



5309 Mohican Rd. Bethesda, Md. 20816 • 301-320-2870  
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# BUILDING DIAGNOSTICS INSPECTION

**CLIENT:** Enlightened Management

**ADDRESS:** 1000 Main Street

Washington, DC 20005

**DATE:** January 17, 2004

**SUBJECT:** Heat loss survey of National Headquarters



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January 17, 2004

Fred Smith  
Chief Engineer  
Enlightned Management  
1000 Main Street  
Washington DC, 20005

Dear Mr. Smith:

We are pleased to submit this report describing our heat loss evaluation for National Headquarters at 1000 Main Street, Washington, DC.

If you have any questions about this report, or any of our services, please give me a call.

We look forward to working with you on future projects.

Very truly yours,

Stephen A. Seeber  
President

# Heat Loss Evaluation: National Headquarters

## I. Introduction

Mid Atlantic Infrared Services, Inc. was retained to conduct an infrared survey of 1000 Main Street, in Washington, DC. The objectives of the survey were 1) identify areas of significant energy losses; 2) identify areas of infiltration/exfiltration that would adversely affect occupant comfort or building operation and 3) identify areas of infiltration/exfiltration that could damage building equipment and components as a result of moisture accumulations or extremely cold temperatures.

## II. Summary of Findings

Two systematic defects were found in this building. Both are likely to be significant sources of lost energy and potential occupant discomfort:

- 1) Typical window design in the building incorporates a painted, single glazed panel above the ceiling line. This panel is contained in a metal frame. The single glazed surface is insulated by laying an R19 faced insulation batt into or against the frame. There is no means of securement and no method to ensure a close fit. Typical insulation is not sealed and contains numerous gaps that essentially short-circuit operation of the insulation.
- 2) The 8<sup>th</sup> floor is encircled by a balcony. The balcony ceiling permits substantial infiltration through an unsealed gap between the ceiling drywall and outer masonry wall. Infiltrating air can enter conditioned spaces by passing between the top of the single glazed panel above the ceiling and the steel pan of the 9<sup>th</sup> floor. Other penetrations of the balcony ceiling/interior were also noted.

## III. Survey Methodology

### ***Detection of Thermal Anomalies with an Infrared Imager***

An infrared imager can be thought of as a television camera that sees heat rather than visible light. When the temperature of a surface increases, the surface emits more infrared energy. The infrared imager senses the various energy levels and transforms them to a black and white or 256-color television type picture. In general, higher temperatures are seen as brighter shades of gray. Lower temperatures are seen as darker shades of gray. Alternatively, the color pattern may be viewed on the side of the

thermogram. Color shades changes from bottom to top of the color scale correspond to increasing temperatures.

The temperature range of each image is indicated by the high and low temperatures located to the left of the color or gray scale bar.

The infrared survey is useful for identifying areas of infiltration/exfiltration and damaged or missing insulation.

Exfiltration can cause exterior building surfaces to become heated, so the location of these areas may be spotted by an exterior inspection. Generally, infiltration cools interior surfaces, but has no impact on exterior surface temperatures. Thus, infiltration cannot be viewed by the exterior infrared survey. It can only be viewed from the interior. The impact for infiltration/exfiltration can be enhanced for survey purposes by operating the building at positive pressure for observing exfiltration from the exterior or negative pressure for observing infiltration from the interior.

The best way to identify infiltration/exfiltration sites is to observe interior surfaces during high wind/cold temperature periods. Such an observation will tend to identify deficiencies on the windward side of the structure. However, identified deficiencies can be extrapolated to similar construction details on other building orientations.

## **Survey Procedure**

The interior survey was conducted on January 16, 2007 beginning at about 6:00 PM. The sky was clear during the survey. The outside temperature was approximately 39°F Winds were from the north west at about 15 mph. Building interior temperatures were approximately 70°F. The building was operated to produce maximum negative interior air pressure.

The survey was conducted primarily from the interior. All interior perimeter building surfaces on the 9<sup>th</sup> through 6<sup>th</sup> floors were checked. Typical existing construction on the 5<sup>th</sup> floor was checked. Inspection was made of numerous ceiling plenum areas. On the 1<sup>st</sup> floor, the mail room, conference room and kitchen were examined.

Following the interior survey, the building exterior was examined. Due to high winds, the exterior survey will reveal only significant thermal deficiencies.

An Inframetrics Thermacam P280 was used for the inspection. Selected images were stored on PCMCIA card. Photographs were taken for each suspected deficiency.

At each office location, the exterior wall, adjacent interior wall, floor and ceiling areas were imaged looking for any thermal anomalies.

## **IV. Results**

Survey results are presented in a uniform format. Each report page presents a specific anomaly. A brief written discussion provides the anomaly location and describes critical thermal features. A color photograph illustrates the location of the anomaly. Black and white and color thermal images are provided for each anomaly.

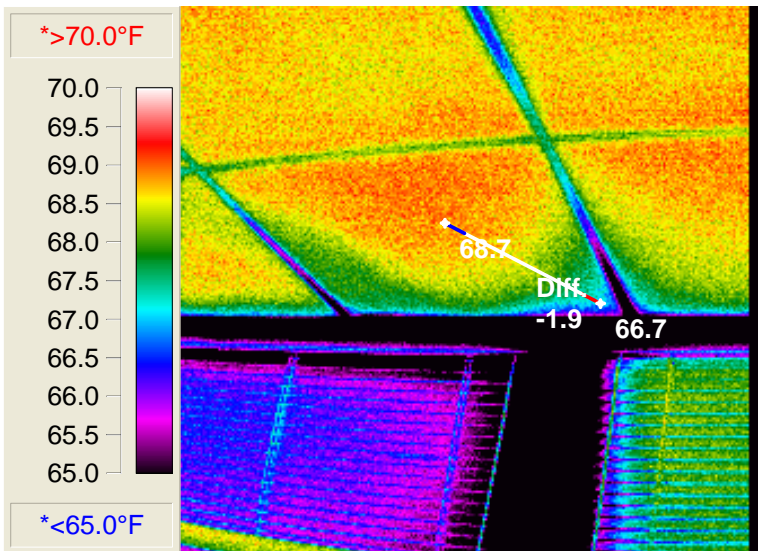
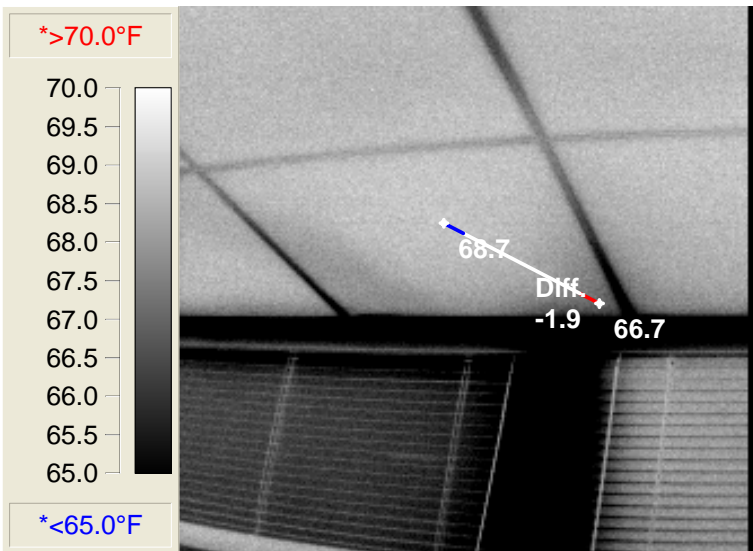
<b>CLIENT</b>		<b>BUILDING</b>	NA	<b>PROBLEM #</b>	1
<b>FLOOR</b>	9	<b>ROOM</b>	9031 Conference room	<b>WALL ORIENTATION</b>	West
<b>LOCATION ALONG WALL</b>		<b>ADDITIONAL LOCATION</b>	Glass panels above ceiling.		

**PROBLEM DESCRIPTION** Large areas of batt insulation have fallen away from glass panels. Others are poorly adhered, permitting convective air flows to short circuit the insulation, rendering it ineffective.

This insulation provides no means of securement or proper fit.

This problem is present throughout all areas added to the original building.

**Follow-up:** Yes

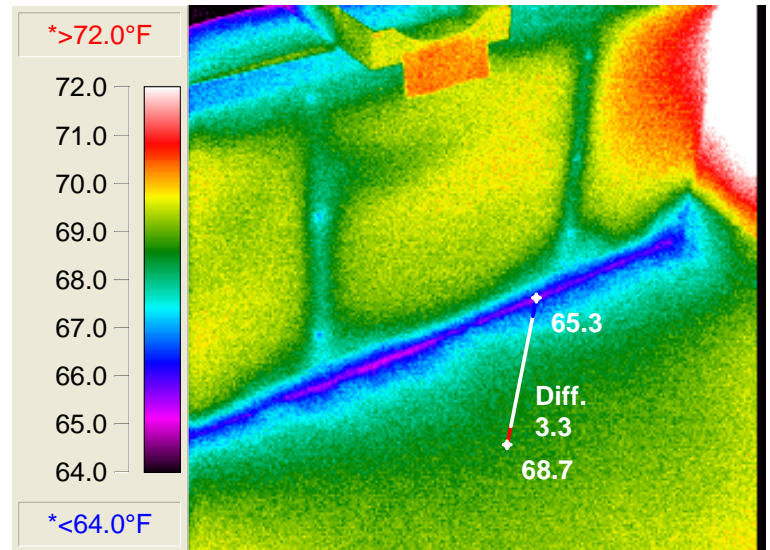
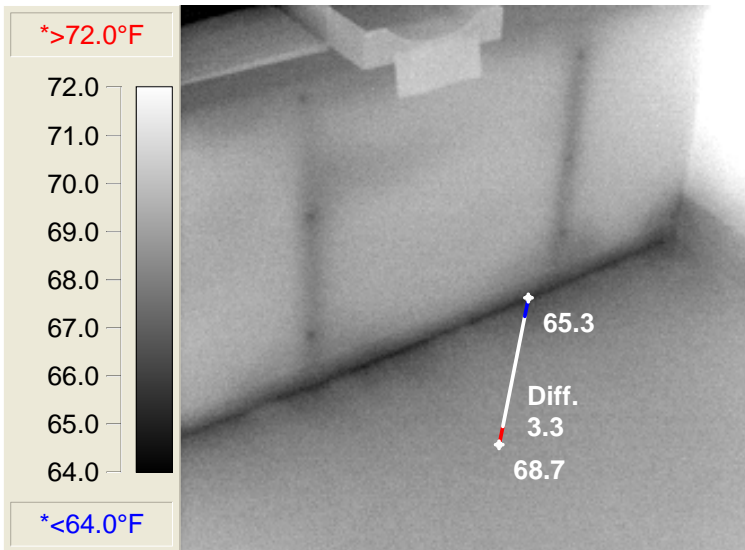


<b>CLIENT</b>		<b>BUILDING</b>		<b>PROBLEM #</b>	7
<b>FLOOR</b>	9	<b>ROOM</b>	9024	<b>WALL ORIENTATION</b>	North
<b>LOCATION ALONG WALL</b>		<b>ADDITIONAL LOCATION</b>			

**PROBLEM DESCRIPTION** Minor infiltration is present at floor. This type of pattern is widespread along the north wall. Check the balcony below.



**Follow-up: Yes**



<b>CLIENT</b>		<b>BUILDING</b>		<b>PROBLEM #</b>	8
<b>FLOOR</b>	8	<b>ROOM</b>	8024	<b>WALL ORIENTATION</b>	North
<b>LOCATION ALONG WALL</b>	Center		<b>ADDITIONAL LOCATION</b>		

**PROBLEM DESCRIPTION** Balcony ceiling below problem # 7.

A 1" gap is present between the drywall ceiling and the masonry wall. This gap is open to the interior. Air infiltration through this gap is the likely source of infiltration seen above and in several of the following the following examples.

This gap is present around the entire floor and provides substantial total area for infiltration.

**Follow-up:** Yes



No infrared image

No infrared image

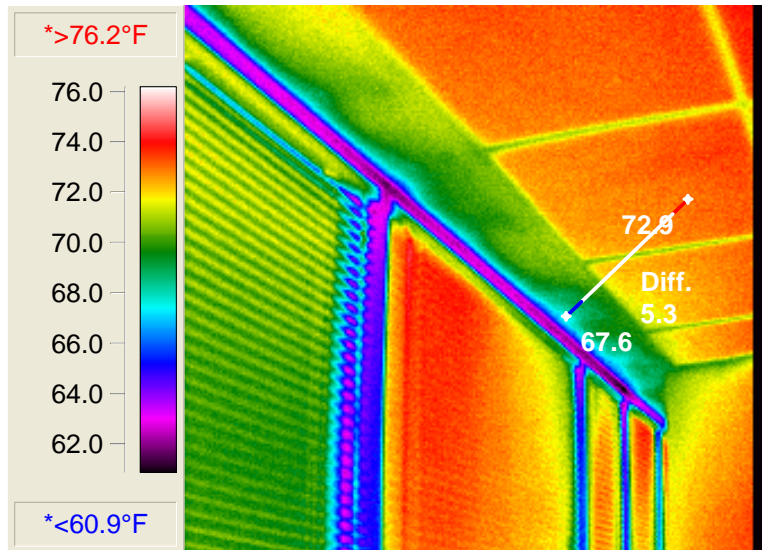
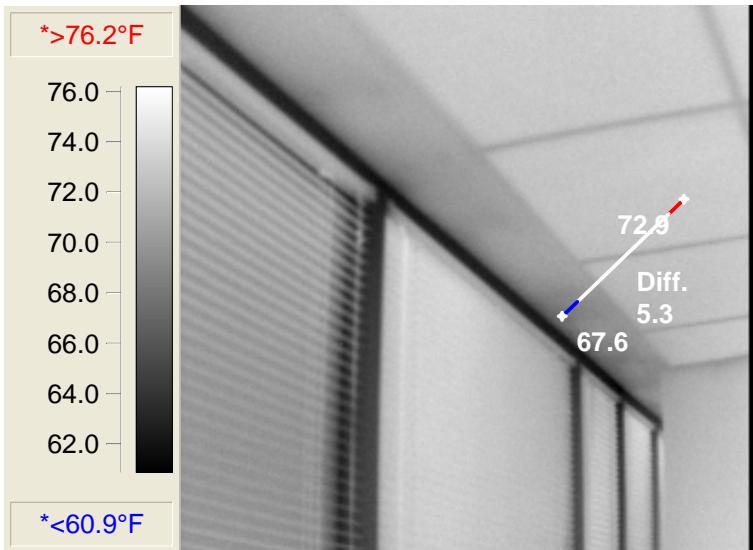
<b>CLIENT</b>		<b>BUILDING</b>		<b>PROBLEM #</b>	9
<b>FLOOR</b>	8	<b>ROOM</b>	8007, hall	<b>WALL ORIENTATION</b>	North
<b>LOCATION ALONG WALL</b>		<b>ADDITIONAL LOCATION</b>	Above ceiling		

**PROBLEM DESCRIPTION**

Photograph shows glass panel above ceiling. Air infiltration occurs over the top of the glass panel frame. It is not properly sealed from the balcony ceiling. This problem is probably present around the entire floor. Air infiltration can be readily felt at this area.

This defect is a significant source of energy loss in this building. The problem was particularly severe in the "nose" area.

**Follow-up:** Yes



<b>CLIENT</b>		<b>BUILDING</b>		<b>PROBLEM #</b>	10
<b>FLOOR</b>	8	<b>ROOM</b>	8017	<b>WALL ORIENTATION</b>	West
<b>LOCATION ALONG WALL</b>				<b>ADDITIONAL LOCATION</b>	

**PROBLEM DESCRIPTION** Pipe chase is open into balcony ceiling plenum, permitting substantial infiltration. Most pipe penetrations that we saw were sealed. However, a thorough inspection should be made for any we missed, especially along the south wall.



**Follow-up:** Yes

No infrared image

No infrared image

<b>CLIENT</b>				<b>BUILDING</b>			<b>PROBLEM #</b>	14
<b>FLOOR</b>	NA	<b>ROOM</b>	J Street	<b>WALL ORIENTATION</b>		South		
<b>LOCATION ALONG WALL</b>			East end	<b>ADDITIONAL LOCATION</b>				

**PROBLEM DESCRIPTION**

Hot spots are present on glass panels above windows. The insulation here is improperly installed.

**Follow-up: Yes**

