Your Home Energy Audit

Home

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Audit Date

Apr 3, 2018
09:00 am

Audited By

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Office (802) 438-2303

Thank you for having me in your home and allowing HEAT Squad to help make your home more energy efficient.

As you will see in this report there are many opportunities to save money and be more comfortable in your home. A comprehensive energy retrofit has benefits beyond fuel savings such as increased building durability and increased comfort. Please consider these recommendations and look into low interest NeighborWorks financing to help make these recommendations an affordable reality!

Please let us know how we can help you moving forward.

Inside Your Report

Concerns

We listened to you!

As our client, we want to make sure we are addressing all of your concerns for your home. If we have missed any concerns in this report, please let us know right away.

Save Money

Reduce fuel usage and lower your energy costs.

Increased Comfort

Regulate temperatures throughout home. Keep rooms warmer during Winter months and cooler during Summer months. Eliminate drafts

Lower Your Carbon Footprint

If the projects outlined in this report are completed, you are looking at an overall Energy Reduction of 37%, a Carbon (CO2) Savings of 7 tons. That's the equivalent 1.5 cars removed from the road annually.
That's really great!

Project Cost - $1,635 Incentives + *($400 + $500 + $800)

If you complete all of the air sealing and insulation measures outlined in the following report you will be eligible for the estimated Efficiency Vermont Incentives listed above. If you change the work scope or reduce the amount of work completed, you will likely receive less incentive money.

In order to receive any incentives, the project must get at least a 10% reduction in air leakage as measured by the HEAT Squad follow up blower door test. Additionally, any health and safety issues would need to be addressed and remedied before incentives are approved.

*Potential point-of-purchase rebates through Efficiency Vermont.
Check www.efficiencyvermont.com for a comprehensive list of all available rebates and incentives.

Moisture

Remediate moisture infiltration and regulate humidity levels throughout house.

Indoor Air Quality

Improve indoor air quality.

Solutions for Your Home

Totals

Approximate Cost

$ 13,900

This is a ballpark guess. Ask your contractor for a detailed bid.

Estimated Savings

$1,619 per year

This is an estimate of how much you could save starting in Year 1. Savings will only increase as energy prices rise over the years.

Impact of upgrades

Energy Reduction	37%
Carbon (CO2) Savings	7 tons
Equivalent cars removed from the road	1.5/yr

Call us today to ask a question or discuss the next step!

DETAILS	APPROXIMATE INSTALLED COST	APPROXIMATE ANNUAL SAVINGS
Reduce Air Leakage by 25%	$ 1,100	$ 192
Insulate Basement Walls	$ 4,500	$ 482
Insulate Crawl Space Walls	$ 3,000	$ 371
Airseal & Insulate Attic Flat	$ 2,900	$ 286
Upgrade Water Heater	$ 2,400	$ 287
Health and Safety		
Moisture		
Home Performance Opportunities		

Reduce Air Leakage by 25%

AIR LEAKAGE

Approximate installed cost

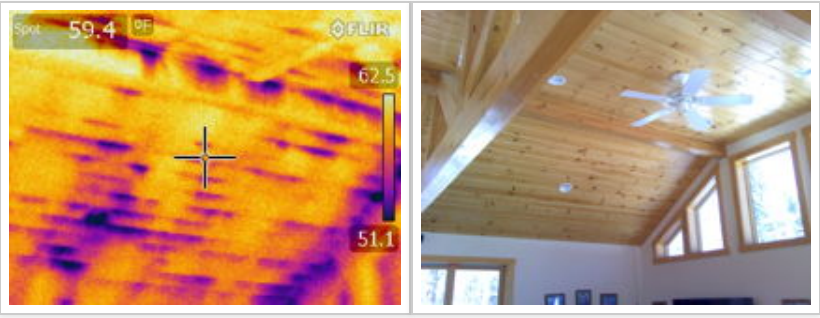
$1,100

Energy Savings

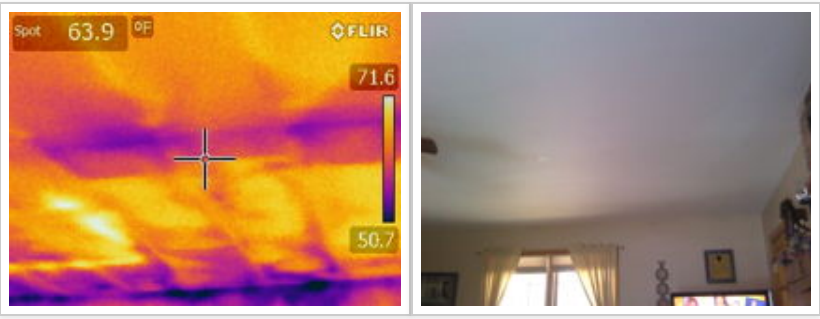
Approx. $192

Why it matters

Air sealing is typically the most cost effective improvement you can make to your home. What ends up having the most profound impacts on reducing air leakage rates are retrofits to entire sections of your home's thermal boundary. Installing or establishing air barriers in attics, sloped ceilings, kneewalls, basements, and crawlspaces where none is present will dramatically increase the comfort of your home and help you save significant energy.



Your home is very leaky, as measured by the blower door test. Your blower door number was **4500 CFM50** and that equates to you heating the volume of air in your house **19.5 times a day**. To put that in context, the average Energy Star home is measured at 8 air changes a day.



Your extremely high air leakage rate is less about specific areas of leakage and more a result of systemic thermal boundary and air barrier flaws in the building envelope. There was never any intention when the home was built, 100 plus years ago, for the home to be airtight. There is no house wrap, no blocking, open interior wall tops, etc. There is no air barrier in the attic space, the exterior walls are not air tight (and largely empty), and the basement is very leaky as well.

What ends up having the most profound impacts on reducing leakage rates are systemic retrofits to entire sections of your home's thermal boundary when completed by a BPI certified Home Performance Contractor. Installing or establishing air barriers in attics, sloped ceilings, kneewalls, basements, and crawlspaces where none is present is the way to most effectively reduce your home's air exchange.

Reduce Air Leakage by 25%

AIR LEAKAGE

Approximate installed cost

$1,100

Energy Savings

Approx. $192

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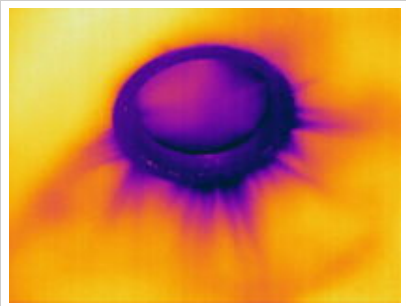
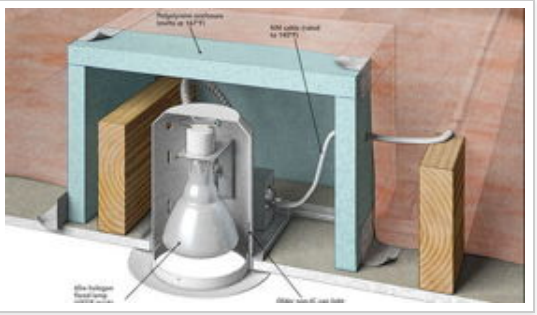
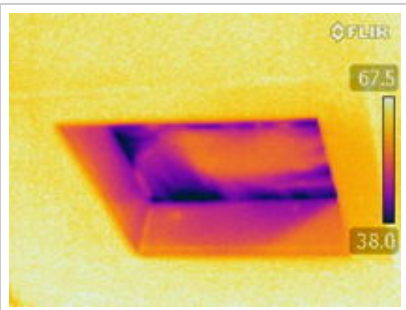
Air sealing is typically the most cost effective improvement you can make to your home. What ends up having the most profound impacts on reducing air leakage rates are retrofits to entire sections of your home's thermal boundary. Installing or establishing air barriers in attics, sloped ceilings, kneewalls, basements, and crawlspaces where none is present will dramatically increase the comfort of your home and help you save significant energy.

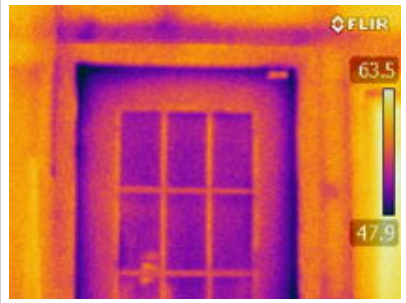


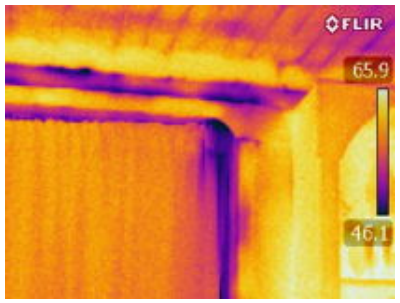


Air leakage at Can Lights and typical solution



Air leakage at attic hatch and typical solution:





Air leakage at exterior doors, doors leading to unconditioned space and fenestrations:

Insulate Basement Walls

BASEMENT

Approximate installed cost

$4,500

Energy Savings

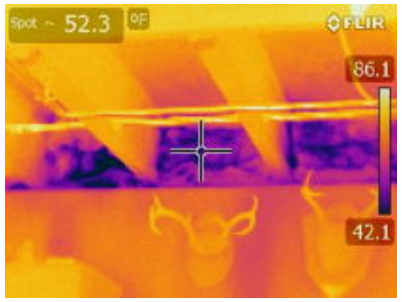
Approx. $482

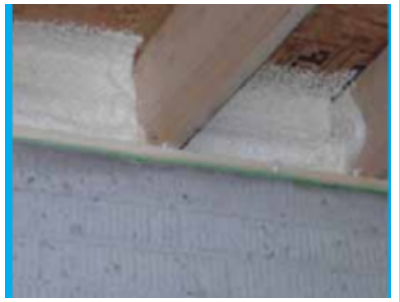
Why it matters

Insulating your basement walls will increase the overall temperature of your basement and make the floors above more comfortable. If heating systems are located in the basement the systems will function more efficiently. This is the most often recommended weatherization measure due to it's relative simplicity, and high return on investment.

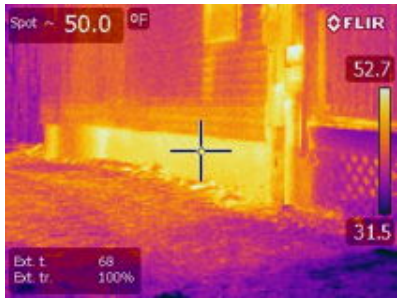
Spray foam insulation on the interior surface of at least the top 4’ of basement walls or a minimum 2' below foundation exposed to the exterior where possible.

Any exposed foam must include a 15 minute ignition barrier.





Remove existing fiberglass if present in box sills and replace with either spray foam or rigid foam. If rigid foam is utilized, care should be taken to assure complete air sealing of box sills and top plate(s).



By insulating the interior of your foundation, you will be able to eliminate tremendous amounts of heat loss that can be seen in this IR images from the outside.

Insulate Crawl Space Walls

CRAWL SPACE

Approximate installed cost

$3,000

Energy Savings

Approx. $371

Why it matters

Insulating your crawl space will increase the overall temperature of the space and make the floors above it more comfortable. Crawlspaces can be improved by sealing off any vents to the outside, insulating the foundation walls, and installing a vapor barrier on top of the dirt floor. Any heating or water lines will be better protected from freezing.

Spray or install rigid foam insulation on the interior surface of crawlspace walls. Any exposed foam must include a 15 minute ignition barrier. There are some instances where insulation can be installed to the exterior surface of the foundation and should be protected from incidental damage and the sun.

Moisture issues must be addressed prior to reducing air infiltration. All exposed earth or wet crawlspace floors should have a sealed vapor barrier to prevent moisture caused mold an structural damage. The vapor barrier should be protected from damage in areas of foot traffic. If the crawlspace has significant water infiltration other treatments may be required to keep or get the water out of the basement such as gutters exterior drainage or interior French drains and sump pumps.

Airseal & Insulate Attic Flat

ATTIC

Approximate installed cost

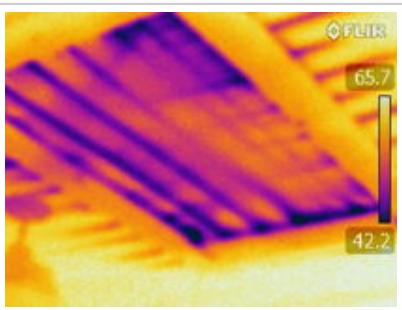
$2,900

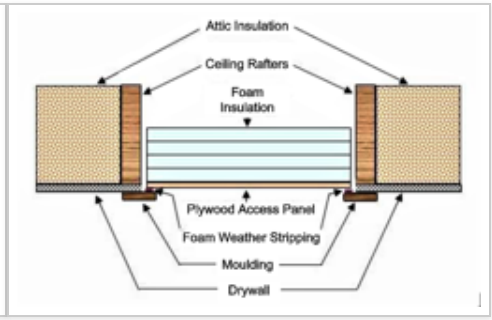
Energy Savings

Approx. $286

Why it matters

Adding insulation to your attic can lead to a significant reduction in your energy costs. This process will be combined with careful air sealing of the attic to ensure the new insulation performs at its maximum level.





Openings used for access to the attic such as hatches and scuttles, doors into knee walls, and drop-down stairs should be air sealed and insulated.

Any attic work must first start with creating a comprehensive air barrier along the attic floor. In many homes, especially older homes with plaster and lathe, the best way to fully seal the attic flat is with a continuous layer of closed cell spray foam.

A thick blanket of cellulose can be installed after air sealing to bring your attic to the R50 energy code and beyond. Cellulose is a recycled newspaper product and is treated to be both fire and rodent resistant. The image on the left is your attic and the image on the right is what your attic might look like after an insulation upgrade project.

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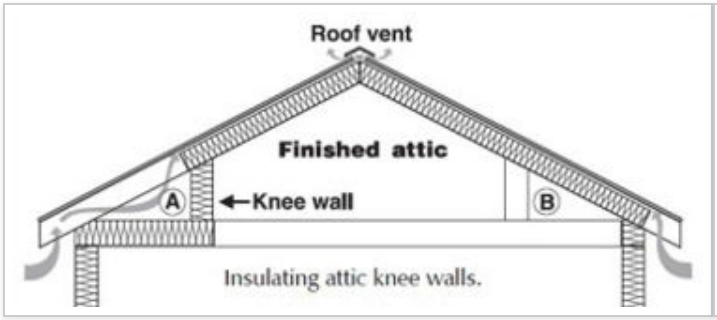


Knee walls are vertical walls with attic space directly behind them. They are often found in houses with finished attics, dormer windows, or above a garage areas. The knee wall should be conditioned to the same values as an exterior wall. In many cases, the insulation can be moved from the floor and wall (A) to the underside of the roof deck (B), as can be see in the image on the left. This is often done with spray foam insulation, like the image on the right.

Skylight Shafts: Skylight shaft walls should be insulated to the same R-value as other exterior walls if the attic they pass through is not insulated.

Upgrade Water Heater

WATER HEATER

Approximate installed cost

$2,400

Energy Savings

Approx. $287

Why it matters

High efficient hot water heaters save energy and are safer due to carbon monoxide. Older units run the risk of leaking. Consider replacement if your hot water heater is 13 or more years old.

Install a heat pump hot water heater, like the Rheem Performance Platinum, Bradford White Aerotherm, or a similar model by another manufacturer. These units look like a traditional hot water heater (with the heat pump unit on top) and create hot water at 250% -310% efficiency. These units are estimated to use 1416 kWh annually (for an average size family). Based on current Vermont electrical costs, that is only $182 annually.

These units also dehumidify at these same high efficiencies, so if you run a traditional dehumidifier (even an Energy Star one) there are significant additional electrical savings that are not reflected in the savings number above.

Limited Time Offer of up to $500 on all sizes of qualifying Hybrid Heat Pump Water Heaters through June 30th, 2018.

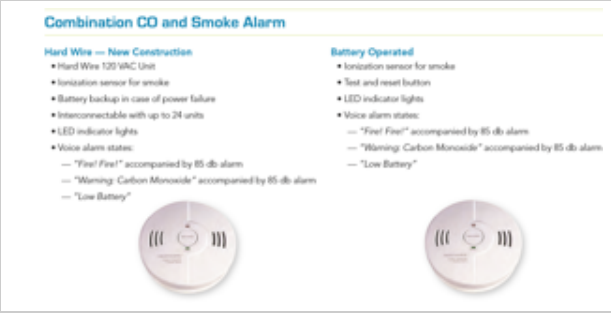
Health and Safety

CUSTOM MEASURE

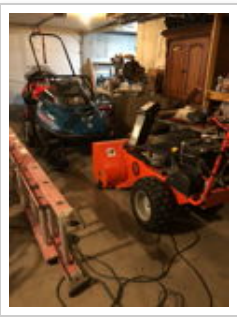
Approximate installed cost

Why it matters

CO is the largest cause of injury and death from gas poisoning resulting in more than 500 deaths per year. Even at low concentrations it reduces our nerve reaction times and can cause headaches, nausea and drowsiness. Heating Oil spills are dangerous and remediation costs are very expensive. Groundwater and drinking water can become contaminated and indoor air quality after a spill is a serious safety concern.



It is important to install CO and smoke detectors in the vicinity of attached garage and on every level of the home per manufacturer's instructions.



Your attached garage, makes it particularly important to monitor Carbon Monoxide and contain potential motor vehicle emissions and VOCs from entering the home. Creating a tight air and fire barrier in the garage space is of vital importance.

Fuel oil tanks need to be inspected at minimum every three years. The legs on your current tank are leaning and in disrepair -- the legs are critical to the stability of your tank and are a common cause of failure.

The copper feed line should be coated and not have contact with the ground or concrete surface and should have a sleeve or coating as pictured above:

There may be removal and repair rebates available through the State of Vermont in 2019. Please refer to the following site for updates:

https://dec.vermont.gov/waste-management/storage-tanks/aboveground

Moisture

CUSTOM MEASURE

Approximate installed cost

Why it matters

Moisture in your home can present health and safety concerns by leading to mold and bacterial growth. It can create conducive environments for pests and threaten the structural integrity of your house. It is important to correct your moisture problem as close to the source of the water origin as possible. The best solution is to prevent the water from entering your home.

Attics

- Any moisture in the attic needs to be addressed by eliminating the path of entry. Fix any leaks. Removing the source of condensation by directing all vents to the exterior and not allowing warm moist air from the house from entering the cooler attic. Air sealing will often accomplish this. Proper ventilation of the attic will allow any small amount of moisture that finds its way in to have a chance to dry out.

Basements

- Leaks in the plumbing should be repaired and condensation eliminated or collected and removed.
- Install gutters or divert water from entering your basement. The water must be directed away from your foundation.
- Intercept the water as it enters your basement and direct it out and away from the building. This can be accomplished by collecting it and sending it out via a daylight drain or sump pump. This is often accomplished by installing an interior curtain drain or referred to as a “French Drain”.
- Dirt floors should be covered with a durable vapor barrier and all joints and seams sealed to keep the moisture out of the house. If the space will be used , it should be protected from damage.

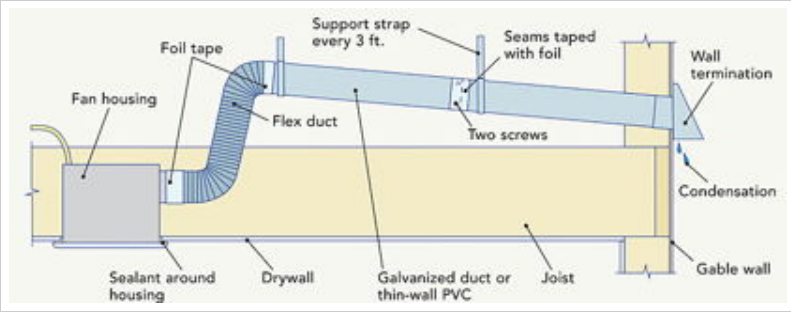
Home Performance Opportunities

CUSTOM MEASURE

Approximate installed cost

Why it matters

Improving Indoor Air Quality and regulating Relative Humidity in the home has proven positive for occupant health. Reducing energy consumption with simple measures such as switching to LED can result in reliable savings on electric utility. Some of the most simple and cost efficient measures have some of the biggest impact.



High Performance Bath Fans
It is highly recommended that exhaust fans be installed in all bathrooms. It is particularly important where showers and baths are located. The fans should have rigid ductwork where possible that slopes to the exterior termination flap to direct any condensation out of the attic. This work is best done before you attic insulation is installed.

Installing an energy efficient and quiet model like the Panasonic Whisper Green Select with a built-in draft preventer and a timer switch that provides automatic runtime will allow ventilation should your house require it.

Upgrade to LED
Continue to replace incandescent light bulbs that are used more than an hour per day with LED bulbs. These bulbs typically reduce lighting energy use by 75%. The technology has come a long way in recent years and LED's now offer a broad spectrum of warm light and are dimmable. There is an LED option for virtually every style of bulb out there.

Home Performance Opportunities

CUSTOM MEASURE

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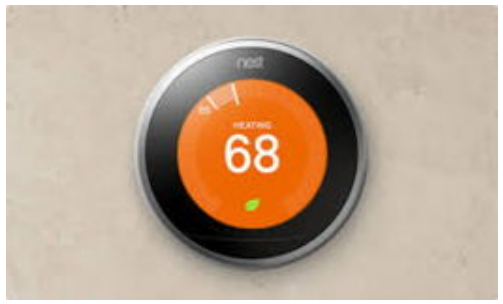
Buy your bulbs in Vermont to take advantage of Efficiency Vermont's outstanding subsidies. With these subsidies most bulbs cost less than $5 a piece.



Programmable Thermostats
Programmable thermostats combine a clock with a thermostat and can save a significant amount of energy, especially for occupants who leave home during the day.

The location of your thermostat can affect its performance and efficiency. Read the manufacturer's installation instructions to prevent "ghost readings" or unnecessary furnace or air conditioner cycling.

Current point-of-sale rebates through Efficiency Vermont are $100 for each thermostat for up to two (limited time).

Solar Power
Consider finding out if your home is a good candidate for solar power.

With a photo voltaic solar system you can produce electricity on your own property and offset the power from your utility. Including efficient heat pump technology you can now heat your home and hot water and control the fuel source. The estimated price does not include eligible tax credits.

Financing

About financing

The loan scenario(s) listed are examples only and are not a formal offer of financing. Rates, terms and closing costs and eligibility requirements may vary.

Energy Loan

THE MATH

Job Cost	$13,900
Cash down and/or Incentives	$ 1,635
Loan amount	$ 12,265
Your loan payment: 4.99 % @ 120 months	$ 130
Estimated energy savings	$ 135
Net Monthly Savings	$ 5

TERMS & CONDITIONS

Minimum Loan	$ 2,500
Maximum Loan	$ 40,000
Min. Cash Down	$ 0
Rate	4.99 %
Term	120 months
Min. FICO Score	620
Closing costs	250

DESCRIPTION

Can be used for Thermal Shell improvements, Weatherization, Heating and Ventilation, Heat pump Technology Energy Efficient Appliances and Renewable Energy. Rebates are estimated

Amanda Moore: amoore@nwwvt.org (802) 797-8106

Metrics

About the metrics

These metrics are for the whole house in a pre and post-retrofit state.

The 'Baseline' savings numbers will likely not be the same as the actual energy consumption of the home. These numbers are weather normalized and then projected based on the 30 year weather normals data from NOAA. In other words, this is the modeled energy consumption of the home for a typical year, not the year that the utility bills were from.

FUELS	BASELINE	IMPROVED	SAVED
Total Fuel Energy Usage therms/year	1,986	1,240	746
Propane Energy Usage gallons/year	85	85	0
Oil Energy Usage gallons/year	1,363	830	533

METRIC	BASELINE	IMPROVED	SAVED
Electric Energy Usage kWh/year	7,101	4,720	2,381
Total Energy Usage MMBtu/year	223.00	140.00	83.00
Fuel Energy Cost $/year	$ 3,401	$ 2,189	$ 1,212
Electric Energy Cost $/year	$ 1,216	$ 808	$ 408
Total Energy Cost $/year	$ 4,617	$ 2,997	$ 1,620
CO2 Production Tons/year	18.9	12.0	6.9
Payback years			8
Total Energy Savings			37%
Total Carbon Savings			37%
Net Savings to Investment Ratio SIR			2.1
Net Annualized Return MIRR			9.0%

HEATING & COOLING LOAD CALCULATIONS		
Heating Load Btu/hr	Base: 92,228	Improved: 62,831
Cooling Load: Sensible Btu/hr	Base: 33,159	Improved: 28,338
Cooling Load: Latent Btu/hr	Base: 800	Improved: 800
Winter Design Temperature	Outdoor: -6°	Indoor: 70°
Summer Design Temperature	Outdoor: 86°	Indoor: 75°