

Richard Kahn
HBRK Associates Inc.
575 Lexington Avenue, 4th Floor,
New York, New York 10022

July 26, 2013

Re: 9 East 71st Street
New York, NY
Engineering Report

Dear Mr. Kahn,

The following is based on our investigation of the conditions in the 3rd floor bedroom in the above space. The purpose of the investigation is to attempt to remedy any adverse comfort conditions the space. The investigation consisted of a review of the existing design drawings for the building, the modification of the bedroom system previously completed, and an inspection of the cellar and 6th floor mechanical rooms as well as a non-destructive inspection of the bedroom and surrounding area.

- 1) Based on the existing drawings the return air in the sitting room and bedroom totals 1670 cfm. The air originally supplied to those two rooms totaled 2735 cfm. With the addition of the 10 ton air handler, the supply air into the bedroom had increased by an additional 1000 cfm, resulting in a total difference of over 2000 cfm. The original return was designed as a "plenum return;" the return duct collects air above the ceiling, requiring the air to migrate to the space above the ceiling thru architectural slots above the bedroom crown molding.

We recommend:

- a) increasing the quantity of return air to the space by installing a booster fan in the return ductwork to match the increased air flow generated by the supply air handler. The booster fan should be installed as far away from the bedroom as possible (potentially near the service stair) to minimize any sound generated from the fan.
 - b) Reroute the ductwork in the corridor to allow the return air to be collected below the ceiling, but above the crown molding.
 - c) The above recommendations for duct modification are based on review of the existing DESIGN drawings and visual inspection of all conditions below the ceiling. The as built conditions above the sheetrock ceiling could not be determined; the design may need to be modified once the actual conditions are determined.
- 2) The 10 ton air handler is a pre-manufactured unit that was designed to provide a design temperature in the bedroom of 60 degrees F. At that temperature, the dehumidification capacity of the unit is limited. The amount of humidity that can be removed from the space is inversely proportional to the supply temperature coming off of the cooling coil; the lower the supply temperature, the more humidity can be removed from the room. This unit can only produce a

temperature of approximately 55 degrees. While this is adequate for cooling, this cannot bring the RH in the space below 70% when the room temperature is 60 degrees.

We recommend:

- a) obtaining a custom built unit which has a chilled water coil that can produce a discharge temperature of approximately 48 degrees F. This temperature can bring the humidity in the space down to 50% or lower, which is within the comfort range. With air temperature this low, it is likely that the space would be overcooled. A hot water heating coil should be added to the unit AFTER the cooling coil. This would raise the temperature of the supply air, without affecting the dehumidifying capacity of the unit, and enable us to regulate the temperature of the bedroom. There will be some additional piping modifications to the piping system required by this installation. Depending on the unit selected, the chilled water requirement may be increased. The pump that presently feeds chilled water to the air handler may be inadequate and need to be replaced as well.
- 3) We were informed of another potential option discussed being the installation of a Mitsubishi split system in the closed adjacent to the bedroom.

We have reviewed this at this time do not recommend this for the following reasons:

- a) The minimum published indoor operating temperature for the Mitsubishi unit is 59 Degrees F. This is very close to our standard room temperature of 60 Degrees. As with the chilled water units, the lower the space temperature, the more difficult it is to dehumidify. While there is no data from Mitsubishi concerning this reduction, a similar system(Daikin) has the moisture removal capacity reduced to 1/3 of its nominal total when the space temperature is lowered from 70 degrees to 61 degrees(lowest published data point). We are not confident that this type of system will significantly reduce the moisture in the room.
- b) The proposed location of the indoor unit is close to the bedroom. Although the Mitsubishi fan coils are very quiet, they still generate some sound. With the unit that close to the bedroom, there will not be an adequate length of ductwork installed to achieve significant sound attenuation.
- c) the Mitsubishi unit will be subject to maintenance on a regular basis. The original design concept of the residence was to have all mechanical equipment remote from the living area, either on the 6th floor or the cellar.
- d) The split system concept requires piping run from the 3rd floor closet up to the roof. This will result in substantial general conditions construction (carpentry, painting, etc) over and above the mechanical work. The work for the chilled water design all be completed in the mechanical spaces; the return duct revisions will require some duct modification in a few local areas.

Let me know if you have any questions or comments

Very truly yours,

Alan R. Schwartz PE