENDATIONS / OBSERVATIONS

Water Heater

DESCRIPTION OF WATER HEATER

Age of Tank 1:	☐Less than 1 yr.	☑Less than 5 yrs.	☐5 to 10 yrs.	☐Over 10yrs	
Water Heater location:	☑Garage	☐Utility Room	☐Closet	☐Basement	☐Crawl Space
	☐Combination	☐Other			
Capacity:	☐30 Gallon	☐40 Gallon	☐50 Gallon	☐75 Gallon or more	
Energy Source	☑Gas	☐Electric	☐Geothermal	☐Other	
Electric Units: KWH	☐4500	☐5500	☐3500	☐Other	
Gas Units: BTUH	☐32000	☐34000	☑38000		

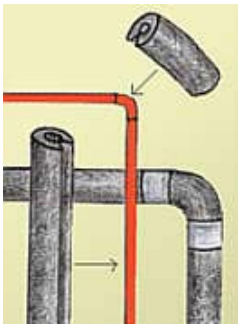
WATER HEATER OBSERVATIONS/COMPLETED IF DIAGNOSTIC AUDIT PERFORMED

1. The water heater appears to be in good condition and properly installed. ☑Yes ☐No

2. The water piping and water tank appeared to properly Insulated if needed. ☐Yes ☑No

- **Improve:** Consideration should be given to insulating the water pipes. Insulating your hot water pipes reduces heat loss and can raise water temperature 2ºF–4ºF hotter than un-insulated pipes can deliver, allowing for a lower water temperature setting at the water heater. You also won't have to wait as long for hot water when you turn on a faucet or showerhead, which helps conserve water.

  Insulate all accessible hot water pipes, especially within 6 feet of the water heater.

  Use quality pipe insulation wrap, or neatly tape strips of fiberglass insulation around the pipes. *Pipe sleeves* made with polyethylene or neoprene foam are the most commonly used insulation. Match the pipe sleeve's inside diameter to the pipe's outside diameter for a snug fit. Place the pipe sleeve so the seam will be face down on the pipe. Tape, wire, or clamp (with a cable tie) it every foot or two to secure it to the pipe. If you use tape, some recommend using acrylic tape instead of duct tape.

  On gas water heaters, keep insulation at least 6 inches from the flue. If pipes are within 8 inches of the flue, your safest choice is to use fiberglass pipe-wrap (at least 1-inch thick) without a facing. You can use either aluminum foil tape or zip ties to secure the insulation.

WATER HEATING SYSTEM

Next to heating the air in a home, water heaters are generally the largest energy users in the home. Water heaters typically use more than 15 percent of the total energy of a home.
Different types of water heating strategies are most practical for different homes.

Storage water heaters are the most common. Typical residential units range in size from 30 to 80 gallons, but smaller and larger tanks are available. Most are fueled by electricity, natural gas, propane or oil. Storage water heaters heat the water in the tank to the set temperature, turn off, and then turn on and off as needed to keep it hot and ready for use. When you use hot water, the unit comes on to heat the incoming cold water that replaces what you use.

Tank less water heaters, also called instantaneous water heaters" and "on-demand water heaters", do not store water. A gas burner or an electric element heats the water when there is a demand or a need for hot water. Hot water never runs out, as long as you don't exceed its designed "flow rate", and the temperature may be relatively low, around 105°F. Energy is saved, or more accurately, not wasted as there are almost no standby losses.

Solar water heaters use energy from the sun to heat water. During the day, the collector heats the water directly or indirectly by heating an exchange medium, such as glycol (which won't freeze), which transfers the heat to the water in the storage tank. This can be an extremely effective and economic approach to supplying 85% and more of a home's hot water needs.

Fireplace/Wood stove/Gas Log

DESCRIPTION OF FIREPLACE/WOOD STOVE/GAS LOG/COMPLETED AT DIAGNOSTIC AUDIT

Type of systems present ☑Fireplace ☐Vented Gas Log ☐Unvented Gas Log
☐Direct Vent Gas Log ☐Wood Stove ☐Wood Stove Insert ☐Other

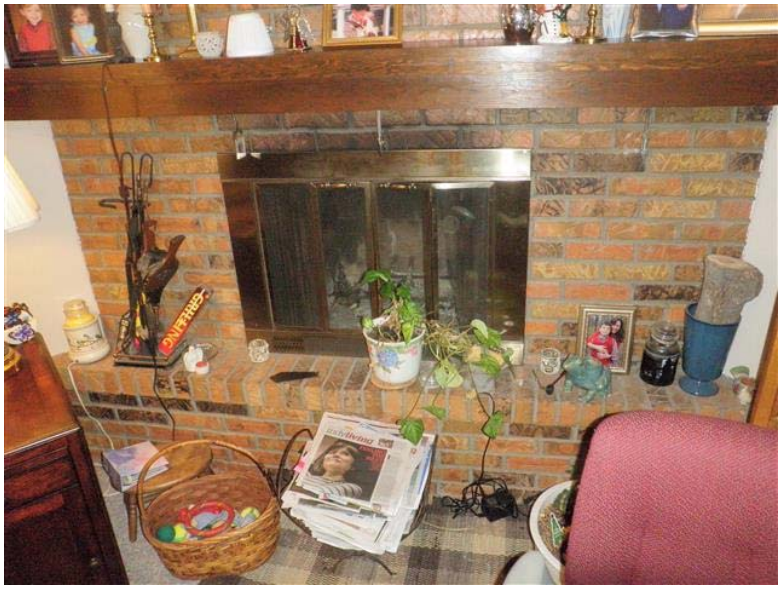
Note: It is not within the scope of this audit to view all portions of the fireplace or chimney. Opinions about the chimney and fireplace should not be considered conclusive. If defects are noted with the chimney or fireplace a qualified chimney sweep should be contacted.

Note: If your home has a non-vented gas log, use should be limited to emergency heat situations only. During operation the home should be well ventilated. A non-vented gas log could contribute to excessive moisture content in the home and/or potential carbon monoxide exposure.

FIREPLACE/WOOD STOVE/GAS LOG OBSERVATIONS/COMPLETED AT DIAGNOSTIC AUDIT

1. **The fireplace and/or chimney appears to be adequately air sealed.** ☑Yes ☐No ☐Not checked

RECOMMENDATIONS / OBSERVATIONS



Electrical Supply and Service

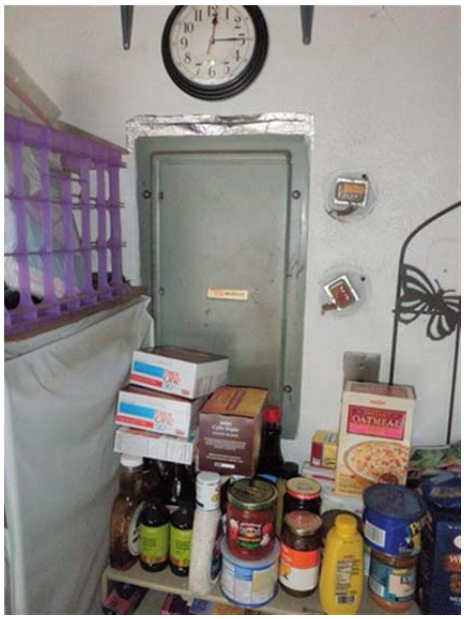
DESCRIPTION OF ELECTRICAL SUPPLY AND SERVICE COMPLETED AT DIAGNOSTIC AUDIT

Main Overload Protection:		**☑Circuit Breaker**	**☐Fuses**		
	Rating:	**☐200 amps**	**☐100 amps**	**☐125 amps**	**☐150 amps**
		☐60 amps	**☐400 amps**		
Main Panel:	**Location:**	**☐Basement**	**☑Garage**	**☐Utility Room**	**☐Mechanical Room**
		☐Storage Closet	**☐Outside by the meter**		
	Rating:	**☐200 amps**	**☐100 amps**	**☐125 amps**	**☐150 amps**
		☐60 amps	**☐400 amps**	**☐Other**	
Service Entrance Type:		**☑Overhead**	**☐Underground**		

ELECTRICAL SUPPLY AND SERVICE OBSERVATIONS

RECOMMENDATIONS / OBSERVATIONS

Electrical Panel Photo



Electrical Branch Circuits

DESCRIPTION OF ELECTRICAL BRANCH CIRCUITS COMPLETED AT DIAGNOSTIC AUDIT

Type of Branch Circuit Wiring Visible: ☑Romex ☐B/X ☐Conduit ☐Knob & Tube ☑Fabric Covered ☐Combination

Type of Conductors Visible: ☑Copper ☐Copper Clad ☐Aluminum ☐Combination

ELECTRICAL BRANCH CIRCUITS OBSERVATIONS

1. **Primary light fixtures appear to have energy efficient bulbs.** ☑Yes ☐No
2. **There appeared to be a limited number of appliances in use.** ☑Yes ☐No
   (Refrigerators, freezers, televisions, etc.)

RECOMMENDATIONS / OBSERVATIONS

Heating & Duct System

DESCRIPTION OF HEATING COMPLETED AT DIAGNOSTIC AUDIT

Type of System: ☐Natural Draft Gas ☐Fan induced gas ☑Sealed Combustion Gas ☐Electric Forced Air ☐Baseboard ☐Heat Pump ☐Geothermal

Estimated Age: ☐Less Than 1 yr. ☐Less Than 5 yrs. ☑5 to 10 yrs. ☐Over 10yrs

Type of Duct Work Present: ☑Metal ☐Flexible ☐Rigid insulated ☐Asbestos ☐Metal Encased Asbestos ☐Metal Sealed at Seams With Asbestos ☐Other ☐N/A

Estimated R Value Duct: ☐R-4 ☐R-6 ☑Not insulated ☐Not Insulated Inside the Thermal Boundary ☐N/A

HEATING OBSERVATIONS/COMPLETED AT FIRST SITE VISIT/DIAGNOSTIC AUDIT

1. **The heating system appears to be in good operating condition.** ☑Yes ☐No ☐Not checked
2. **The visible air ducts appeared to be in good condition and adequately air sealed.** ☐Yes ☑No ☐Not checked

WORST CASE DRAFT TESTING/COMPLETED IF DIAGNOSTIC AUDIT IS PERFORMED GAS HEAT

CAZ Pressure Testing	
Part 1	
Best Case Set-up	
a) Are the combustion appliances turned off or to pilot?	☑Yes ☐NO ☐N/A
b) Are all exterior doors & windows closed?	☑Yes ☐NO ☐N/A
c) Are all interior doors open including the CAZ door?	☑Yes ☐NO ☐N/A
h) Is pressure gauge set-up to read CAZ pressure with reference to outside?	☑Yes ☐NO ☐N/A
j.) Record the CAZ Pressure with reference to the Outside	
Establish Worst Case Draft Testing/Make the CAZ as small as possible	
Part 2 Worst Case Set-up	
a) Are the combustion appliances turned off or to pilot?	☑Yes ☐NO ☐N/A
b) Are all exterior doors and windows closed?	☑Yes ☐NO ☐N/A
c) Are all interior doors closed? (except for rooms with exhaust fan and no supply)	☑Yes ☐NO ☐N/A
d) Are all fireplace and wood stove dampers closed?	☑Yes ☐NO ☐N/A
e) Are all exhaust fans on including clothes dryer? (except whole house fan)	☑Yes ☐NO ☐N/A
f) If house has working fireplace, is blower door set-up for 300 cfm to simulate fire?	☑Yes ☐NO ☐N/A
g) Is furnace filter clean or removed from furnace?	☑Yes ☐NO ☐N/A
h) Is pressure gauge set-up to read CAZ pressure with reference to outside?	☑Yes ☐NO ☐N/A

Part Continued 2											
Determine Worst Case Configuration											
i) Is there a door between the CAZ and the rest of the structure?									☐Yes ☑NO ☐N/A		
j) Is there a blower on the heating system?									☑Yes ☐NO ☐N/A		
To determine, test CAZ pressure under, up to, four (4) different configurations.											
Auditor			**Contractor Interim**			**Contractor Final**			**Final Inspection**		
CAZ DOOR	FAN	PA/WC	CAZ DOOR	FAN	PA/WC	CAZ DOOR	FAN	PA/WC	CAZ DOOR	FAN	PA/WC
OPEN	ON		OPEN	ON		OPEN	ON		OPEN	ON	
CLOSED	ON	0.4	CLOSED	ON		CLOSED	ON		CLOSED	ON	
OPEN	OFF		OPEN	OFF		OPEN	OFF		OPEN	OFF	
CLOSED	OFF	0.5	CLOSED	OFF		CLOSED	OFF		CLOSED	OFF	
k.) Record the CAZ Pressure with reference to the Outside Under Worst Case											
l.) Record the CAZ Pressure with reference to the Outside Under Best Case (Recorded in step 1)											
m.)Record the net difference (line item k and l)											
n) Is the CAZ Pressure adequate based on the BPI table below									☐Yes ☐NO ☐N/A		

CAZ Depressurization Limits

Venting Condition	Limit (Pascal's)
Orphan natural draft water heater (including outside chimneys)	-2
Natural draft boiler or furnace commonly vented with water heater	-3
Natural draft boiler or furnace with vent damper commonly vented with water heater	-5
Individual natural draft boiler or furnace	-5
Mechanically assisted draft boiler or furnace commonly vented with water heater	-5
Mechanically assisted draft boiler or furnace alone, or fan assisted DHW alone	-15

Step 3 Ventilation & Combustion Air	
(80%, natural draft or one pipe condensing appliances only. Direct vent 2 pipe furnaces do not apply.)	
☐N/A	
A. What is the combustion appliance zone?	Garage
B. What is the total BTUH input of open combustion appliances in the CAZ	138,000BTUH
C. What is the volume of air available that communicates with the combustion appliance zone? (Include areas that are connected with transfer grills or louver doors.) Record in Cubic Feet	22x24x9 =4752
D. What is the volume of air needed for open combustion appliances? (to determine divide BTUH input Line B by 20)	1900
E. What is the volume of air needed for induced draft combustion appliances? ☐N/A (to determine multiply BTUH input line B by .0375)	
F. Is there an adequate amount of combustion air (Line C should be ≥ Line D or E)	☑Yes ☐NO

Step 4 Appliance Testing				
After determining "worst case", leave the structure in that configuration & Monitor C/O Levels				
(perform "5-2-5" tests, starting with lowest BTUH rated input appliance)				
Smallest appliance or water heater	**Auditor**	**Contractor Interim**	**Contractor Final**	**Final Inspection**
Does the smallest appliance establish flow in the vent within 5 seconds?	☑Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair
Does the smallest appliance stop spillage within 2 minutes?	☑Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair
Document the 5 minute draft reading.	☑PA: -5.1 ☐W/C:	☐PA: ☐W/C:	☐PA: ☐W/C:	☐PA: ☐W/C:
Record outdoor ambient temperature.	68 ºF	ºF	ºF	ºF
Does the vent draft pressure meet the requirements with regard to outside temperature?	☑Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair

Acceptable Draft Test Ranges

Outside Temperature (degree F)	Minimum Draft Pressure Standard (Pa)
<10	-2.5
10-90	(T out/40) – 2.75
>90	-0.5

Largest appliance or Furnace	**Auditor**	**Contractor Interim**	**Contractor Final**	**Final Inspection**
Record the CO level under both sides of the draft hood after 5 minutes of operation.	PPM:	PPM:	PPM:	PPM:
Does the larger appliance establish flow in the vent within 5 seconds?	☑Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO ☐N/A ☐Needs Repair
Does the larger appliance stop spillage within 2 minutes?	☑Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO ☐N/A ☐Needs Repair
Document the 5 minute draft reading.	☑PA: NA ☐W/C:	☐PA: ☐W/C:	☐PA: ☐W/C:	☐PA: ☐W/C:
Does the vent draft pressure meet the requirements with regard to outside temperature?	☐Yes ☐NO☑N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO ☐N/A ☐Needs Repair

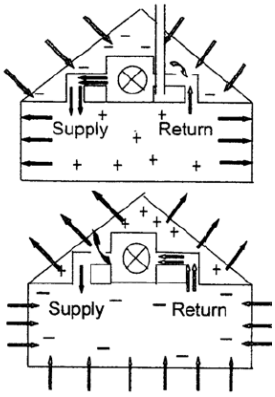
	Auditor	Contractor Interim	Contractor Final	Final Inspection
Retest smaller appliance for spillage and draft	☑PA: -5.1 ☐W/C:	☐PA: ☐W/C:	☐PA: ☐W/C:	☐PA: ☐W/C:
Does the vent draft pressure meet the requirements with regard to outside temperature in the smallest appliance?	☑Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO ☐N/A ☐Needs Repair
Did the larger appliance cause spillage or reduction in draft of smallest appliance?	☑Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐N/A ☐Needs Repair	☐Yes ☐NO☐ N/A ☐Needs Repair
Record the C/O level after 5 minutes of operation Furnace or larger appliance (Open Draft hood appliance record each cell)	PPM:	PPM:	PPM:	PPM:

Combustion Safety Test Action Levels			
CO Test Results	**And/or**	**Spillage and Draft Test Results**	**Retrofit Action**
0-25 ppm	*And*	Passes	Proceed with work
26-100 ppm	*And*	Passes	Recommend that the CO problem be fixed
26-100 ppm	*And*	Fails at worst case only	Recommend a service call for the appliance and/or repairs to the home to correct the problem
100-400 ppm	*Or*	Fails under natural conditions	**Stop Work:** Work may not proceed until the system is serviced and the problem is corrected
> 400 ppm	*And*	Passes	**Stop Work:** Work may not proceed until the system is serviced and the problem is corrected
> 400 ppm	*And*	Fails under any condition	**Emergency:** Shut off fuel to the appliance and have the homeowner to call for service immediately

Acceptable Draft Test Ranges	
Outside Temperature (degree F)	Minimum Draft Pressure Standard (Pa)
Less than 10 degrees	-2.5
10 to 90 degrees	(T out/40) – 2.75
Greater than 90 degrees	-0.5

DUCT LEAKAGE & AIR DELIVERY

The U.S. Department of Energy determined that an average of 25% to 40% of heating and cooling energy is lost through duct system leakage. Duct leakage has a major impact on indoor air quality and energy efficiency. Return ductwork air leaks draw air into the house from crawlspaces, garages, and attics. This leakage can bring unconditioned air, dust, mold spores, insulation fibers and other contaminants into the building. Leaking supply ducts will tend to depressurize the home, drawing air from wherever is most accessible to try and balance the pressure. Often this air will come from interior walls, crawlspace, or even reversal of exhaust flues pulling combustion chemicals into the house.



Household depressurization can also pull combustion products such as carbon monoxide from furnaces, water heaters and fireplaces into the house, which can lead to polluted indoor air and potentially harmful health effects. In the case of your home, the furnace ducts including their connections to the registers) are leaking excessively. Delivery system repair and/or replacement will significantly improve both system performance and indoor air quality.

There are a variety of factors that affect the balance and flow of your forced air system. Solutions to air flow problems are most often multi-faceted. Proper airflow has major impacts on comfort as well as energy efficiency and air quality. Common problems that affect airflow and balance include the following factors:

- **Duct Leakage Goal 1.5 Pascals@50**
- **Poor Design (too small, too long, constricted, etc.)**
- **Dirty or Dense Filter Media**
- **Improperly Sized Equipment**
- **Closed Dampers**
- **Poorly Selected Grilles**

Table 4
Pressure Pan Table

Location Duct	Auditor	Contractor	Contractor	Final Auditor	Location Duct	Auditor	Contractor	Contractor	Final Auditor
Zone PD Supply	Initial PD:	Interim PD:	Interim PD:	PD:	Zone PD Return	Initial PD:	Interim PD:	Interim PD:	PD:
R1: See Print	7				RA1: See Print	1.6			
R2: See Print	3.6				RA2: See Print	0.8			
R3: See Print	3.8				RA3: See Print	1.1			
R4: See Print	1.2				RA4: See Print	1.2			
R5: See Print	2.7				RA5: See Print	1.3			
R6: See Print	5				RA6: See Print	0.6			
R7: See Print	3.3				RA7: See Print				
R8: See Print	6.1				RA8: See Print				
R9: See Print	42.2				RA9: See Print				
R10: See Print	5.2				RA10: See Print				
Total Ducts excess of 1.5	9				**Total Ducts excess of 1.5**	1			
Average Reading	**8.01**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**Average Reading**	**1.10**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**

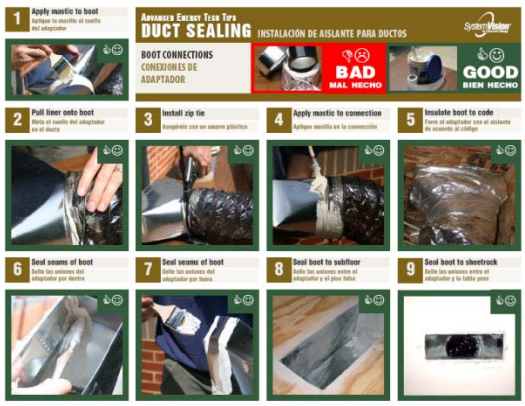
RECOMMENDATIONS / OBSERVATIONS

RECOMMENDATIONS / OBSERVATIONS

- **Repair:** The air ducting is excessively leaky. Ducts that move air to-and-from a forced air furnace, central air conditioner, or heat pump are often big energy wasters. Sealing and insulating ducts can improve the efficiency of your heating and cooling system by as much as 20 percent and sometimes much more.

  Focus first on sealing ducts that run through the attic, crawlspace, unheated basement, or garage. Use duct sealant (mastic) or metal-backed (foil) tape to seal the seams and connections of ducts. After sealing the ducts in those spaces, wrap the ducts in insulation to keep them from getting hot in the summer or cold in the winter. Next, seal ducts that you can access in the heated or cooled part of the house.

  Location of condition: See table 4.



Air Conditioning & Heat Pump

DESCRIPTION OF AIR CONDITIONING & HEAT PUMP COMPLETED AT DIAGNOSTIC AUDIT

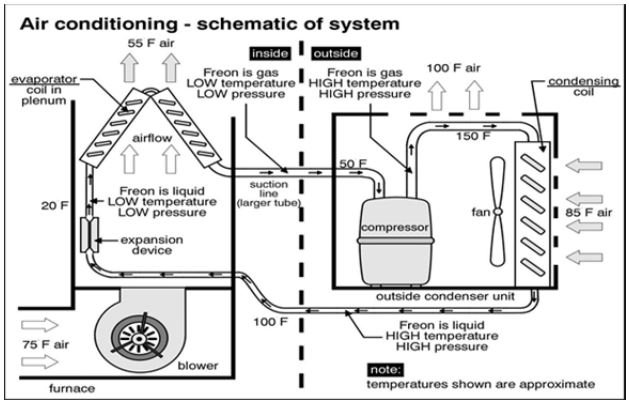
Type of System:	☑Air Conditioner	☐Heat Pump	☐Geothermal	☐Other
Estimated Age:	☐Less than 1 yr.	☐Less than 5 yrs.	☑5 to 10 yrs.	☐Over 10 yrs
Limitations:	☑To prevent refrigerant loss, gauges NOT applied.			

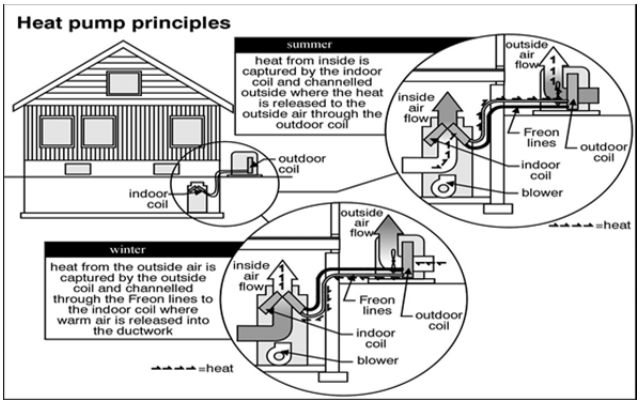
AIR CONDITIONING & HEAT PUMP OBSERVATIONS/COMPLETED AT DIAGNOSTIC AUDIT

1. **The air conditioner/heat pump appears to be in good operating condition.** ☑Yes ☐No ☐Not checked

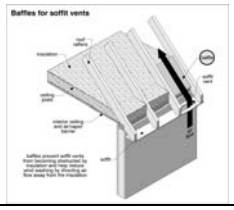
RECOMMENDATIONS / OBSERVATIONS

Air Conditioner or Heat Pump Photo



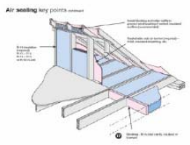


Work Scope Summary Completed if Diagnostic Audit Performed
Items the Client Should Consider

Type of Contractor	Item	Expected to Improve Energy Efficiency	Repair Status	Auditor	Date	Time	Additional Comments
				Choose an item.	**1/2/2013**		
☑Home Owner	**Insulate attic to R38 equivalent. Current Attic Estimate R value = 20-30 Existing Insulation Depth = 6-8 Add Insulation Depth = 6-8 Insulation type ☑Blown in Cellulose ☑Fiberglass**	**☐Yes ☐No**	**☐Item Repaired ☐Item not Repaired**				
☑Home Owner	**Install wind baffles at soffit vents to prevent wind washing 6 feet OC Provide insulation dams at vented soffits where wind baffles have not been installed.** 	**☐Yes ☐No**	**☐Item Repaired ☐Item not Repaired**				

- Items listed in the work scope under "Items Client Should Consider" in the auditor's or managers opinion do not represent cost effective measures at this time.

Items Client Should Consider

Assigned To	Item	Other Necessary Repair	Repair Status	Auditor	Date	Time	Additional Comments
☑**Home Owner**	**Provide rigid or semi rigid air barrier at knee.** **Acceptable Material:** ☑1/2 inch insulation board ☑Fan Fold ☑Spray foam ☑Tyvek Check all ceiling cavities or joist cavity bays and air seal as needed. 	☐**Yes** ☑**No**	☐Item Repaired ☐Item not Repaired				
☑**Home Owner**	**Vent fan vents to exterior. All fan vents must be vented in hard pipe and insulated. All exhaust must terminate clear to exterior vent properly equipped with a pest screen.** **Location:** ☑Hall bathroom ☑Master bathroom	☑**Yes** ☐**No**	☐Item Repaired ☐Item not Repaired				

- Items listed in the work scope under "Items Client Should Consider" in the auditor's or manager's opinion do not represent cost effective measures at this time.

Work Scope Summary Completed if Diagnostic Audit Performed
Recommended Work Scope

Assigned To	Item	Other Necessary Repair	Repair Status	Auditor	Date	Time	Additional Comments
☑Shell Contractor	Blower door directed air Sealing. Seal all by-passes in attic, Basement or Crawl space to minimize air movement and/or bulk moisture transfer. Stop air sealing at 100CFM per man hour, or at Minimum ventilation rate.	☐Yes ☑No	☐Item Repaired ☐Item not Repaired	Choose an item.	1/2/2013		
☑Shell Contractor	Seal with mastic all accessible air ducting with pressure pan readings in excess of 1.5 Pascal's	☐Yes ☑No	☐Item Repaired ☐Item not Repaired				
☑Shell Contractor	Install 6 mill plastic vapor barrier or equivalent throughout the floor of the crawl space. Extend vapor barrier 12 to 16 inches up the foundation wall, overlap sections by 6 inches. Secure in place. 12 to 16 inch lap on foundation wall not required below manufactured homes. SQ. FT. = Aprox 500 new needed, spread out existing throughout.	☑Yes ☐No	☐Item Repaired ☐Item not Repaired				

Recommended Work Scope

Assigned To	Item	Other Necessary Repair	Repair Status	Auditor	Date	Time	Additional Comments
☑Shell Contractor	Insulate and gasket crawl space access door	☐Yes ☑No	☐Item Repaired ☐Item not Repaired				
☑Shell Contractor	Insulate Foundation wall to R10 or equivalent. 1.5 inches of Closed Cell Spray foam acceptable. Insulation must extend 2 feet below grade and remain 6 inches above ground. Spray foam applied on basement wall shall have a suitable ignition barrier ☑Crawl Space Aprox 145 lf or 290 sqft @ 2' down	☐Yes ☑No	☐Item Repaired ☐Item not Repaired				
☑Shell Contractor	Install R-10 Rigid foam board in foundation vents. Vent covers can be secured in place with spray foam designed to be cut for removal if necessary.	☐Yes ☑No	☐Item Repaired ☐Item not Repaired				

Recommended Work Scope

Assigned To	Item	Other Necessary Repair	Repair Status	Auditor	Date	Time	Additional Comments
☑Shell Contractor	Insulate Rim Joists with R-19 Batt or equivalent. A combination of spray foam and batt insulation is acceptable. Under no circumstances shall the spray foam exceed 2 inches. ☑Crawl Space Aprox 145 lf	☐Yes ☑No	☐Item Repaired ☐Item not Repaired				
☑Shell Contractor	Insulate with appropriate pipe insulation hot and cold water piping within 6 feet of the Water Heater. Secure insulation in place with zip ties or mechanical fastener, Provide 6 inch clearance to draft hood or single wall exhaust pipe. Provide 1 inch clearance to B vents.	☐Yes ☑No	☐Item Repaired ☐Item not Repaired				
☑Shell Contractor	Document zone reading, interim and final Pressure Pan Readings in the attached audit table. Document Daily Test out if applicable in a Daily Test out form. Leave copy of final work scope and pressure pan results and Daily test out information near the furnace or in a readily accessible area.	☐Yes ☑No	☐Item Repaired ☐Item not Repaired				

Table 4
Pressure Pan Table
Completed at Diagnostic Audit

Location Duct	Auditor	Contractor	Contractor	Final Auditor	Location Duct	Auditor	Contractor	Contractor	Final Auditor
Zone PD Supply	Initial PD:	Interim PD:	Interim PD:	PD:	Zone PD Return	Initial PD:	Interim PD:	Interim PD:	PD:
R1: See Print	7				RA1: See Print	1.6			
R2: See Print	3.6				RA2: See Print	0.8			
R3: See Print	3.8				RA3: See Print	1.1			
R4: See Print	1.2				RA4: See Print	1.2			
R5: See Print	2.7				RA5: See Print	1.3			
R6: See Print	5				RA6: See Print	0.6			
R7: See Print	3.3				RA7: See Print				
R8: See Print	6.1				RA8: See Print				
R9: See Print	42.2				RA9: See Print				
R10: See Print	5.2				RA10: See Print				
Total Ducts excess of 1.5	9				Total Ducts excess of 1.5	1			
Average Reading	8.01	#DIV/0!	#DIV/0!	#DIV/0!	Average Reading	1.10	#DIV/0!	#DIV/0!	#DIV/0!

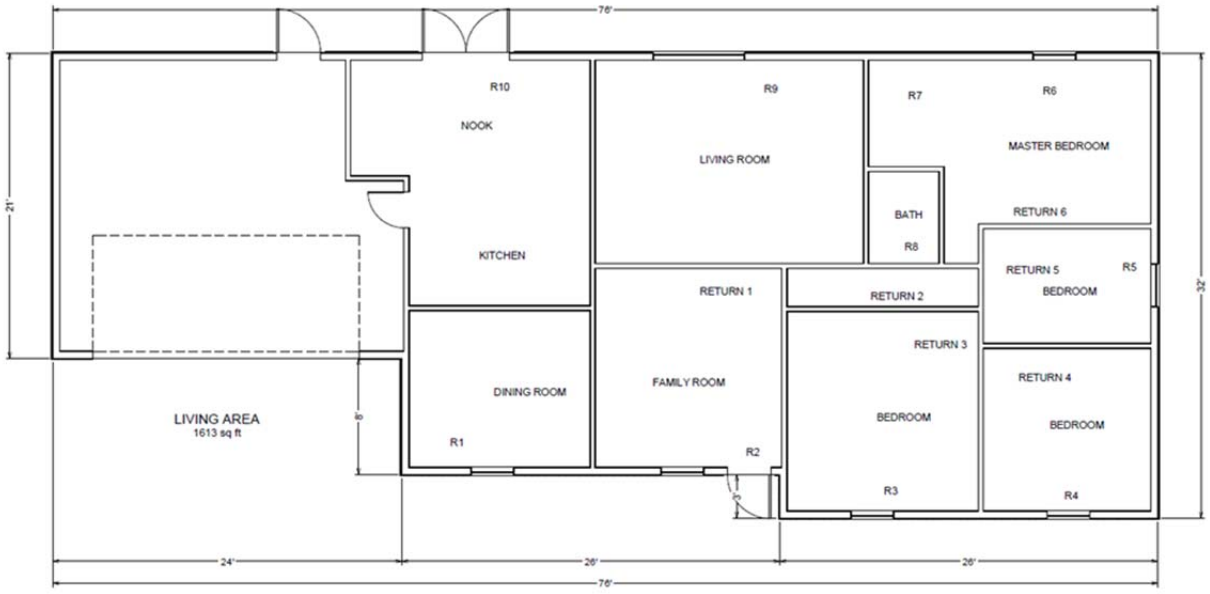
Table 2
Air Leakage & Pressure Differentials
Completed at Diagnostic Audit

Blower Door @ CFM 50	Auditor	Cont Interim	Cont Final	Final Auditor
List:	2914		0	
Pressure Differentials @CFM50 Taken At	Auditor	Cont Interim	Cont Final	Final Auditor
Attic	Not taken			
Crawl	41.2			
Knee Wall				
Bulk head				
Minimum Ventilation Rate	2,034		2,034	2,034
70 % MVR (lowest blower door reading can be)	1,424			
Opportunity for Improvement	1,490			
Contractors Final Improvement			1490	
Final Auditor Improvement				1490

House Configuration Table

House and Blower Door Configuration	Auditor List	Cont Final	Final Auditor
Door used	Main Entry Door	Please Select	Please Select
Ring	Open	Please Select	Please Select
Interior doors	Open	Please Select	Please Select
Exit Doors	Closed	Please Select	Please Select
Common Doors Open	N/A	Please Select	Please Select
Common Doors Closed	N/A	Please Select	Please Select
Registers outside thermal boundary need sealed.	N/A	Please Select	Please Select
Special Weather Conditions	None	Please Select	Please Select

Insert Floor Plan If Diagnostic Audit Performed



Insert pricing Sheet If Diagnostic Audit performed

2014 PRICING FORM									
updated 3/18/13	Auditor Pre-Blower Door	2,914							
	Minimum Ventilation Rate	2,034							
	70% MVR	1,424			max air sealing hours:		0.00		
	Opportunity CFM	1,490	Contractor Post Blower Door:						
	Contractor Post Blower Door	0							
	Auditor Post Blower Door	0			Client:	Bill Smith		Address:	100 South Maple
		DNR	Shell Co	Approve	Quantity	Cost / Material	Method	Quantity / Labor	Estimate
AIR SEALING									
Opportunity Blower Door Directed Air Sealing: Locate & seal all accessible by passes			x		0.00	$10.00	TBD	0.00	$0.00
Contractor Blower Door Directed Air Sealing: Locate & seal all accessible by passes					0.00	$10.00	TBD	0.00	
Final Auditor Blower Door Directed Air Sealing: Locate & seal all accessible by passes					0.00	$10.00	TBD	0.00	
Manager Adjusted Blower Door Directed Air Sealing: Locate & seal all accessible by passes			x	x	6.00	$10.00	TBD	6.00	$353.94
Contractor Performed Diagnostic Testing			x	x	1	$150.00	Per Unit	1.50.00	$150.00
Contractor Minimum trip charge						$150.00	Per Unit	1.50.00	$0.00
Duct Work Air Sealing									
Seal distribution lines with mastic/UL181 tape in excess of 1.5			x	x	10	$5.00	Per Unit	5.00	$294.95
Crawl Space Air Sealing									
Build, install & insulate crawl space hatch (time/mat)						$125.00	Per Unit	0.00	$0.00
Insulate and gasket crawl space access opening			x	x	1	$30.00	Per Unit	1.00	$78.99
Seal bypasses for bulk moisture Transfer						$10.00	Per Unit	0.00	$0.00
Air Seal joist pockets between basement and Crawl space						$2.00	Per Unit	0.00	$0.00
Attic Fiberglass Blanket Insulation									
Install R 19 fiberglass batt to attic						$0.60	Square Feet	0.00	$0.00
Crawl Space Insulation									
Insulate crawl space perimeter w/ R 10 foamboard per sq ft			x	x	290	$1.55	Square Feet	5.80	$733.64
Insulate crawl space rim joist w/ 2" spray foam per ln ft						$4.23	Linear Feet	0.00	$0.00
Insulate crawl space rim joist w/ R 19 batt per ln ft			x	x	145	$0.41	Linear Feet	3.63	$237.04
Insulate crawl / basement common opening per sq ft						$0.50	Square Feet	0.00	$0.00
Insulate vents			x	x	8	$1.50	Per Unit	2.00	$109.96
Insulate cantilever foundation wall per sq ft						$1.14	Square Feet	0.00	$0.00
CONTRACTOR WATER SYSTEM TREATMENT									
Insulate water lines within 6 feet of water heater			x	x	1	$30.00	Per Unit	0.50	$54.50
Crawl Space									
Install 6 mil vapor barrier			x	x	500	$0.15	Square Feet	2.50	$197.48
									Estimate
TOTAL Contractors									$2,210.51

Utility Rebates

Receive up to $350 for sealing and insulating your home!

The Smart $aver Insulate and Seal program provides incentives for improving the efficiency of your home and duct system. Call one of our Participating Contractors and have your home evaluated today.

Program rules and requirements:

- To be eligible for the Insulate and Seal incentives, the service must be performed by a Participating Contractor.
- The Insulate and Seal service must be completed in its entirety, and result in your home or duct system's efficiency improving, as determined by pre and post measurements that will be taken by your contractor.
- Your contractor must submit the completed application within 90 days of service in order for you to be eligible for the incentive.

40% of the total cost up to $450 - Attic Insulation
R-value of previously existing attic insulation must be equal to or less than R-8 and an R-value of R-38 or greater upon completion of attic insulation.

40% of the total cost up to $450 - Wall Insulation & Insulation for Enclosed Ceiling Cavities
R-value of previously existing wall and enclosed ceiling cavities insulation must be equal to or less than R5 and an R-value of R13 or greater upon completion of insulation.

Up to $400 - Duct Sealing
The majority of the duct system must be located outside conditioned space with no more than 40% located within the conditioned space of the house. Duct work must be sealed with approved mastic at a thickness of 1/16th of an inch or approximately the thickness of a nickel.

Approved Contractors:

Insulation: http://www.vectren.com/cms/assets/pdfs/rebates/insulation_contractors.pdf

Duct Sealing: http://www.vectren.com/cms/assets/pdfs/rebates/ductsealing_contractors.pdf

Diagnostic Audit Photos



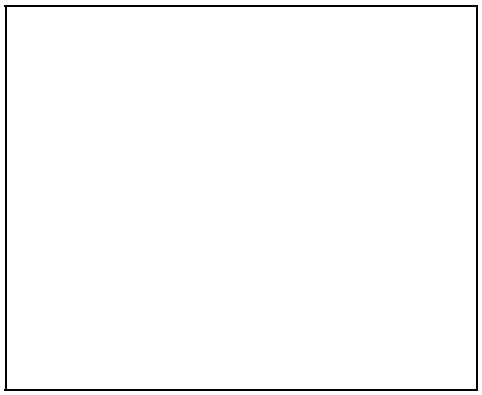
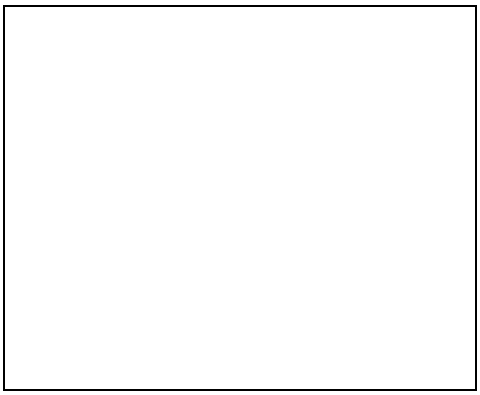
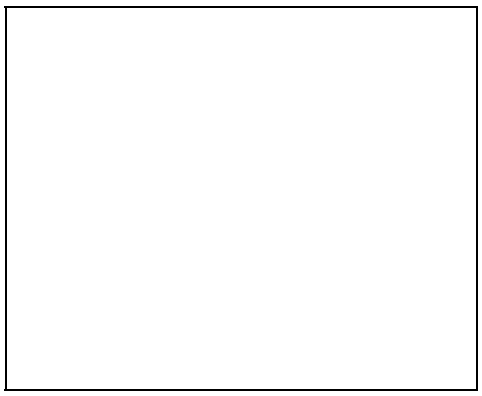
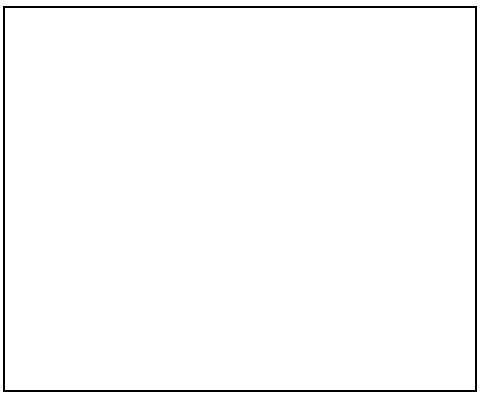
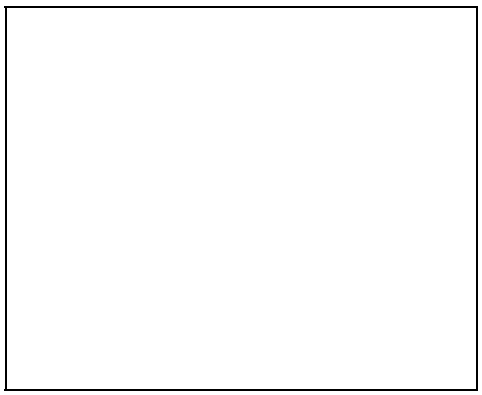
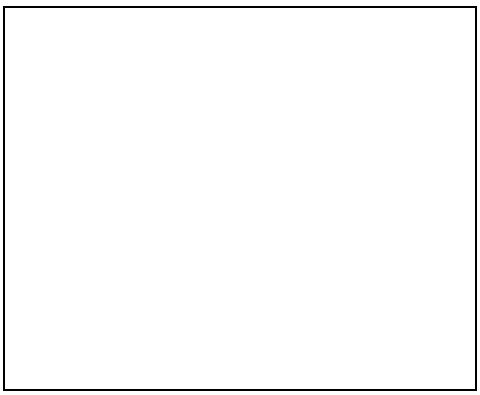



Diagnostic Audit Photos

Manometer Reading Photo

Final Audit Photos

Final Audit Photos

Final Manometer Reading Photo

GLOSSARY OF TERMS

Whole House Air Leakage:
Whole House Air Leakage is a major contributor to both high energy bills, and the inability to keep the building at a comfortable temperature. As heated air rises, it escapes out of holes in the building envelope, escaping into the attic and out of the building. This rising air creates low pressure in the lower part of the building which draws cold unconditioned air into the house from wherever the house is least sealed. When it is windy- which often coincides with those periods when heating is the most important- we see even greater rates of air change.
Replacement air is often drawn from unwanted areas such as crawlspaces, the garage, wall cavities, combustion appliance zones (CAZ), and chimneys. Air from these areas can increase moisture levels, bring dust and hazardous fumes into the living space, and cause a number of indoor air quality issues. Reducing the whole house air leakage not only will tightening up the building and decrease your heating load, it will also increase your building's efficiency and indoor air quality. Finding and eliminating sources of leakage will be the single most important challenge in the process of improving your building's comfort and efficiency. The areas we will achieve this most effectively include: air sealing, doors, and floor and ceiling joists accessible from the attic and crawlspace

Air Duct Leakage:
The U.S. Department of Energy determined that an average of 25% to 40% of heating and cooling energy is lost through duct system leakage. Duct leakage has a major impact on indoor air quality and energy efficiency. Return ductwork air leaks draw air into the house from crawlspaces, garages, and attics. This leakage can bring unconditioned air, dust, mold spores, insulation fibers and other contaminants into the building. Leaking supply ducts will tend to depressurize the home, drawing air from wherever is most accessible to try and balance the pressure. Often this air will come from interior walls, crawlspaces or other unconditioned areas. Delivery system repair and/or replacement will significantly improve both system performance and indoor air quality.

Air Barrier and R Value:
An *air barrier* is any material that restricts the flow of air and can thereby serve to prevent air from leaking in and out of a building. In wall assemblies, the exterior air barrier is typically a combination of sheathing and either building paper, house wrap, or board insulation. The interior air barrier is often an interior finish, like gypsum board. A *thermal barrier* restricts or slows the flow of heat. This is accomplished through insulation including fiberglass batts, rock wool, blown cellulose, vermiculite, spray foam and rigid board insulation. Regardless of which material is used, insulation is not fully effective unless it is installed properly –that is, continuously aligned with a contiguous air barrier. Insulation works because it is resistant to the flow of heat- that is, it slows the conduction of heat. This resistance to heat flow is measured by the R-value of the material. However, most insulation products (with the exception of closed foam insulation) do a poor job at stopping air flow

Base Load
The energy or fuel that is consumed by household devices that has little to no dependence on outside air temperature including, but not limited to, lighting, kitchen and cleaning appliances such as refrigerators, freezers and the like, domestic hot water, and electronics. The Base Load is calculated by the average of the lowest 3 months of kilowatt usage.

Seasonal Load
The energy or fuel that is consumed by household devices that is dependent on outside air temperature. These items are limited to Furnaces, and Air Conditioners. The Seasonal Load is calculated by subtracting the Base Load from the Seasonal Load.

Phantom Load
Any appliance that consumes power even when it is turned off. Examples of phantom loads include equipment chargers, appliances with electronic clocks or timers, appliances with remote controls, and appliances with wall cubes (a small box that plugs into an AC outlet to power appliances). Phantom loads can be a significant part of a household's electric use.

ACH Air Changes per Hour - The number times in one hour the entire volume of indoor air in a house or room is replaced with outdoor air through ventilation and infiltration, usually measured in cubic feet per hour. Your house should have minimum whole house ventilation equal to 0.35 air changes per hour.

Air Infiltration - The amount of air leaking into the home through the walls, floor, and ceiling. Excessive amounts of air infiltration cause uncomfortable, drafty rooms and high energy bills. Common places of air infiltration include chimneys, attic access hatches, and plumbing and electrical penetrations.

Air Sealing - Sealing penetrations in the walls, floor, and ceiling where outside air enters the home. It's the most cost-effective way to improve the energy efficiency of a home.

Annual Fuel Utilization Efficiency (AFUE) - The measure of seasonal or annual efficiency of a residential heating furnace or boiler. It takes into account the cyclic on / off operation and associated energy losses of the heating unit as it responds to changes in the load, which in turn is affected by changes in weather and occupant controls.

Back drafting - The flow of air down a flue or chimney and into a house caused by low indoor air pressure that can occur when using several fans or fireplaces or if the house is very tight.

Blower Door - A device used by energy auditors and raters to pressurize a building to locate places of air leakage and energy loss.

Btu British Thermal Unit - The amount of heat required to raise the temperature of one pound of water one degree Fahrenheit; equal to 252 calories.

Building Envelope - The structural elements (walls, roof, floor, foundation) of a building that enclose conditioned space; the building shell.

Building Science - The study and practice of constructing buildings so they are durable, safe, and comfortable to be in, taking into account the building materials, the occupants, and the equipment and other items in the building.

Carbon Monoxide - A colorless, odorless but poisonous combustible gas with the formula CO. Carbon monoxide is produced in the incomplete combustion of carbon and carbon compounds such as fossil fuels (i.e. coal, petroleum) and their products (e.g. liquefied petroleum gas, gasoline), and biomass.

CFLs Compact Fluorescent Lights - A smaller version of fluorescent lamps that can directly replace standard incandescent lights. These lights consist of a gas filled tube and a magnetic or electronic ballast. The newer CFLs are vastly improved. They fit in most light fixtures and have warmer color tones and longer life. They will reduce the energy used by 75% over an incandescent bulb, and last 6-10 years.

CFM50 - The amount of cubic feet per minute (CFM) of air moving through a structure and measured at 50pascal pressure.

CFM natural - The cubic feet of air flowing through a house from indoors to outdoors during typical, natural conditions. This figure can be roughly estimated using a blower door.

Chimney (or Stack) Effect - The tendency of heated air or gas to rise in a duct or other vertical passage, such as in a chimney, small enclosure, or building, due to its lower density compared to the surrounding air or gas.

Convective Air Flow - Air movement where less dense (warmer) air is displaced by more dense (cooler) air. Often expressed by the phrase "hot air rises." Convective air flow can be useful if controlled, as in gravity hot air heating systems, but is more often a contributor to heat loss.

Degree Day - A unit for measuring the extent that the outdoor daily average temperature (the mean of the maximum and minimum daily dry-bulb temperatures) falls below or above an assumed base temperature, normally taken as 65 degrees Fahrenheit, unless otherwise stated. One degree day is counted for each degree below (for heating) or above (in the case of cooling) the base, for each calendar day on which the temperature goes below or above the base.

Distribution System (Heating and Cooling) - That part of a central heating system used to deliver heated transfer media to the living space, and return the cooled transfer media to the appliance for re-heating. In a forced air system this includes the blower, ducts, registers, dampers, and cold air returns. In a hot water system this includes circulators, supply lines, radiators, and return lines.

Ducts - The round or rectangular tube(s), generally constructed of sheet metal, fiberglass board, or a flexible plastic-and-wire composite, located within a wall, floor, and ceiling that distributes heated or cooled air in buildings. It is important that ducts be insulated and sealed properly when in unconditioned space to avoid unnecessarily high utility bills. The best practice would be to not put ducts in unconditioned space.

EER Energy Efficiency Ratio - The measure of the instantaneous energy efficiency of room air conditioners; the cooling capacity in Btu / Hr divided by the watts of power consumed at a specific outdoor temperature (usually 95 degrees Fahrenheit). While the SEER considers year long efficiency (kWh), EER is a measure of the maximum use at a given time (kW).

ENERGY STAR Qualified Products - Appliances and other products that meet strict energy efficiency guidelines set by the EPA and DOE. Products in more than 50 categories are eligible for the ENERGY STAR label. They use less energy, save money, help protect the environment, and are identified with the ENERGY STAR label.

Exfiltration - The movement of air out of a building. Often refers to warm air leaving a building due to pressurization, infiltration, wind, stack effect, and / or convective flow.

Heat Gain - The amount of heat introduced to a space from all heat producing sources, such as building occupants, lights, appliances, and from the environment, mainly solar energy.

Home Heating Index - The number of Btus of energy used by a home divided by its area in square feet, then divided by the number of heating degree days during the time period.

House as a System (Whole House System) - The approach to home design, building, remodeling, and weatherization that recognizes how all the features in a home are connected -and that changing one component can greatly affect another part of the house. It is based on the principles of building science and relies on diagnostics to verify results. Using this approach will improve not only the overall energy efficiency of the home, but also its comfort, indoor air quality, safety, durability and affordability.

Humidity - A measure of the moisture content of air; may be expressed as absolute, mixing ratio, saturation deficit, relative, or specific.

HVAC Heating, Ventilation, and Air-Conditioning System - All the components of the appliance used to condition interior air of a building.

IAQ Indoor Air Quality - The quality of indoor air relative to its acceptability for healthful human habitation. Assessing and improving, when necessary, the quality of indoor air is a major concern of home performance and weatherization. In particular, all by-products of major combustion appliances must be directly evacuated to the outdoors under all operating conditions.

Infrared Thermography - The science of using infrared imaging to detect radiant energy or heat loss in a building. The infrared camera or scanner electronically senses heat radiated by objects and converts that thermal energy into images visible to the human eye. Some scanners can automatically record these images on video. Used in conjunction with a blower door, the scanner can provide valuable data about air leakage sites and thermal bypasses.

Kilowatt-hour (kWh) - The most commonly-used unit of measure telling the amount of electricity consumed over time. It means one kilowatt of electricity supplied for one hour. A kilowatt-hour is the equivalent of using ten 100-watt light bulbs for one hour.

Low-E Windows - Windows that are coated with a metallic glass (low emissivity) film to resist the flow of radiant heat.

Manual J - The standard method for calculating residential cooling loads developed by the Air-Conditioning and Refrigeration Institute (ARI) and the Air Conditioning Contractors of America (ACCA) based largely on the American Society of Heating, Refrigeration, and Air-Conditioning Engineer's (ASHRAE) "Handbook of Fundamentals."

Phantom Load - Any appliance that consumes power even when it is turned off. Examples of phantom loads include equipment chargers, appliances with electronic clocks or timers, appliances with remote controls, and appliances with wall cubes (a small box that plugs into an AC outlet to power appliances). Phantom loads can be a significant part of a household's electric use.

Pressure Pan Test – Commonly used to test duct leakage in conjunction with a blower door. Results above 1.5 Pascal's should be repaired. The U.S. Department of Energy determined that an average of 25% to 40% of heating and cooling energy is lost through duct system leakage. Duct leakage has a major impact on indoor air quality and energy efficiency.

Pressurization (Blower Door) Testing - A diagnostic technique that uses a blower door to locate areas of air infiltration by exaggerating the defects in the building shell. This test only measures air infiltration at the time of the test. It does not take into account changes in atmospheric pressure, weather, wind velocity, or any activities the occupants conduct that may affect air infiltration rates over a period of time.

Relative Humidity - A measure of the percent of moisture actually in the air compared with what would be in it if it were fully saturated at that temperature. When the air is fully saturated, its relative humidity is 100 percent.

R-Value - A measure of the capacity of a material to resist heat transfer. The R-Value is the reciprocal of the conductivity of a material (U-Value). The larger the R-Value of a material, the greater its insulating properties.

Therm - A unit of heat containing 100,000 British thermal units (Btu). 100,000 Btu's equals 29,307 watts.

Thermal Bypass - Similar to a convection loop, this structural heat loss is characterized by heated air traveling up exterior or interior stud cavities and leaking out the top of that cavity to the attic through joints and cracks in the framing, wiring, and plumbing holes, etc. These types of heat loss sources are sometimes the most difficult to locate.

U-Value (Coefficient of Heat Transmission) - The reciprocal of R-Value. The lower the number, the greater the heat transfer resistance (insulating) characteristics of the material.

Ventilation - The process of moving air (changing) into and out of an interior space either by natural or mechanically induced (forced) means.

Ventilation Air - That portion of supply air that is drawn from outside, plus any re-circulated air that has been treated to maintain a desired air quality.

Weatherization - Modifying a home or building to conserve energy. Methods include: sealing windows and door frames with caulking or gaskets, installing storm doors and windows, adding or increasing the insulation value, and upgrading appliances and equipment.

WEATHERIZATION COMPLETION FORM
Sherlock Homes Inspection Service Inc.
Completed if Final Audit Performed

Address: 100 South Maple Somewhere Indiana

Date: Click here to enter a date.

The work listed in the final work scope has been completed by the weatherization contractor.

☐Yes ☐No

CLIENT APPROVAL

Signature of Client:_____

Print Name:_____Telephone:_____

I have been made aware that the home is:

☐Above the Minimum ventilation rate and additional air sealing opportunities should be considered. Initial_____

☐Within 70 % of the minimum ventilation rate and fresh air ventilation should be considered. Initial_____

☐Below 70% of the minimum ventilation rate and continuous ventilation should be installed. Initial_____
I understand that installing continuous ventilation is beyond the scope of this weatherization program.

INSPECTOR OR CONTRACTOR

I hereby certify that all weatherization work activities have been completed in a satisfactory manner.

☐Yes ☐No

Signature of Inspector or Contractor: _____

Print Name: _____

WE VALUE YOUR FEEDBACK: (Check any that apply)

Sherlock Personnel:

☐Prompt to appointments ☐Courteous on phone and in person
☐Provided valued information ☐Demonstrated pride in workmanship
☐Other

Weatherization Contractors

☐Prompt to appointments ☐Courteous on phone and in person
☐Provided valued information ☐Demonstrated pride in workmanship
☐Other

PLEASE USE THE SPACE BELOW OR ON THE BACK FOR ANY COMMENTS YOU WOULD LIKE TO ADD.