

**Commissioning  
and  
Rebalancing  
of  
Existing System**

**25 Sigourney Street  
Hartford, CT  
Project #BI-2B-033K**

**Prepared by:**  
*LMG Consulting Engineers, Inc.  
78 Beaver Road  
Wethersfield, CT 06109  
November 21, 2007*

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## Executive Summary

The purpose of this commission is to provide retro-commissioning services to a portion of the HVAC system - specifically the percentage of outside air delivered and floor pressurization values. The target for these was a 30% reduction in outside air intake and a reduction in floor pressurization from 0.2" to 0.1", based on the first recommendations listed on Page 14, Item 7, Conclusions and Recommendations, of the "Study for Outside Air Quantity" by BVH Integrated Systems, dated August 21, 2006.

Dick Wing of Wing's Testing and Balancing and technicians from SNE Building Systems worked together (Table 1, Page 2), with Dick taking measurements of air flow and pressure while the SNE technicians made adjustments to the controls. The adjustments implemented resulted in the desired 30% reduction in outside air. The resultant floor pressurization balanced out at 0.125".

Further adjustments can be made to further reduce outside air intake and bring floor pressurization to +0.05". Refer to the Recommendations in the body of the report.

## Purpose

The purpose of this commission is to provide retro-commissioning services to a portion of the HVAC system - specifically the percentage of outside air delivered and floor pressurization values.

## Retro-Commissioning Team

The team assembled for the retro-commissioning was as follows:

1. LMG Consulting Engineers, Inc.  
Peter J. Luchini, P.E. - Principal in Charge  
Edward G. Flynn - Project Manager
2. Wing's Testing & Balancing Co., Inc.  
Richard Wing
3. SNE Building Systems, Inc.  
John Zelek  
Daniel Pouliot

## Procedure

The following procedure was established to accomplish the retro-commissioning targets.

TABLE 1 - WORK SEQUENCE		
TASK	WING'S	INVENSYS
Record baseline pressures on each floor	X	
Set outside air controls to allow 70% of their existing flow rate for each mechanical room		X
Set make-up fan static pressure control point to the lowest pressure possible while producing design flow everywhere with one VAV make-up virtually wide open	X	X
Reset building pressures at critical locations	X	
Verify operation of each spill damper	X	X
Adjust spill dampers by trial and error to obtain a positive pressure on the Lobby Level	X	X

Baseline pressures were recorded by Dick Wing on September 10, 2007.

Dick Wing and SNE Building Systems technician (Dan Pouliot or John Zelek) started September 11, after hours, to complete the balance of the Tasks listed in Table 1.

## **Results**

The adjustments made resulted in the desired 30% reductions in outside air intake. The resulting floor pressurization leveled out at 0.125", slightly above the target of 0.1".

Several minor equipment adjustments and repairs to Invensys equipment, as listed in the Wing's Testing and Balancing report dated September 20, 2007 (Appendix A), were made, as follows:

- |          |  |
|----------|--|
| 10/4/07  | Removed existing failed minimum O.A. damper actuators on 16 <sup>th</sup> and 17 <sup>th</sup> floor and replaced with new 60 in. lb. actuators.   |
| 10/11/07 | Replaced erratic 6 <sup>th</sup> floor north static pressure sensor and disassembled and repaired 6 <sup>th</sup> floor relief air damper linkage. |
| 11/15/07 | Completed repairs to the 8 <sup>th</sup> , 10 <sup>th</sup> , 15 <sup>th</sup> and 16 <sup>th</sup> floor relief air damper linkages.              |

It was noted that the 9<sup>th</sup> floor relief damper is located above a computer room that is sealed off from the rest of the floor. A duct should be extended from this damper to the main return air plenum to allow air to reach the relief damper.

A further test was run in which the outside air flows were reduced by 50%. This brought the floor pressurization to 0.106" at the Lobby and 0.096" at the roof, matching the target of 0.10".

## **Recommendations**

1. Provide a duct above the ceiling of the 9<sup>TH</sup> floor computer room, to allow relief air to reach the relief damper.

Probable Cost ..... \$ 7,500.00

2. Install a new atmospheric sensor located at the entry level and control all relief dampers from this point. The outside air quantities are similar on each floor and subsequently the pressures will be similar.

Probable Cost ..... \$ 6,800.00

3. Reduce the outside air to a lesser value to produce +.05" of pressure. The CO<sub>2</sub> monitors can override the setting to maintain no more than 800 PPM (adj). The +.05" of positive pressure will be sufficient to avoid the infiltration of moisture and will reduce the energy demand on the HVAC systems and latent load on the cooling coils.

Probable Cost ..... Included in Item 2

# WING'S



TESTING & BALANCING CO., INC.

94 No. Branford Rd., Branford, CT 06405  
203-481-4988 Fax 203-488-5634

Appendix A

**Re: 25 Sigourney St. Ventilation Reduction**

\* \* \* \*

LMG Engineers  
Attn: Peter Luchini  
78 Beaver Rd.  
Wethersfield, CT 06109

September 20, 2007

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*SM-1 License # 5775*

# WING'S



TESTING & BALANCING CO., INC.

94 No. Branford Rd., Branford, CT 06405

203-481-4988 Fax 203-488-5634

September 21, 2007

LMG Engineers  
Attn: Peter Luchini  
78 Beaver Rd.  
Wethersfield, CT 06109

Re: 25 Sigourney St. Ventilation Reduction

Dear Pete,

The testing and adjustments have been completed to reduce the outside air ventilation rates by 30%.

Our initial testing documented baseline conditions prior to any adjustments. During this process we reviewed the settings and flow of the outside air intake and found:

- Some settings had been modified to other than listed values. They have been reset to their design.
- The 9<sup>th</sup> floor damper was side open while handling less than design CFM. An inspection discovered fibrous material plugging the honeycomb air straightener for the Air Flow Station. (See Photo)
- Some flow didn't change when commanded due to defective damper actuators. They are listed on the Outside Air Intake Sheet.

Building pressures were measured by the computer which did not match the actual conditions measured at the lobby entrance and 20<sup>th</sup> floor to the roof. A list of differences is shown on the Relief Damper Operation Sheet. We did notice that the building pressure reduced by .03" when the relief damper on the roof was opened. This was caused by some relief through floor dampers which are not tight. The initial building pressure was +.13" with the roof relief damper open.

The floor relief dampers were tested on a command of full open and full closed to verify operation.

We did find some issues which affect the building pressure and they are:

- The 6<sup>th</sup> floor damper is 80% open when commanded for 0% open due to a linkage connection problem. Also, the light fixture is placed in a position that will not allow closure of the damper. (See Photo)
- 4 dampers are not tight and leak air which are on the 8<sup>th</sup>, 10<sup>th</sup>, 15<sup>th</sup>, & 16<sup>th</sup> floors.
- The 9<sup>th</sup> floor relief damper is located in a computer room which is sealed off from the other floor space. No floor pressure will be relieved through this damper.

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We decreased the outside air CFM settings to 70% of the existing condition while all relief dampers were commanded closed. The building pressure was +.125"

An experiment was made in reducing the outside air to 50% of the original condition. The building pressure was +.106" in the lobby and +.096" on the 20<sup>th</sup> floor.

The outside air was reset to the 70% value as a requirement of this contract.

Recommendations:

1. Repair or replace all faulty equipment.
2. Install a new atmospheric sensor located at the entry level and control all relief dampers from this point. The outside air quantities are similar on each floor and subsequently the pressures will be similar.
3. Reduce the outside air to a lesser value to produce +.05" of pressure. The CO2 monitors can override the setting to maintain no more than 800 PPM (ajd.). The +.05" of positive pressure will avoid the infiltration of moisture and reduce the energy demand on the HVAC systems.

The following pages represent the initial and final set conditions. If you have any questions, or if we can be of further service, please do not hesitate to call.

Very truly yours,

Wing's Testing & Balancing Co., Inc.



Richard A. Wing  
Certified TABB Technician #40008  
CT SM-2 License 3226

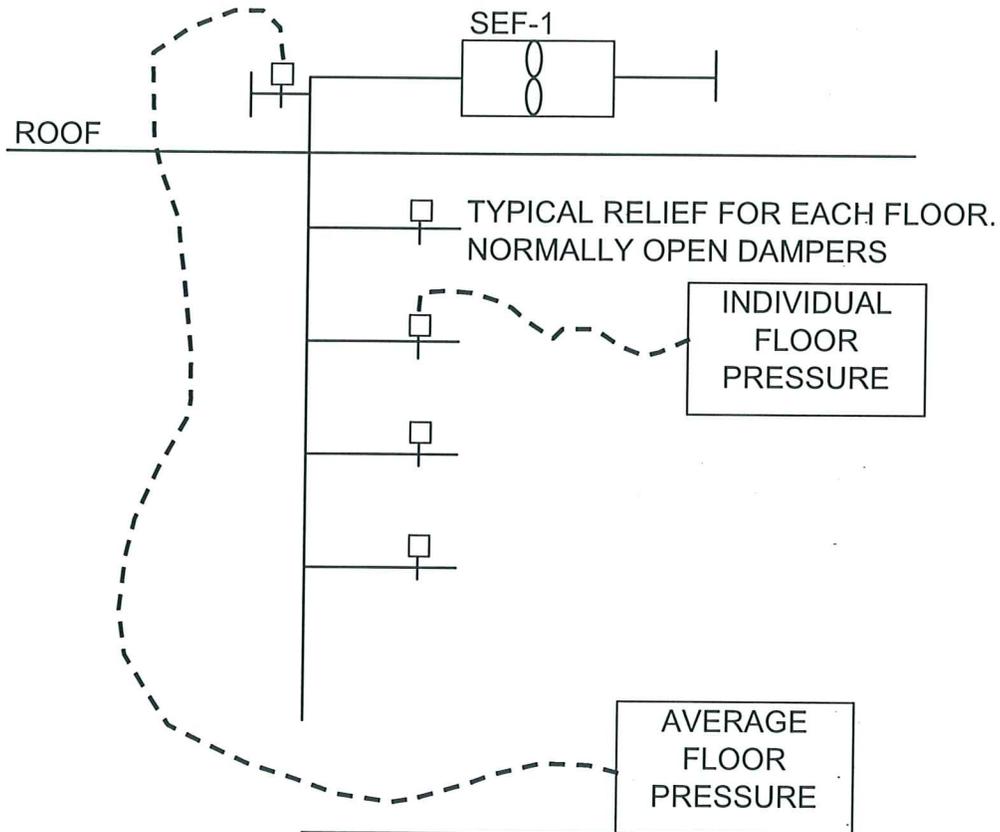


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# RELIEF DUCTING

PROJECT:	25 SIGOURNEY ST.	DATE:	9/20/07
AREA / SYSTEM:		TECH:	D.W.



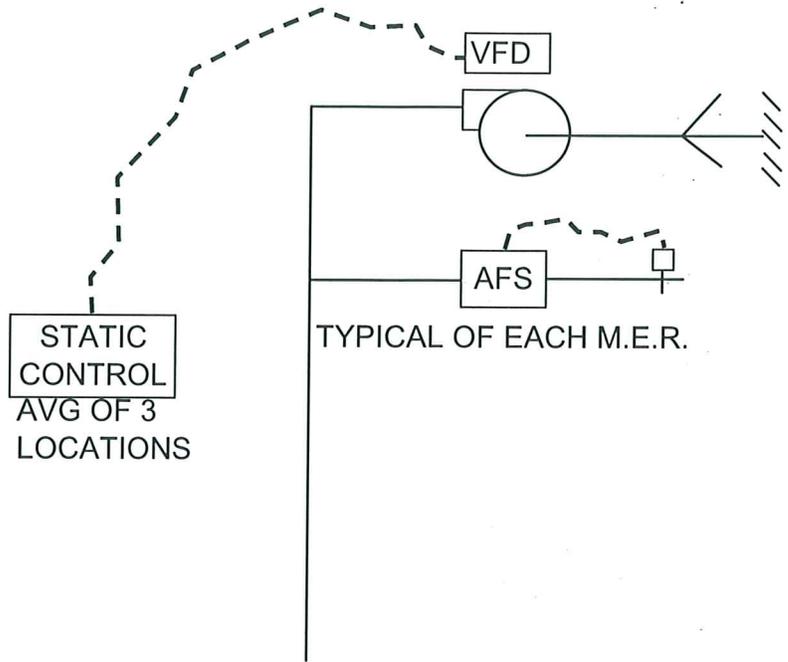
FLOOR	FL. PRESSURES	
	SOUTH	NORTH
16		
8		
6		
AVG.		

## REMARKS

THE BUILDING PRESSURE REDUCES BY .03" WHEN THE ROOF DAMPER OPENS DUE TO FLOOR DAMPERS WHICH DO NOT FULLY CLOSE

# OUTSIDE AIR DUCTING

PROJECT:	25 SIGOURNEY ST.	DATE:	9/20/07
AREA / SYSTEM:		TECH:	D.W.



	FL. PRESSURES	
FLOOR	SOUTH	NORTH
16	.19	.27
8	.23	.32
6	.20	-.07
AVG.	.21	.17
VFD HZ	43.8	49.2

## REMARKS

THE NORTH SIDE 6TH FLOOR SENSOR IS NOT READING CORRECTLY.



WING'S TESTING AND BALANCING CO., INC  
 94 NORTH BRANFORD RD, BRANFORD, CT 06405

## RELIEF DAMPER OPERATION

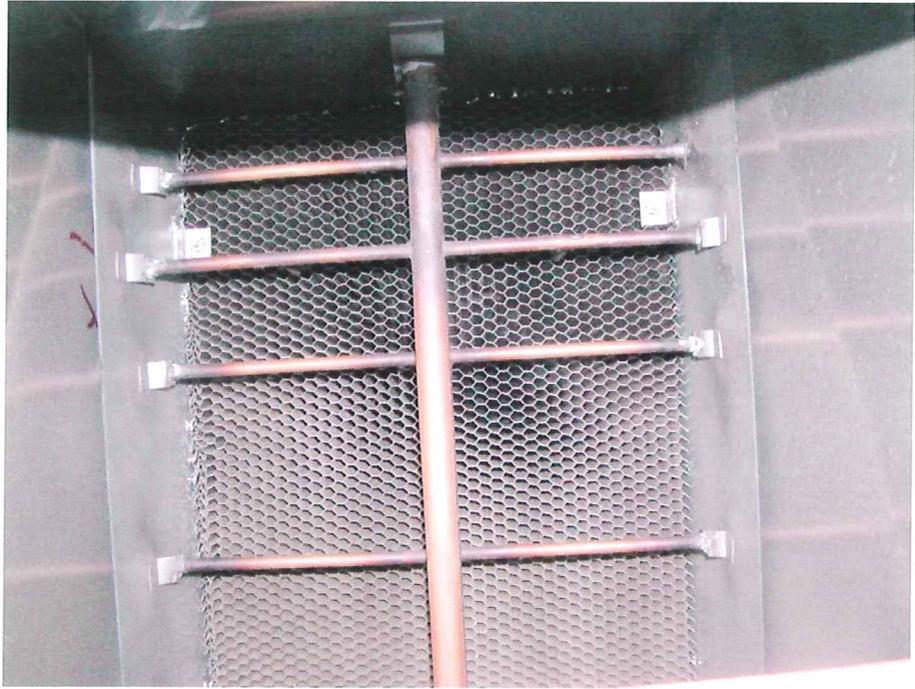
PROJECT 25 SIGOURNEY ST.										DATE: SEPT., 2007
SYSTEM: TEST OF RELIEF DAMPERS										TECH: D.W.
LOCATION	ATC % OPEN	TEST % OPEN	ATC PRES.	TEST PRES.	REMARKS	ATC % OPEN	TEST % OPEN	ATC PRES.	TEST PRES.	REMARKS
S. MEZZ	0	0				100	100	+0.10	+0.10	
N. MEZZ	0	0				100	100	+0.05	+0.10	
6	0	80	-0.02	+0.10	(1)	100	80	N/A	N/A	(1)
7	0	0	+0.02	+0.10		100	100	+0.03	+0.08	
8	0	25	N/A	+0.01	(2)	100	100	+0.04	+0.01	
9	0	0	N/A	+0.05		100	100	+0.01	+0.05	(3)
10	0	20	-0.05	+0.12	(2)	100	100	-0.05	+0.08	
11	0	0	+0.06	+0.12		100	100	+0.04	+0.06	
12	0	0	-0.01	+0.12		100	100	-0.01	+0.10	
14	0	0	+0.01	+0.12		100	100	-0.06	+0.09	
15	0	20	+0.02	+0.16	(2)	100	80	-0.01	+0.11	(2)
16	0	5	-0.06	+0.14	(2)	100	100	-0.06	+0.09	
17	0	0	-0.03	+0.16		100	100	-0.06	+0.095	
18	0	0	-0.05	+0.16		100	100	-0.08	+0.08	
19	0	0	-0.06	+0.14		100	100	-0.09	+0.06	

### REMARKS

(1) DPR LINKAGE BROKEN AND LIGHT FIXTURE BLOCKING CLOSURE. SEE PHOTO  
 (2) DPR LINKAGE SLOPPY. NEEDS SERVICE.  
 (3) THIS COMPUTER RM IS VERY TIGHT AND WILL NOT RELIEVE SPACE PRESSURE.

## 25 Sigourney – September, 2007 Outside Air Intake

Air Flow Station looking upstream at the honeycomb air straightener.



Looking downstream at a plugged honeycomb air straightener.



## 25 Sigourney – September, 2007 Relief Dampers

The normally open actuator is stroked. The damper is still open due to a broken linkage. 6<sup>th</sup> Fl



The light fixture is in the way of the damper linkage and can not close. 6<sup>th</sup> Fl

