

Home Performance Energy Report

Prepared for:

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GENERAL SUMMARY

This home was built in 1887 and has had an addition on the back 3 years ago in 2005. According to the owner, the utility bills can be as high as \$700 - 900 per month for gas in the winter months. There are comfort problems as well with the addition being cold in the winter time. Sometimes the boiler glycol solution can slush up when it is cold and windy. There are ice dams and some of the windows have condensation on them during the cold days.

The heating system is a boiler which delivers in floor heat, a heat coil in the plenum of an air handler and the domestic hot water for the home. The unit is a side vented, 110,000 BTU/hr model installed in 2004. The side vented flue pipe is forced draft. The boiler has an estimated annual efficiency of 80+%.

The building shell is the largest contributor to all problems noted above. Luckily, directing the attention to an air tightening and insulation strategy should increase comfort, reduce ice dams while decreasing overall energy use and associated costs.

The base use for gas, that is the amount for non-heating use associated with the water heater, stove, and dryer is a larger split than for the average home. The base use accounts for 35% of natural gas costs and the space heating is 65%. This would more commonly be a 15/85 to 25/75 split indicating a larger than average base use cost, most likely from water heating.

The appliances are new with the remodel and in good shape. It was noted that the furnace fan was running constant during the inspection. This sometimes (not always) can have a benefit but also increases the electricity costs.

To make a dramatic difference in this home will require major weatherization improvements, most notably air sealing measures. The problems noted above can be attributed to the large infiltration rate. As the wind blows, it carries away the heat from the space. Additionally, as noted earlier, the other costs for both gas base use and electricity are both above average.

Utility costs are included but also on a separate Excel worksheet. Natural gas for space heating, gas for base use and electricity are all above average. See attached sheet.

There is good potential for energy and cost savings in this household as well as reducing if not eliminating many of the above mentioned problems. This report makes suggestions on how to accomplish those goals.

Utility Consumption Record

ELECTRICITY		UTILITY	COSTS	NATURAL GAS		
Month	kWh	Estimated Cost	Month	therms	Estimated Cost	
Aug 2008	3004	\$330	Aug 2008	121	\$133	
Jul	1268	\$139	Jul	142	\$156	
Jun	1122	\$123	Jun	109	\$120	
May	1422	\$156	May	190	\$209	
April	1417	\$156	April	402	\$442	
March	1270	\$140	March	489	\$538	
Feb	1473	\$162	Feb	696	\$766	
Jan	1527	\$168	Jan	630	\$693	
Dec 2007	1386	\$152	Dec 2007	600	\$660	
Nov	1122	\$123	Nov	274	\$301	
Oct	1359	\$149	Oct	86	\$95	
Sept	3033	\$220	Sept	45	\$110	
SUB-TOTAL	19403	\$2,021	SUB-TOTAL	645	\$4,223	
TOTAL	for both	\$6,244.00				

RECOMMENDATIONS

Lower Cost/Homeowner

1. Connect downspout.
2. Direct flue pipe away from siding on home.
3. Clean air conditioner coil.
4. Seal gaps and leaks at plenum on furnace. See photo.
5. Run fan on "auto" instead of "on", to determine if there are any noticeable differences. If not, there is little benefit to running the fan 24/7.
6. Research future water heater replacement.

Contractor projects (listed in order of priority)

7. Seal attic by-passes (warm air leaks into the attic) as noted in the infrared photos.
8. Insulate crawlspace. This could be done from the exterior with a rigid foam product covered with aggregate. See Protecto-Coat XP from www.waterproofinginc.com The other option is from the interior although access is very difficult if not impossible in some areas. Exterior would be easier. For below grade, a cheaper cost product such as blueboard can be used to save on costs.
9. Insulate side walls with densely packed cellulose insulation. With brick exterior construction, this would need to be done from the interior which is, of course, disruptive to living conditions temporarily although patching of plaster is easy to do. A test hole can be found in the second floor closet. The walls appear to be a full 4" thick (versus standard 2 x 4 construction of 3.5" giving an additional 1/2" of space).
10. Windows are lowest on the priority list for either replacement or retrofit.

TECHNICAL DATA

Utility Data: See attached sheets for utility consumption records. Overall utility consumption is high for this home. Actual costs are estimated based on current energy prices.

Electricity Use: Average kilowatt hour use per month (for the year) is 1,617 kwh. The average for a family of four is 700 - 1,000 kwh per month. Your average is well above the average.

BTU/SQ. FT./Heating Degree Day: 14.3 for all gas, 9.3 for space heating only. As a general rule homes over 10.0 are considered high consumption, 8.0 average. There are many variables in this factor. At the end of the day, there are a lot of energy improvements that can be done on your home.

BUILDING SHELL

INSULATION LEVELS

Attic: Not easy access due to tall dam. Lots of cellulose. Estimated high R-value but attic by-passes reduce the effectiveness of the insulation.

Slants: Blown in foam insulation in remodeled section on second floor.

Rim Joist: Brick

Side Walls: None

Foundation: None

Crawlspace: Radiant barrier on floor joists. Could visually see that it has fallen down in many places. Also leaky. A video was taken of cobwebs flowing during the blower door test (see attached). Sealing the crawlspace and additional insulation is a critical component of the weatherization of this home.

Windows: Mix of double hung primary windows with storm. New addition has thermopane windows. Even for older windows, replacement is a lower priority.

Doors: Wood.

INFILTRATION / BLOWER DOOR TEST

CFM @ 50 Pascals: 5,350 cfm

Air Leakage Ratio (CFM50/net square footage): 5,350 cfm/ 2856 net sq. ft = 1.87

A home is considered tight and in need of mechanical ventilation at 1.0. Your home is much greater than 1.0 and is an extremely leaky home.



Downspout disconnected



Flue pipe from boiler is directed against wall. Moisture in flue pipe is peeling the paint. Note the condition of paint in other areas is much better.



West side of crawlspace. Lip at red arrow makes exterior sidewall insulation easier to install. Excavate 1 - 2 feet below grade.

Waterproofing Inc has a good product for this. See next photos.



Hard to see in this photo but if you look in this space with a flashlight, you can see the radiant barrier insulation has fallen down in many areas.



Exterior insulation covered with aggregate from the factory. Looks similar to concrete in color.



Blind photo of attic taken from ladder. Attic hatch dam too high to be able to get over it for inspection.



2004, 110,000 BTU/hr input boiler, 80% efficient



Air handler and air conditioning unit for second floor



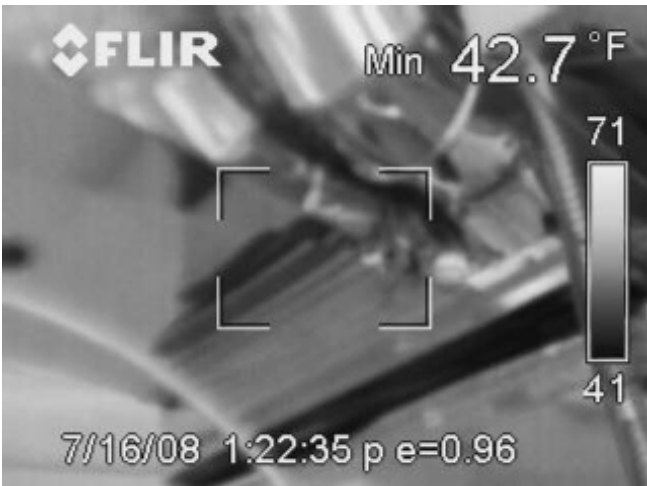
80 gallon storage tank for domestic hot water use



Air leaks into furnace area from leak in the plenum



Air leaks at plenum unnecessarily cool and heat the furnace space.





SPACE COOLING SYSTEM

Exterior component of the cooling system. Installed in 2004, 3 ton, estimated SEER (efficiency rating) of 13.0. Coils are dirty and should be cleaned every season. Red arrow indicates coils.



Coils are slightly dirty



First floor dining room



Cold air traveling between the floors with blower door running. Old construction has no blocking between floor. Dark color represents cooler surface temperatures in all infrared photos.



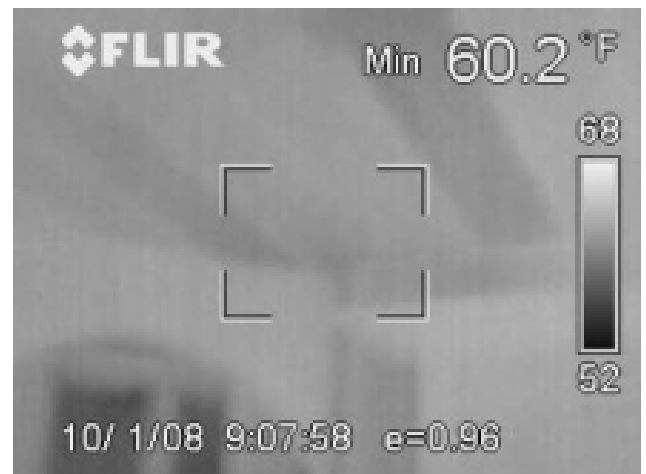
Similar shot of same area in dining room.



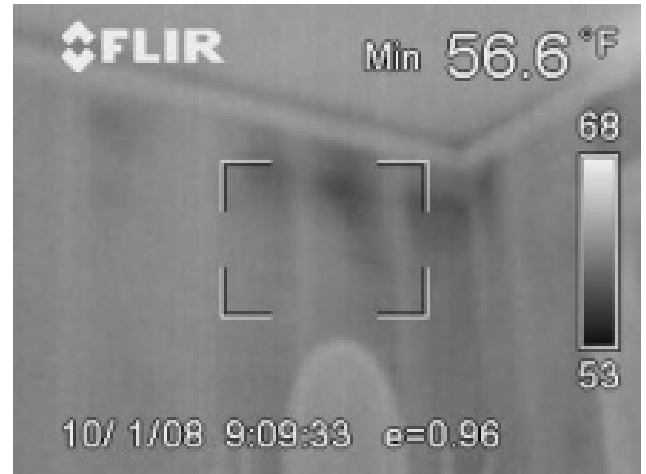
Near front entryway



Floor open to outside as shown with cold streak.



Similar shots



Second floor attic by-pass at interior wall.



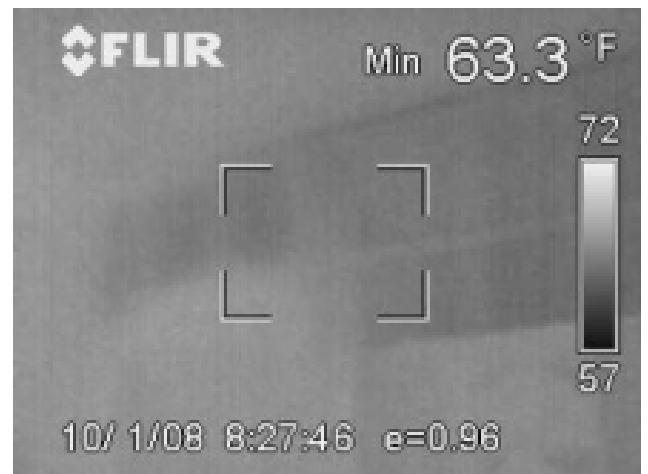
Closet interior wall is open to the attic. Could be sealed from the attic or the interior walls blown tight with densely packed cellulose insulation.



Same interior wall taken from other side



Uninsulated wall



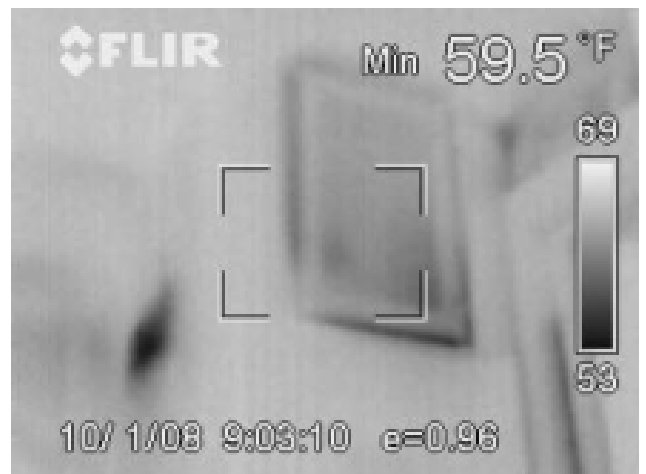
Second floor, interior wall of closet is open to attic



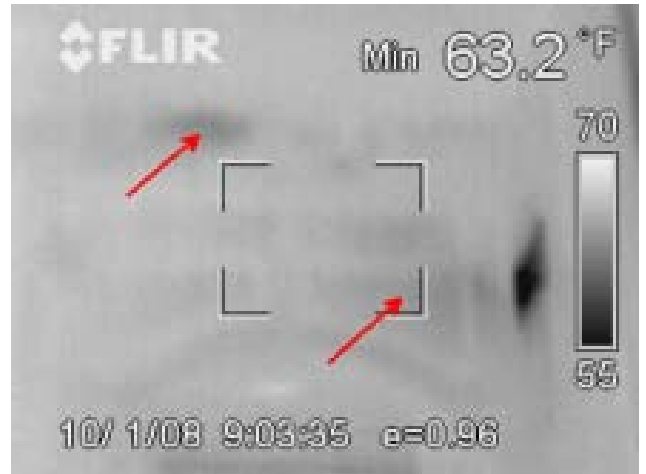
Off kitchen



Shows leaks to the outside



Same area, different view



Cool spots in interior section of home



Ductwork taken inside cabinet



Exact same shot as previous



Back stairway



Uninsulated wall and open wall cavity to the outside



Basement stairs



Needs foaming or other sealant



Crawlspace west side. See video of this with blower door running, attached to email message. The crawlspace is a very leaky area.



Very tall attic hatch dam made it impossible to pull myself up into the attic. Photos were taken and showed cellulose insulation.



Mysterious blue hose. What is it?