



Energy Audit

*The Janzen House
146 W Spring St.
Marquette, Mi 49855*



350 Foster Creek Rd., Marquette, Mi 49855
Kerry@hesmgt.com
906-361-9183

Observations about the building

Insulation
Windows
Air Infiltration (blower door test)
Mechanical Systems

Heating Cost Graph (unimproved)
Annual Energy Cost (unimproved)
H.E.R.S. Score (unimproved)
Equipment Sizing Summary (unimproved)
Improvement analysis

Add sidewall insulation
Add attic insulation
Perform air sealing

Heating Cost Graph (improved)
Annual Energy Cost (improved)
H.E.R.S. Score (improved)
Equipment Sizing Summary (improved)

Improvement analysis

Disconnect old boiler
Remove combustion air piping

Observations

Insulation Above grade walls are brick exterior, 2 x 4 framing, interior wall covering, no cavity insulation.

Below grade wall where framed and finished are without cavity insulation.

Attic did not have an access panel, however, several locations with large gaping holes which would contribute to warm air rising in the attic, causing snow to melt off of roof deck, and icicles would form at the eaves. **Prior to insulating and air sealing the attic, consult with fire protection system installer to make sure unit will function in attic with freezing temperatures.**



Fire suppression system in attic



One of several holes above suspended ceiling

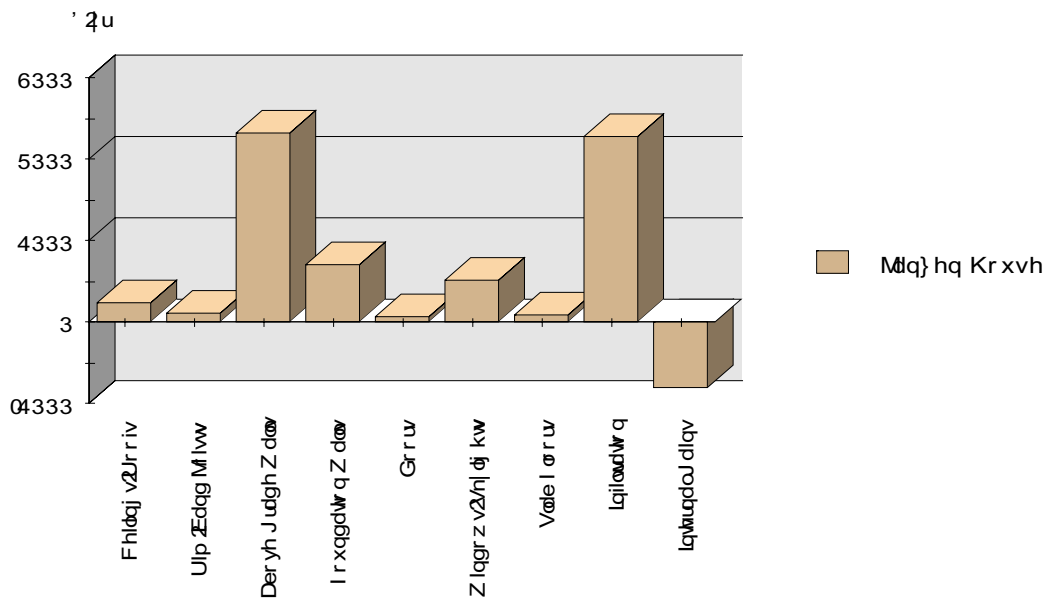
Windows The majority of windows in building have been upgraded to double pane vinyl or metal.

Air Infiltration Attempted to get building to -50 pascals to determine air leakage. Because of the amount of leakage and size of building, could only get building -25 pascals @ 8992 cfm. This calculates to a leakage rate of 14117 cfm @ -50 pascals, or 9.7 air changes per hour. In a residential home this would be an alarming leakage rate and would be responsible of excessive energy loss. This is also a significant energy loss at Janzen House, but because of the amount of residents, it is necessary for the building to ventilate to maintain a safe and healthy environment.

Mechanical systems Heating – A Weil-McLain Ultra 310 92% efficient condensing boiler was connected in series with a 78% efficient unit. While performing the energy audit, I did note the Ultra was on warm weather shut down which is an energy saving measure and prevents the boiler from firing when it is 70°F or warmer outside. However, the lower efficiency boiler **was** firing on a call for heat. The other issue in the mechanical room was the amount of combustion air. There are currently 460 square inches of air coming into the mechanical room (1-10x30 and

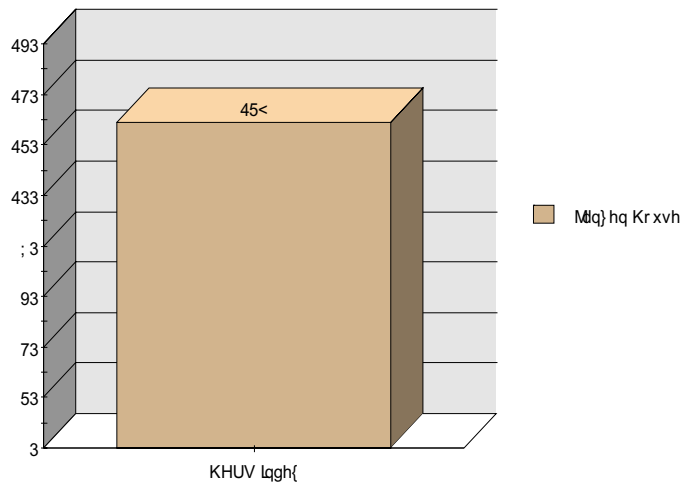
1-8x16). While this may have been necessary with the old heating equipment, the Weil-Mclain Ultra 310 boiler is sealed combustion and does not require additional outdoor air. The calculation for combustion air is 1 sq. in. for each 2000 btu of naturally vented appliances. The old boiler is 260,000 btu and the water heater is 70,000 btu for a total of 330,000 btu. $330,000 / 2,000 = 165 \text{ sq. in.}$ of fresh air required for these two appliances. Water Heater – Water heater has a manufacturers date of 2005, these commercial units typically last 6 – 10 years. When unit fails would suggest having an indirect water heater installed off of the boiler, these units are typically guaranteed for life against leaks, and would eliminate combustion air.

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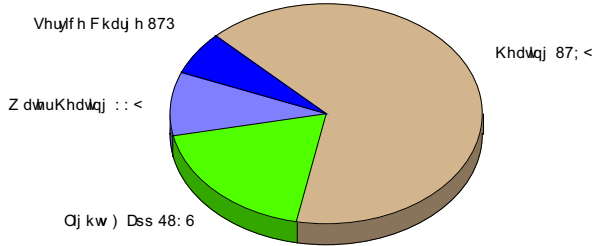


As the above graph indicates, above grade walls and infiltration are the two largest inefficiencies of this building. Therefore, we have prepared an improvement analysis to insulate the above grade walls, insulate the attic, air seal and repair the ceiling, add attic access, and do other air sealing measures.

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The graph on the upper left suggests annual energy costs. The graph on the upper right is this building in the HERS index. HERS (Home Energy Rating System) is a universal method for rating building performance. A score of 100 (baseline) on the HERS index indicates a building is even with the 2004 IECC (International Energy Conservation Code). A score of 129 describes the building as 29% less efficient than the 2004 IECC.

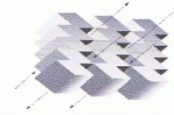
W v d f r

EQUIPMENT SIZING SUMMARY

Date:	September 14, 2009	Rating No.:	
Building Name:	Janzen House	Rating Org.:	Home Evaluation Services
Owner's Name:	Janzen House	Phone No.:	906-361-9183
Property:	146 W Spring	Rater's Name:	Kerry Noble
Address:	Marquette, MI 49855	Rater's No.:	525
Builder's Name:		Rating Type:	Confirmed Rating
Weather Site:	Alpena, MI	Rating Date:	09/10/2009
File Name:	Janzen REMrate.blg		

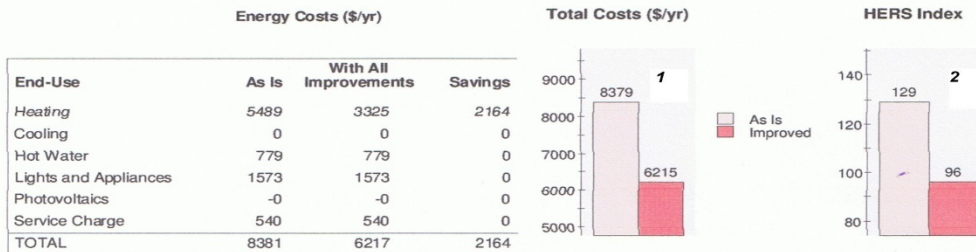
HEATING		Janzen House
Calculated Peak Load (kBtu/hr)		235.7
Sizing Factor (%)		100.0
HEATING EQUIPMENT CAPACITY (kBtu/hr)		
Required		235.7
Specified		488.0

NOTE – the peak calculated heat load for this building in its current condition is 235,700 btu



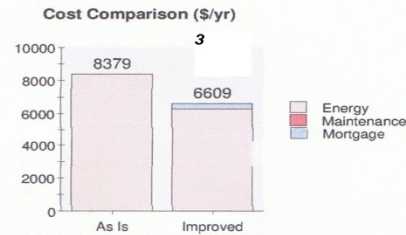
IMPROVEMENT ANALYSIS REPORT

Date:	September 14, 2009	Rating No.:	
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Owner's Name:	Janzen House	Phone No.:	906-361-9183
Property:	146 W Spring	Rater's Name:	Kerry Noble
Address:	Marquette, MI 49855	Rater's No.:	525
Builder's Name:		Rating Type:	Confirmed Rating
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Information For Lenders and Appraisers

Installed Cost of Improvements (\$)	11812
Cost Weighted Life of Measure (Years)	30
Mortgage Term (Years)	30
Discount/Mortgage Rate (%)	0.000
Present Value Factor	30.0
Expected Annual Energy Savings (\$)	2164
Expected Annual Maintenance Costs (\$)	0
Expected Annual Savings (\$)	2164
Increased Annual Mortgage Costs (\$)	394
Present Value of Savings (\$)	64922
Expected Annual Cash Flow (\$)	1770



REM/Rate - Residential Energy Analysis and Rating Software v12.7

This information does not constitute any warranty of energy cost or savings.
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The above improvement analysis report is based on adding sidewall insulation, adding attic insulation, air sealing attic and ceiling below, installing proper attic access, and reducing overall air infiltration in the building by 25%. **Before insulating and air sealing the attic, it is important to contact the fire suppression system installer and verify system can be in freezing temperatures.**

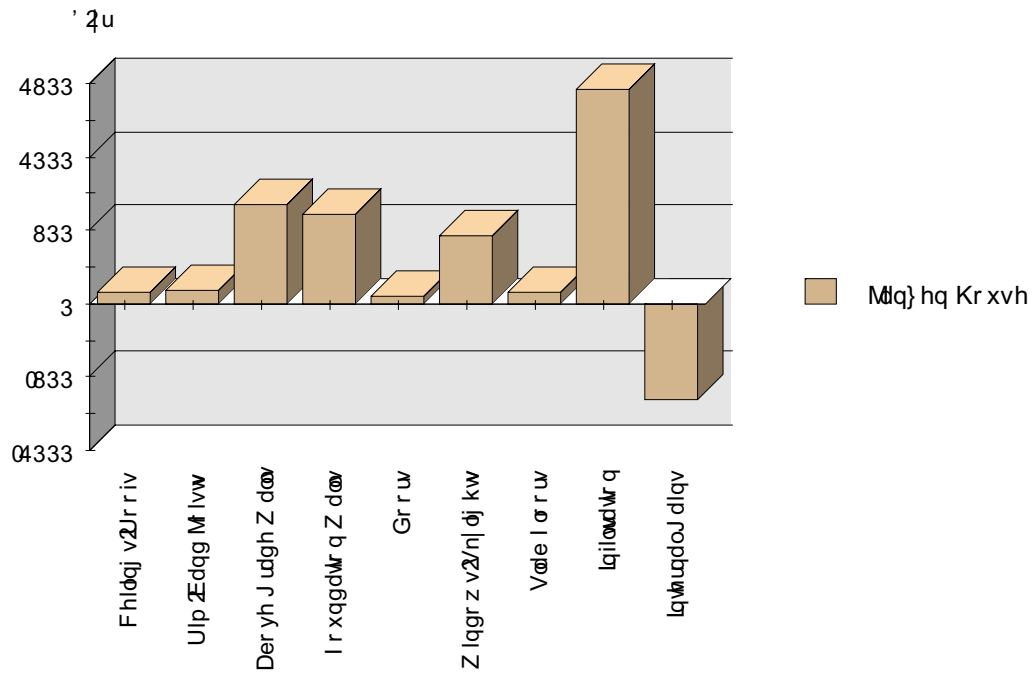
Graph 1 – indicates heating costs will be reduced from \$8379 to \$6215.

Graph 2 – indicates HERS score drops from 129 to 96, a 33% increase in building efficiency!

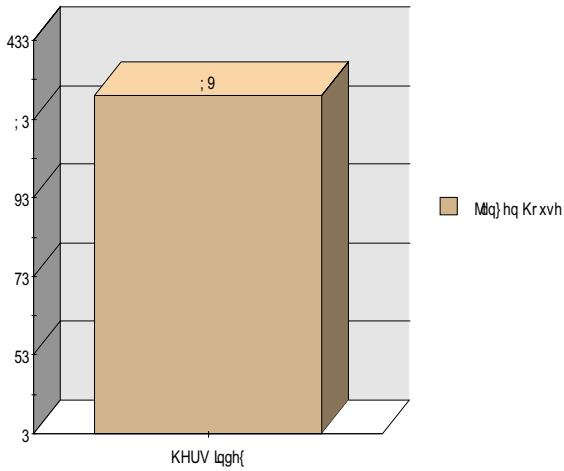
Graph 3 – indicates that if the money had to be borrowed for the bank for the \$11812 improvements (firm quote must be obtained from insulating contractor), that the building would still have a positive cash flow of \$1770.00 per year.

This is a graph based on the building improvements, note the difference in building component heat lost from the original graph in this report.

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File Name:	janzen improved.blg	Rating Date:	09/10/2009

Janzen House

HEATING

Calculated Peak Load (kBtu/hr)	153.8
Sizing Factor (%)	100.0

HEATING EQUIPMENT CAPACITY (kBtu/hr)

Required	153.8
Specified	285.0

The equipment sizing dropped from 235,700 btu to 153,800 btu, a difference of 81,900 btu or 35%. This would allow you to totally disconnect the old boiler and reduce the combustion air in the mechanical room from 460 sq. in. to 35 sq. in. This reduction alone, 425 square inches, would significantly reduce air infiltration into the building.

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