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December 5, 2011

Ms. Donna Lennard
Il Buco Vineria
53 Great Jones Street
New York, NY 10012

Re: Rooftop HVAC Noise

Dear Ms. Lennard,

I retested the rooftop HVAC equipment for the third time today. The previous visit was on November 8, 2011. There have been continuing complaints from neighbors that have resulted in another DEP inspection visit. According to you, the DEP inspector said you were 3 decibels over now, compared with 20 decibels previously.

The purpose of today's inspection was to measure from 48 Bond where you arranged access for my sound tests, and to make further sound reduction recommendations.

TEST, INSPECTION, RECOMMENDATIONS

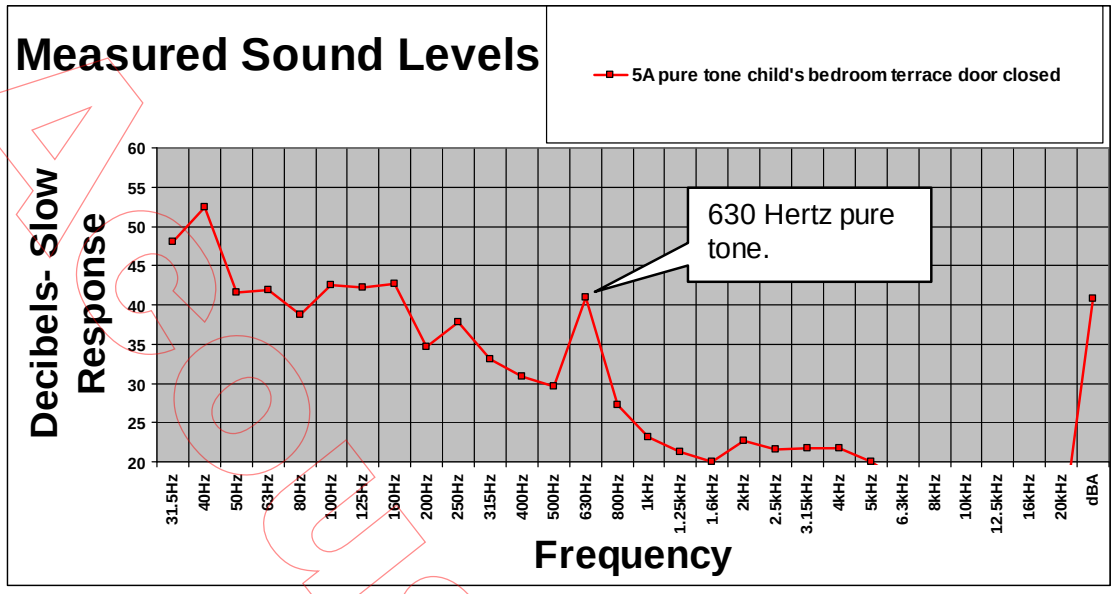
PURE TONE AT 48 BOND

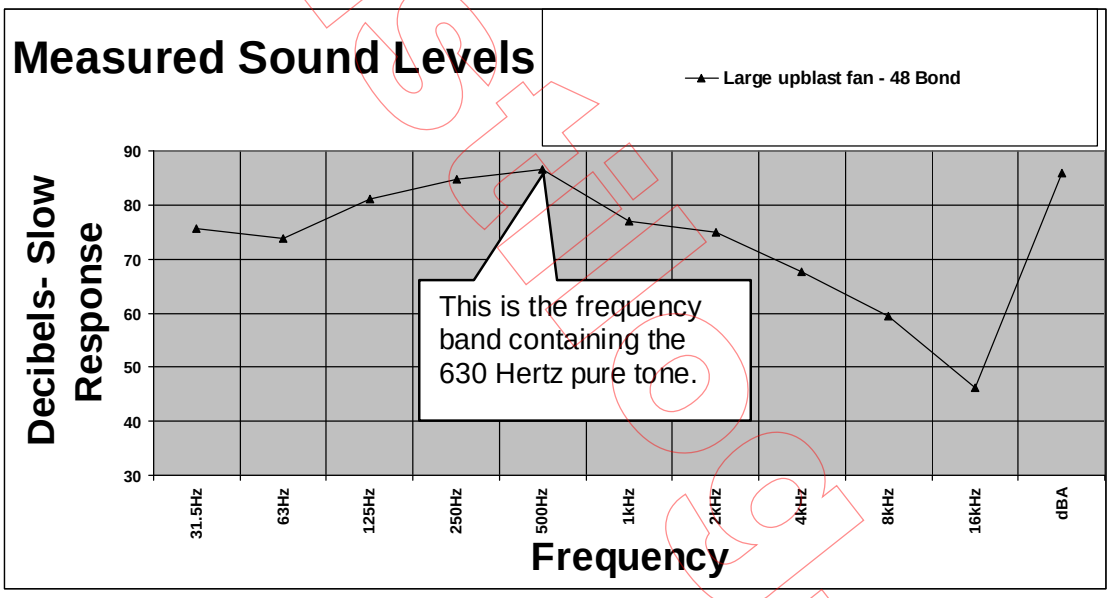
I measured sound in Apartment 5A at 48 Bond. The resident said that the problem is a high whining sound coming from the silver box with the visible fans. She led me into the son's room where a pure tone was clearly heard even with the terrace door shut. The same sound, with a slightly different character, was heard in the master bedroom. The resident also complained that the fans were not turned off at night so she suffers from the tones all the time.

I noticed that when the fans were turning they made no audible noise; I pointed this out to the resident who thought that both fans were off when one was clearly spinning. She then saw this herself. However, the pure tone was heard with the fans running or not. The pure tone consisted of a 630 Hertz continuous "ringing" or "humming" sound, measuring as loud as 41 decibels in the son's bedroom.

630 Hertz is best described as a midrange sound; this pure tone sounds like an owl hooting except that it does not stop. A pure tone is not a natural sound, like ocean waves, rainfall, or wind. While such sounds consist of a range of frequencies, a pure tone consists mostly of a single frequency or pitch, like a fog horn or a machine hum. A pure tone is unnatural, attention-getting, and penetrating.

Because the sound was from a pure tone source, it varies up and down in level depending on where one measures it. This is due to the existence of "standing waves", a series of high and low loudness locations. The sound bounces back and forth in the room and either adds to or subtracts from the same sound bouncing in another direction. In some places in a room, the combined waves can cancel each other out, while in other locations the sound can be quite strong. Outdoors, pure tones are hard to localize. See the graphs below.





I suspected that the fans belonging to 48 Bond could be a problem during my first visit on September 2, 2011 at which time I photographed them and stated,

> *"There is audible noise coming from the new condo building to your south. The noise appears to emanate from the louvers and exhaust fans shown in this picture."*

At the end of this report is a photo of the Eva Scrivo store at 50 Bond where I went to investigate the noise of the 48 Bond fans. When I got close to the fans, it was obvious that the large upblast fan is the source of the 630 Hertz tone, measuring 87 decibels in the midrange frequencies 1 foot from the fan. 87 decibels is not approximately "twice" as loud as the 41 decibels in the apartment; it is more than 24 times louder. This proves that the pure tone is definitely coming from 48 Bond's own fan and not from the

equipment on your roof. Apparently you have been blamed by the 48 Bond residents for their own noise for months.

48 Bond has more visible grills that lead to other noise sources, which have not yet been investigated. These noise sources could be seasonal so past and future noises could have/may be blamed on your equipment.

The owners of the 48 Bond fans should fix this problem. My simple suggestion is to have them call their own mechanical contractors to eliminate the noise, which is probably due to a bad bearing in the fan. I can design a solution for them that works if their contractor cannot.

DEP INSPECTOR - LOT LINE WINDOW

Your contractor, Andre, confirmed my guess that the DEP inspector measured from the lot-line window overlooking your roof deck. As I mentioned before, “lot-line” windows are sometimes referred to as “illegal windows”. Also, if they are lot-line windows, they are not built as required and are also not guaranteed to always provide light and air; they can be blocked by neighboring construction in the future.

This depends upon many factors but it may be a defense for any Noise Code summons that readings should not be measured inside a lot line window. In fact, I have sometimes recommended installing a wall directly in front of any lot line window when complaints are made. While tenants do not like this, lot line windows are not entitled to light and air and this method reduces noise levels inside if the tenant continues to call the DEP. This is an option we may have to consider in the future after more remediation work is done. However, that does depend on the air rights issue.

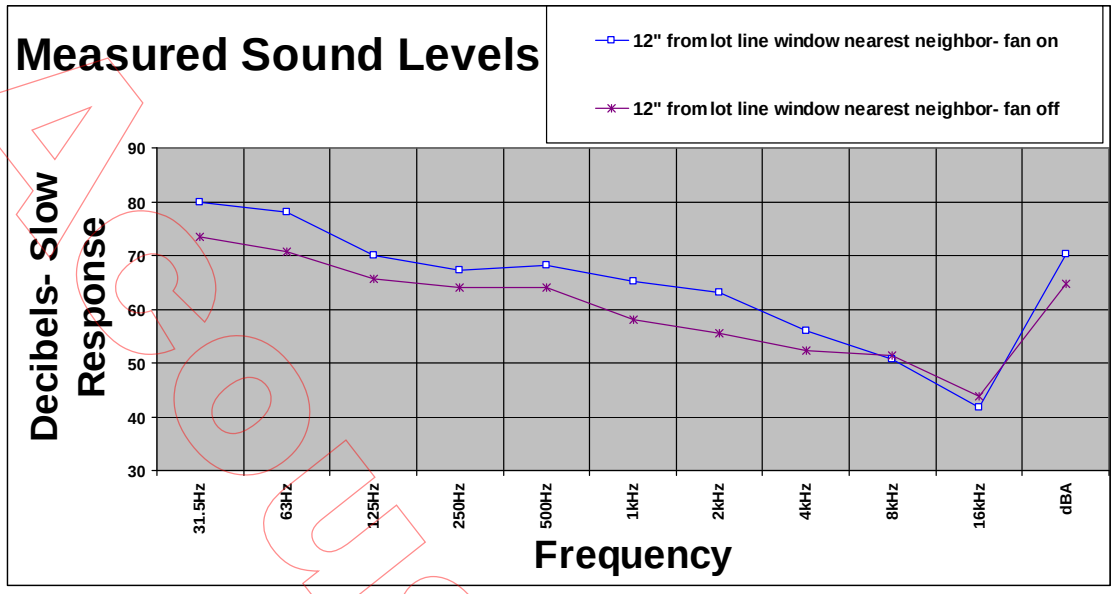
The large exhaust fan now has an enclosure. The enclosure has been built but not according to my specifications. The inside faces are all supposed to have exposed fiberglass insulation. Instead, concrete board was used on the inside as well as the outside, so the fiberglass cannot absorb any of the noise in the enclosure. Take the inner concrete board off.

There is an issue about the height of the enclosure; if necessary lower the box but do not let it touch the fan gooseneck duct.

Since we now know that the lot line window is the DEP preferred test location, I suggest that you modify the box slightly by making the discharge opening point west instead of north. This opening will therefore face away from the lot line window. There would also be less discharge in the direction of the air conditioners and the east makeup air intake. This opening should be at least as large as the actual fan duct opening itself, approximately 14 x 22. Install the inner gooseneck as planned but add a 45 degree “scoop” or angle of inner fiberglass to direct the exhaust west toward the opening. Cover the 2” fiberglass throughout the inside of the enclosure with Armstrong 5/8” thick ceiling tile, with the white side facing the airstream. Use any of the following types, available from Home Depot:

403 espirit 10 panels 30 sq.' 2x4 5/8
404 pebble 10 panels 30 sq.' 2x4 5/8
421 shasta 10 panels 30 sq.' 2x4 5/8

When the panels get too dirty, replace them. They can be attached with pins or they can be covered with porous screening to hold them in place against the airflow.



The graph above shows that the fan's noise level is 70 dBA outside the window, and 65 dBA when the fan is off. Accounting for the drop in sound when the window is opened and sound is measured 3 feet inside the opening, I predict that the sound level from the fan is now approximately 60 dBA, still far in excess of the Code limits. However, the actual level depends upon the configuration of the fan enclosure, which has changed in the last several days. Although it is not known whether the noise level I measured today is the actual level measured by the DEP inspector, the soundproofing recommendations which I am providing will greatly lower the sound level.

SILVER COMPRESSOR BOX

There is a high frequency noise coming from the compressors inside the silver cabinet but not from the two fans themselves.

At this point, the silver compressor box needs the inner damping and fiberglass treatment that I described in my original report. Also, a cover has been put on the box with fiberglass inside; this can remain but the vertical concrete board facing the inside of the box needs to be removed to expose the yellow fiberglass.

SMALL EXHAUST FAN

The small exhaust fan does not have to be treated at this time.

RETEST AND INSPECTION

I suggest you have me either retest or inspect during the work so that we can minimize the time required to get the job done right.

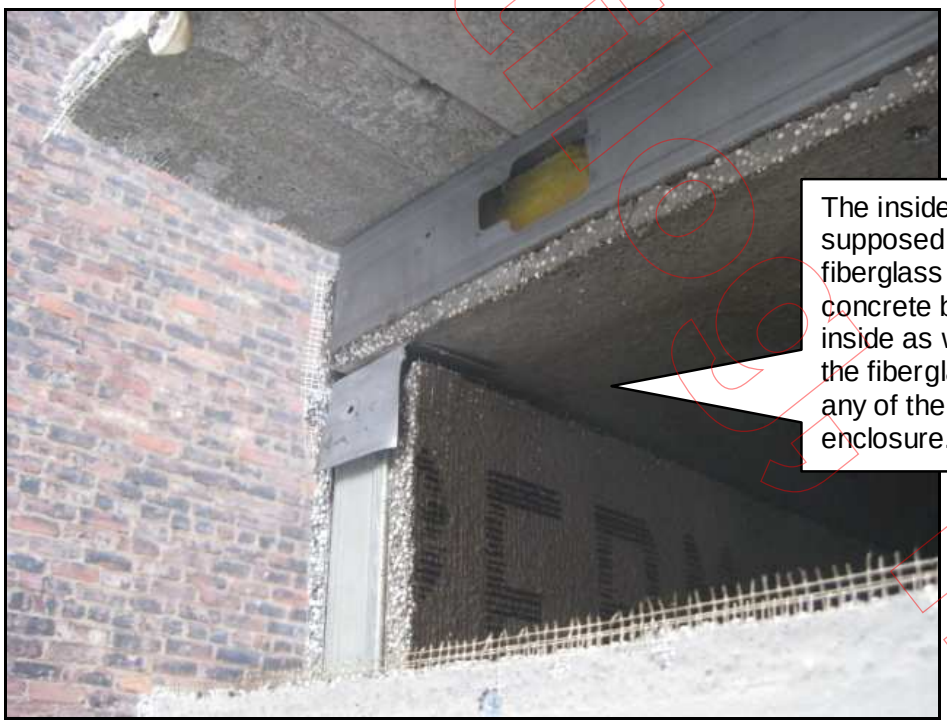
If I can be of further assistance, please call.

Yours Truly,

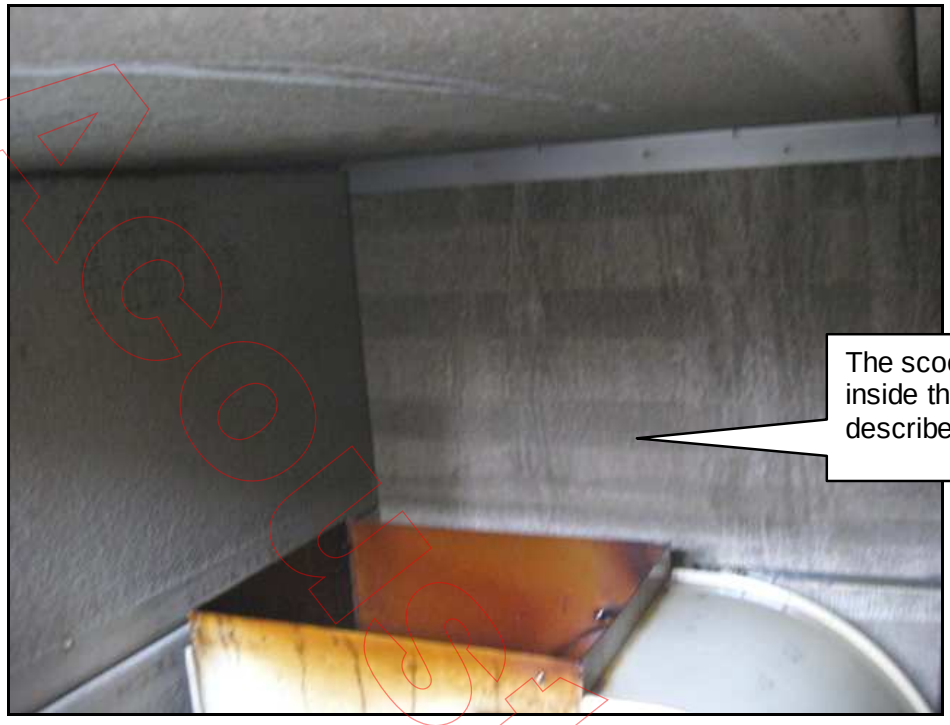
Alan Fierstein
President
af1@acoustilog.com

All readings re: .0002 microbar. Readings taken with Bruel & Kjaer 2260/2270 Analyzer, Bruel & Kjaer 4135, 4145, or 4165 Microphone, Acoustilog 232A Reverberation Timer. Calibrated to Bruel & Kjaer 4220 Sound Source or Quest CA-15.

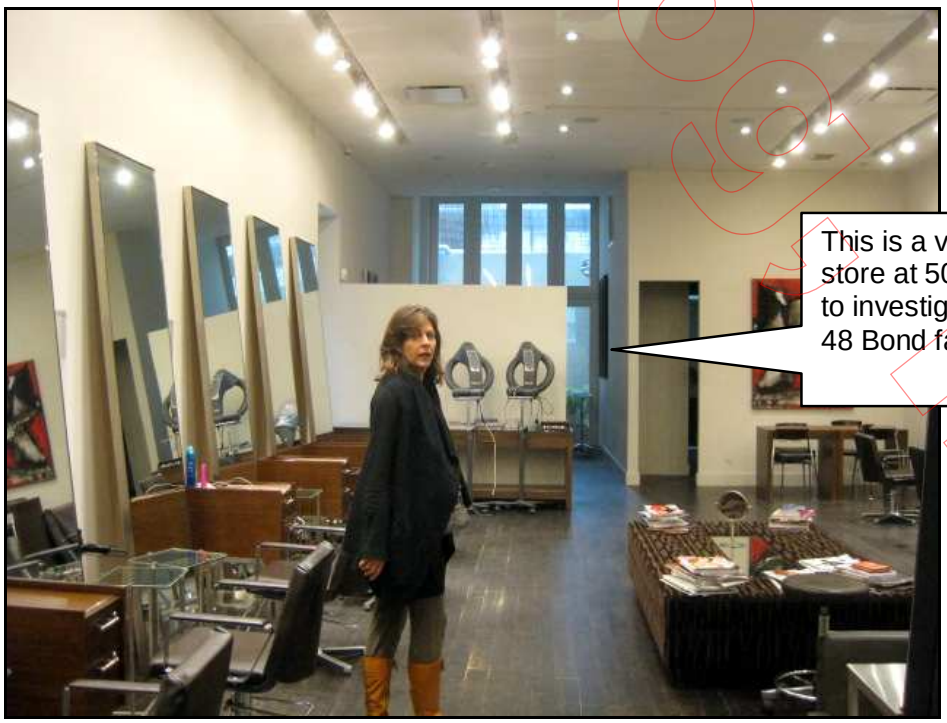
The enclosure has been built but not according to specifications.



The inside faces are all supposed to have exposed fiberglass insulation. Right now, concrete board is used on the inside as well as the outside, so the fiberglass cannot absorb any of the noise in the enclosure.



The scoop should be installed inside the enclosure as described in the last report.



This is a view of the Eva Scrivo store at 50 Bond where I went to investigate the noise of the 48 Bond fans.

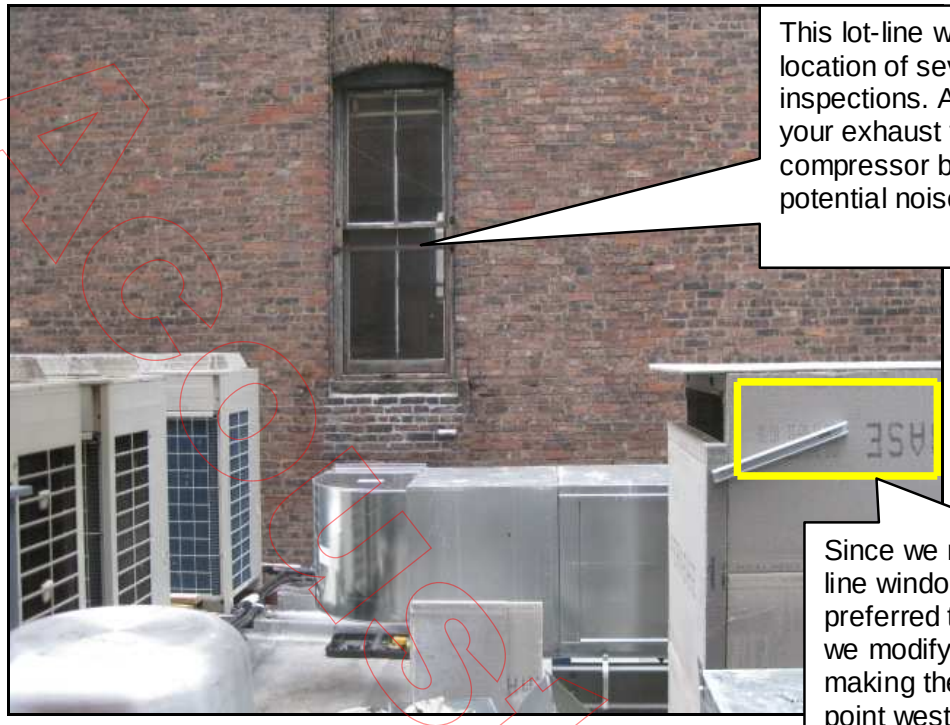
This is a view of the 48 Bond fans from the back door of the Eva Scrivo store. The front fan is the one causing the pure tone noise.

The front fan is the one causing the pure tone noise.

These fans belong to 48 Bond. The annoying 630 Hertz pure tone has been coming from this largest upblast fan on the left, and not from the equipment on your roof.

Not only are the fans belonging to 48 Bond a source of noise, but there are other visible grills that lead to other noise sources. These sources have not yet been investigated.

48 Bond has more visible grills that lead to other noise sources, which also have not yet been investigated.



This lot-line window is the location of several DEP inspections. At this location, your exhaust fan and the silver compressor box can be a potential noise.

Since we now know that the lot line window is the DEP preferred test location, I suggest we modify the box slightly by making the discharge opening point west instead of north.

At this point, the silver compressor box needs the inner damping and fiberglass treatment that I described in my original report. Also, a cover has been put on with fiberglass inside; this can remain but the vertical concrete board facing the box needs to be removed to expose the yellow fiberglass.

This is a view of the 5th floor apartment (5A) at 48 Bond where I took measurements as seen from your roof.

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