LILLIS BUSINESS COMPLEX OFFICES: A STUDY OF PASSIVE INTEGRATION



ductwork? **METHODOLOGY:** way (photo, above right).

AIR FLOW OBSERVATIONS

OFFICE CONFIGURATION STUDY

HYPOTHESIS: Office configurations have a notidcable affect on

thermal comfort within the north-side offices. **QUESTIONS:** Does opening the door cause the office to leave the

ASHRAE comfort zone? Does opening the window cause the office to leave the ASHRAE comfort zone? Does turning on the overhead fan cause the office to leave the ASHRAE comfort zone?

METHODOLOGY:

Temperature/rH sensors were placed in various locations of an unoccupied north-side office. Temperature/rH were measured for 24 hours in each of threel office configurations: the window closed, with the fan off; the window closed with the fan on; and the window open with the fan on. Because the system was designed to work with the door closed, we did not test the effect of this control.

OBSERVATIONS:

Temperatures vary within the room, anywhere from 2 - 12 degrees, depending on the various configurations. The fan increased the homogenaety of temperatures within the space.

CONCLUSION:

Although this room is atypical of the north-side offices (we managed to find the one office on the north-side with mechanical cooling potential!), it demonstrates the capabilities of control within one of the passive offices. Clearly the configuration of the room can affect the occupant's perception of the temperature, with the cooler temperatures occuring close to the window. Turning on the fan will homogenize this temperature gradiation, and opening the window will introduce the fastest way to cool the space. Our observations demonstrate that the passive controls available to the user to are capable of establishing personal comfort during the winter months.

FUTURE STUDY RECOMMENDATIONS: Although the rooms are designed to function with the door closed, we observed many occupants keeping their door open (perhaps for other reasons). The impact of this habit may be drastic on the functioning of the passive cooling of the north-side offfices. Observing the effect of having the door open in conjunction with the above-recorded observations might reveal why the occupants are observing "hot" temperatures.

Further, conducting the same study in the summer might reveal the true effectiveness of cooling the offices when they require excessive cooling.

Finally, conducting the same test in different offices might record a better cross-section of actual experience, determining a trend either toward occupant controls, or perhaps some other effect of the system.





ridors and the offices, and then from the

•How does air move within the atrium? •How does air move in the corridors? •Is there a different air movement on the and fourth floors? •What does air movement in the corridor suggest about air movement within the

Observe bubble flow paths in atrium and hall-Observe movement of strips on hallway-



Air is exhausted into the atrium from the cor- The air in the atrium does not flow directly upwards; its behavior is more erratic. Air in the hallways of each floor flows east, away from the atrium.

OBSERVATIONS:

CONCLUSION: While not conclusive, the evidence points toward the ventilation patterns in the atrium first and second, as compared with third and the corridors not supporting the stack effect in the atrium.

FUTURE STUDY RECOMMENDATIONS:

South-facing Offices North-facing Offic

HYPOTHESIS The north-side offices are always warmer than the southside offices.

QUESTIONS: •Are the offices within the ASHRAE comfort zone? If so,

which ones, when, and for how long? •Are occupants experiencing excessive temperatures, or are they anticipating a mechanically conditioned space, therefore expecting cooler temperatures?

METHODOLOGY

given day.

temperatures. **OBSERVATIONS:**





CONCLUSION

TEMPERATURE AND COMFORT STUDY

Temperature/rH sensors were placed in six offices of the east wing. Both north- and south-side offices were tested, with a range of distances from the atrium represented. Readings were taken for 4 days, and the data compared with outdoor

The north-side offices appear to have a lower daily maximum temperature and a greater range of temperatures throughout a

Inconclusive study: although the north-side offices tend to be warmer, they also produce a smaller temperature variation, and maintain temperatures within the Comfort zone.

FUTURE STUDY RECOMMENDATIONS: This study might provide more conclusive results if performed in the summer, when average temperatures would be higher, potentially exceeding the ASHRAE comfort zone.