



INTRODUCTION

1.1 Terms of Reference

Insight Infrared Energy Inspections Inc. was retained by Ms. Lori McLeod, to perform an Infrared scanning survey of the existing test building located in Winnipeg, MB.

1.2 Work Plan

The work plan for the survey was as follows:

- Conduct the Infrared Survey from ground level.
- Provide a brief report including thermographic principles, air temperatures and thermal images of the areas scanned.

EXAMINATION OF EXISTING CONDITIONS

2.1 Survey Conditions

The ambient outside temperature at the time of the survey was -20°C, with the interior temperature at approximately 20°C. The wind speed noted was 7km/h at the time of the survey.

PRINCIPLES OF THERMOGRAPHY

3. General

All objects at temperatures above absolute zero radiate energy to their surroundings. The sensor in the infrared camera absorbs radiation given off by objects in its field of view. This information is converted into a visual image, which appears on the display monitor for analysis. The thermograms included in this report provide a visual snapshot of the warm surfaces (white tones) and the cold surfaces (dark tones) noted during the scanning survey.

2.2 Interpreting Thermographic Images

Irregular thermographic patterns are called thermal anomalies and different anomalies are generally indicative of specific problems.

- **Air Leakage**

Air leakage is the passage of air through elements of the building envelope, such as walls, windows and joints. Leakage from the interior is referred to as exfiltration.

There are three primary mechanisms driving air through a building envelope:

1. **Stack Effect** Stack effect is due to warm air being lighter than cool air and thus tending to rise.
2. **Wind Effect** Wind blowing on a building induces positive pressures on the Windward side and negative pressures on the leeward side of the building as well as eddy effects and pressure differentials at corners, at grade and at the roof. This will affect the infiltration and exfiltration characteristics of the building. Wind blowing on a building that is under positive pressure will reduce the exfiltration on the windward side and increase the exfiltration on the leeward side.
3. **Mechanical** Mechanical systems supply and exhaust air to and from a building. The systems are balanced in order to create positive, negative or neutral pressures in a building with respect to the interior.

The combined effect of these three mechanisms induces air movement through openings in the building envelope, such as openings in sealants or glazing gaskets.

On external thermograms exfiltrating air generally shows up as an intense bright spot at the source of the leak and a warmed zone flaring out from the leak, cooling (darkening) as it moves away.

2.3 Thermal Bridging

Thermal bridging is caused by structural components, which penetrate the insulation. As a result, conduction of heat takes place along these short circuit paths through the insulation. On external thermograms thermal bridges show up as light areas with distinct defined edges, generally in the shape of the structural components causing the bridge.

2.4 Insulation Faults

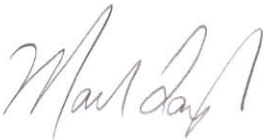
On an external scan, missing insulation shows up as light patches with distinct, well-defined edges, which generally outline the cavity not insulated. Improperly installed or damaged insulation also shows up as light patches with well defined edges which outline the areas within the cavity where the insulation is not performing its function. Moisture soaked insulation appears as a patchy pattern.

OBSERVATIONS

Our observations of the above building found that the general condition of the building was excellent with no appreciable heat loss noted. The structure was found to be extremely efficient in blocking the transfer of heat/cold, with the only evidence of heat loss noted confined to minor amounts around the window and door entrance. This condition would be considered normal and extremely minor in nature.

We trust that this report meets with your approval and if you have any questions please contact the writer.

Yours truly,
INSIGHT INFRARED ENERGY INSPECTIONS INC.



Mark L. Taylor
President

Project: U of M

Date: February, 2003

Photo # 1

Picture of the small test building.



Photo # 2

Real Life photograph of the test building.



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Date: February, 2003

Photo # 3

Picture of the North wall,
please note no heat loss
was noted at the time of
this survey.

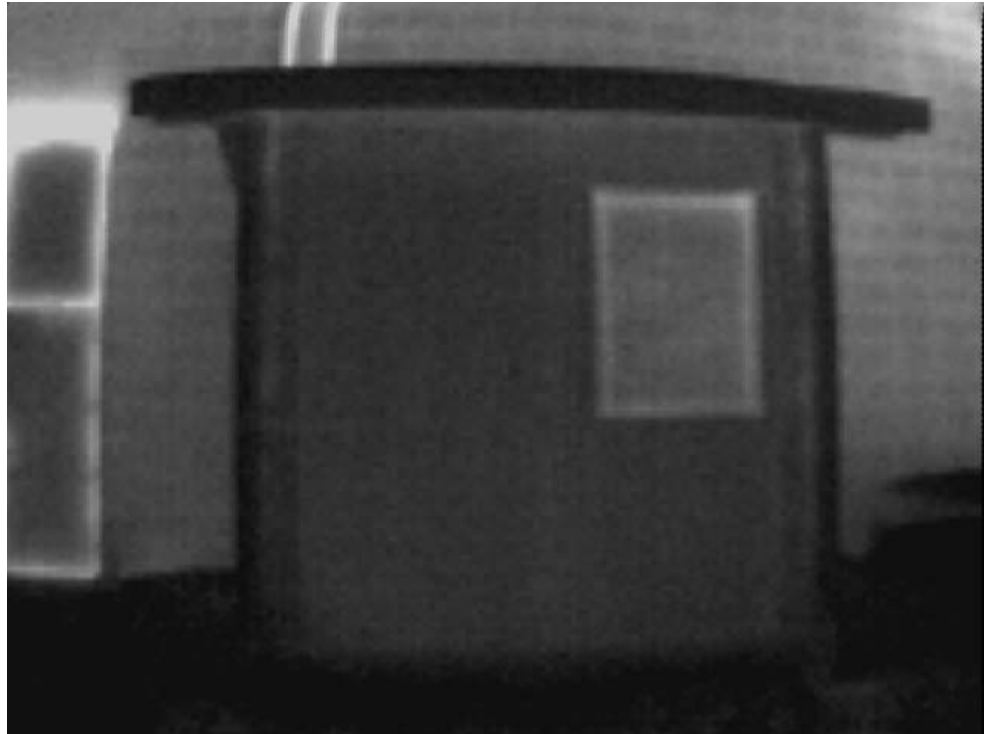


Photo # 4

Real Life photograph of the
test building.



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Photo # 5

Picture of the North and West walls of the test building.



Photo # 6

Real Life photograph of the test building.



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Photo # 7

Picture of the Roof Area of
the test building.

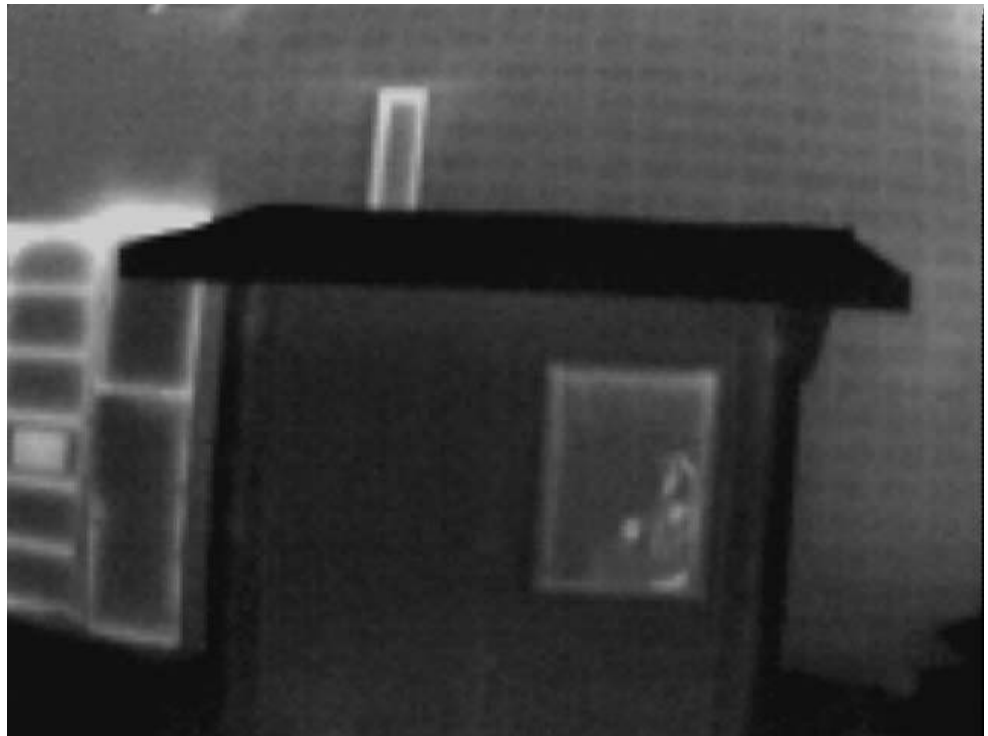
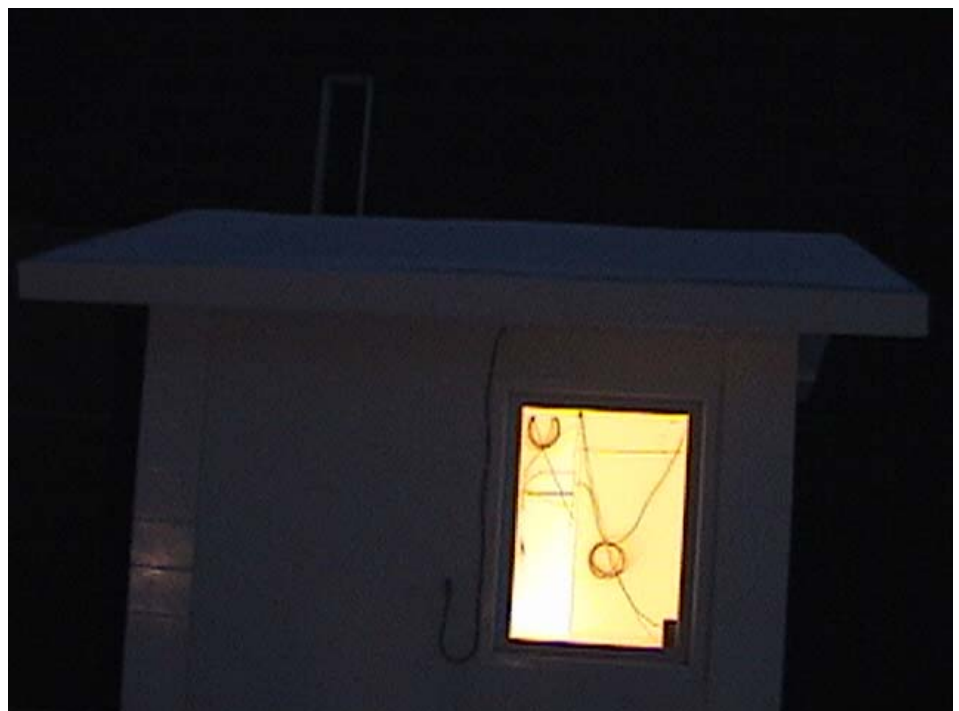


Photo # 8

Real Life photograph of the
test building.



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Photo # 9

Overall Picture of the test building.



Photo # 10

Real Life photograph of the test building.

