June 4, 2012

Mr. BK via email: Chief Information Officer
Chief Information Officer W: 631-xxx-xxxx
Duralee
5th Ave, PO Box xyxy

Dear Mr. K.,

On April 4, 2012 Professional Building Inspectors performed a thermal imaging inspection at the above property. The goal of the inspection was to locate defects in the building envelope that result in excessive heat loss or heat gain and thereby increase the operational costs resulting from the HVAC system.

This non destructive testing utilized a FLIR B20HS infra red thermal imaging camera and include all accessible areas of the interior of the building (office space, loft, warehouse and store) as well as an exterior scan of the building (front, left, right and rear).

SUMMARY OF OUR FINDINGS

In our professional opinion, based on our inspection and testing as detailed below, the following conditions exist in the building:

1. There are open sheet metal HVAC ducts and other roof penetrations. These openings allow excessive heat loss in the winter months and heat gain in the summer. Essentially they are 2 ft x 2 ft openings in the roof.
2. The open ventilation fans in the warehouse section of the building and in the retail store area do not have a weather seal of any kind nor is there any insulation. These areas are essentially open to the elements and allow excessive heat loss in the winter months.
3. The exterior emergency doors throughout the building make a poor air seal and result in excessive heat loss in the winter months.
4. The overhead garage doors on the left side of the building make a poor air seal and result in excessive heat loss in the winter months.
5. The single overhead door located closer to the front of the building has no curtain or other barrier to create a vestibule.
6. There is thermal bridging of the structural steel along the sides of the warehouse and one section of the roof in the rear of the building. This results in heat loss during the heating season and heat gain in the summer. This energy loss is via conduction and is less significant than the loss due to open louvers and open HVAC ducts mentioned above.
7. There are sections of HVAC ductwork that have minimal insulation. This allows heat loss during the heating season. Duct sealing should be performed and additional insulation should be added.
8. There are 2 active water leaks along the front wall of the building to the right of the front door. This appears to be the result of failure of the structural caulking on the exterior of the building. This needs prompt attention as water intrusion can result in mold growth and significant damages to the interior components of the building.
9. Office equipment including printers and copiers are left on over night and not shut off when not in use. This results in excess energy consumption in both direct electrical usage and secondary heat gain from the equipment.
10. A through wall air conditioner has been installed on an interior demising wall in the warehouse. This is between an employee break room and the retail area of the building.

This can result in a host of issues / problems including water damage from the condensate of the AC unit, dew point condensation on the wall resulting in mold growth and excessive heat gain inside the building.

Further detail and images are provided below. Should you have any questions about the report please do not hesitate to contact me directly.

Sincerely,

Scott Gressin
Council Certified Environmental Thermography Consultant #100510
Certified Infrared Thermographer #32227
Certified Indoor Environmental Consultant # 0705065
NYS Home Inspector License #16000028893
Certified EIFS Inspector #785806
NYS EPA Asbestos Inspector #07-07380
NYS EPA Lead Inspector #LII-7355
Introduction

The thermal imaging camera used by PBI is a highly sensitive and calibrated device that enables our inspector to see the infrared spectrum. This wavelength of energy is indicative of the heat energy of a given object. In most applications it is not the temperature reading itself that is important but rather the pattern of temperature differentials. Using our knowledge and skill in building construction, electrical distribution systems and environmental consulting we interpret
patterns in the images to determine if defects are present as well as the cause and origin.

The inspector for this report is Mr. Scott Gressin. He hold certifications in thermal imaging from both the Infra Red Training Institute, ITC, as a Certified Infra-red Thermographer, #32227 and the American Counsel of Accredited Certification, A.C.A.C., as a Certified Environmental Thermal-imaging Inspection Consultant, CETI-C. This is the highest level of IR certification the A.C.A.C. offers. In addition, Mr. Gressin is an A.C.A.C. IR Board member who responsibilities include a national IR curriculum development and testing development for the A.C.A.C.

In addition to the above Mr. Gressin also holds certifications, as a Certified Indoor Environmental Consultant (CIE-C) by American Counsel of Accredited Certification, A.C.A.C., is a licensed New York State Home Inspector. He holds certification as an E.I.F.S. Inspector, C.E.I., through the Association of the Wall and Ceiling Industry and is licensed by NYS DOL and the EPA in various other fields.

Photographs may be taken by the Inspector during the course of the inspection. All Photographs taken are for the sole use of the inspector. At the discretion of the inspector who performed the inspection photographs may be provided to the client and their representative(s) for the sole purpose of clarification of conditions observed during the inspection. All photographs taken are solely and exclusively owned by Professional Building Inspectors and no other parties have any rights or claims to the photographs.

Please be advised that the scope of this inspection does not include verification of code compliance, nor a check of any public records including if all permits exist for the structure as inspected. We do not evaluate existing construction drawings, or evaluate C of O's issued by the local building department.

All directions given in this report are such that you would be exterior to the building when viewing the area in question, and if the area in question is interior to the building the view is still based on the exterior position. The images below are side-by-side digital photographs and thermal images. Essentially, the image on the right is what you see and the image on left is what the infrared camera sees.
1. **There are open sheet metal HVAC ducts and other roof penetrations.** These openings allow excessive heat loss in the winter months and heat gain in the summer. Essentially they are a 2 ft x 2 ft opening in the roof.

During our inspection in the warehouse storage areas to the rear of the building we found several duct penetrations in the ceiling of the building. These ducts may have been installed in the past as part of an HVAC system or as a means of providing fresh air into the building.

At the present time we suspect that these openings allow **significantly excessive** air inflow and outflow. The images below are typical of the warehouse in the rear of the building. The red arrows indicate the example of these penetrations.

The IR images below are from the same area and illustrate the cold air infiltration noted on the morning of the inspection, the areas in blue.

We recommend that you have your HVAC technician review the required building air flow standards per ASHRAE. Should the minimum air flow required in the space be met absent these openings then the openings should be sealed. If the openings are necessary to meet the
ASHRAE standard then we suggest a louver or damper be installed to control air flow when the building or the area is dormant. Alternately an energy recovery ventilator (E.R.V.) could be installed.

The image below is an additional IR view of ceiling which is typical of our findings as detailed above. Again, the cold air infiltration noted on the morning of the inspection, the areas in blue.

![Image of IR view of ceiling](image)

2. The open ventilation fans in the warehouse section of the building and in the retail store area do not have a weather seal of any kind nor is there any insulation. These areas are essentially open to the elements and allow excessive heat loss in the winter months.

We find multiple roof top and side wall mounted ventilation fans along with duct penetrations in the ceiling of the building. These ducts may have been installed in the past as part of an HVAC system or as a means of providing fresh air into the building. At the present time we suspect that these openings allow excessive air inflow and outflow. The images below are typical of the warehouse in the rear of the building. The red arrows indicate an example of these penetrations.
3. The exterior emergency doors throughout the building make a poor air seal and result in excessive heat loss in the winter months.

The images below are typical of the exterior emergency exit doors. We find these doors make a poor weather seal as illustrated by the air leaks notes, areas in blue. This is a typical finding on doors such as this and standard weatherization techniques will address this.
4. The overhead garage doors on the left side of the building make a poor air seal and result in excessive heat loss in the winter months.

5. The single overhead door located closer to the front of the building has no curtain or other barrier to create a vestibule.

6. There is thermal bridging of the structural steel along the sides of the warehouse and one section of the roof in the rear of the building.

   This results in heat loss during the heating season and heat gain in the summer. This energy loss is via conduction and is less significant than the loss due to open louver and open HVAC ducts mentioned above. Essentially, this type of defect cost less in energy loss than the air leaks associated with the open fans, open HVAC ducts and door leaks.
In addition to the thermal bridging of the structural steel as noted above there is one section of the retail area of the building that has a similar condition of thermal bridging. This is the areas behind the decorative corner stone façade, shown below.
The images below show side by side (digital image on the left, IR image on the right) of exterior wall of the building noted above. The thermal bridging is shown as the area that is blue in the black and white IR image,

7. **There are sections of HVAC ductwork that have minimal insulation. This allows heat loss during the heating season.**

Duct sealing should be performed and additional insulation should be added. In this case this is shown by the areas in red as the heat was and the ducting was hot with respect to the rest of the environment.
8. **There are 2 active water leaks along the front wall of the building to the right of the front door.**

This appears to be the result of failure of the structural caulking on the exterior of the building. This needs prompt attention as water intrusion can result in mold growth and significant damages to the interior components of the building.

The images below show side by side (digital image on the left, IR image on the right) the front wall of the building with an active water leak. The water intrusion into the building results in “evaporative cooling” of the wet sheetrock and therefore the temperature change becomes visible in the IR spectrum. This is shown as the area that is darker in the black and white IR image, Blue arrow.
Two additional IR images below show another water leak, above the window. Again, the water intrusion into the building results in “evaporative cooling” of the wet sheetrock and therefore the temperature change becomes visible in the IR spectrum. Below is a digital image of the same area for reference.

On the exterior of the building we find structural caulking that has deteriorated. This is likely the source of the water intrusion noted above, although it was beyond the scope of this report to
evaluate this water leak/intrusion fully and there may be other sources for the water intrusion.

9. **Office equipment including printers and copiers are left on over night and not shut off when not in use.** This results in excess energy consumption in both direct electrical usage and secondary heat gain from the equipment.
10. A through wall air conditioner has been installed on an interior demising wall in the warehouse. This is between an employee break room and the retail area of the building.

This can result in a host of issues / problems including water damage from the condensate of the AC unit, dew point condensation on the wall resulting in mold growth and excessive heat gain inside the building.

The images below are typical of our findings in the remaining portions of the office space. In these locations we found no thermal anomalies to indicate problems. Essentially, this is what normal thermal images of insulated walls look like. There is some thermal bridging from the nails holding the sheetrock to the studs, black dots and the pattern of the walls studs are noted as they have a different R value than the wall cavity.
The images below are typical of our findings in the remaining portions of the exterior of the building. In these locations we found no thermal anomalies to indicate problems. Essentially, this is what normal thermal images of walls look like from the exterior.
The color changes seen are associated with lighter and darker brick color. The lighter bricks result in less heat gain (solar loading) and therefore a slightly colder surface temperature on the surface of the wall.
**General Comment**  
With many older buildings the trees and shrubs around the building are allowed to grow out of proportion over the years. In this building we find this common problem. Minimally any branches that now or soon will rub against either the side of the building and or the roof should be cut back prior to the bricks or roof being damaged.

Additionally, buildings also require some space between the landscaping and the building to breathe properly. All lower branches of trees should be cut back so that they are approximately fifteen feet off of the ground. You should consult with a qualified landscape contractor or arborist for further recommendations.

**CONCLUSION**

In our professional opinion, based on the testing we performed as illustrated above there are areas of the building envelope that could be and should be improved. This should lead to better energy efficiency of the building and lower heating costs.

The biggest area of potential improvement is air sealing and weatherization. This should be done with focus ceiling of the warehouse as this area is of greatest pressure difference due to stack effect. Air sealing of the doors, garage doors, ventilation fans and duct sealing is also important. Adding insulation to the beams and behind the stone in the retail area will reduce heating costs, however, the return on investment, ROI, is going to be longer as there is less loss due to conduction as compared to the convective air currents.

Should you have any questions regarding our findings, please do not hesitate to me.

Sincerely,

**Scott Gressin**

Council Certified Environmental Thermography Consultant #100510  
Certified Infrared Thermographer #32227  
Certified Indoor Environmental Consultant # 0705065  
NYS Home Inspector License #16000028893  
Certified EIFS Inspector #785806  
NYS EPA Asbestos Inspector #07-07380  
NYS EPA Lead Inspector #LII-7355

cc:  Ed Goldstein, Logical Solutions Group  
     Tom Murphy, Logical Solutions Group
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