

The Atlantic Center for the Arts: Helene B. Roberson Dance Studio



Team Orange:

Jim Tice, Viraj Srivastava,
Crystal Maeker, Alan Hedge

Team Leaders

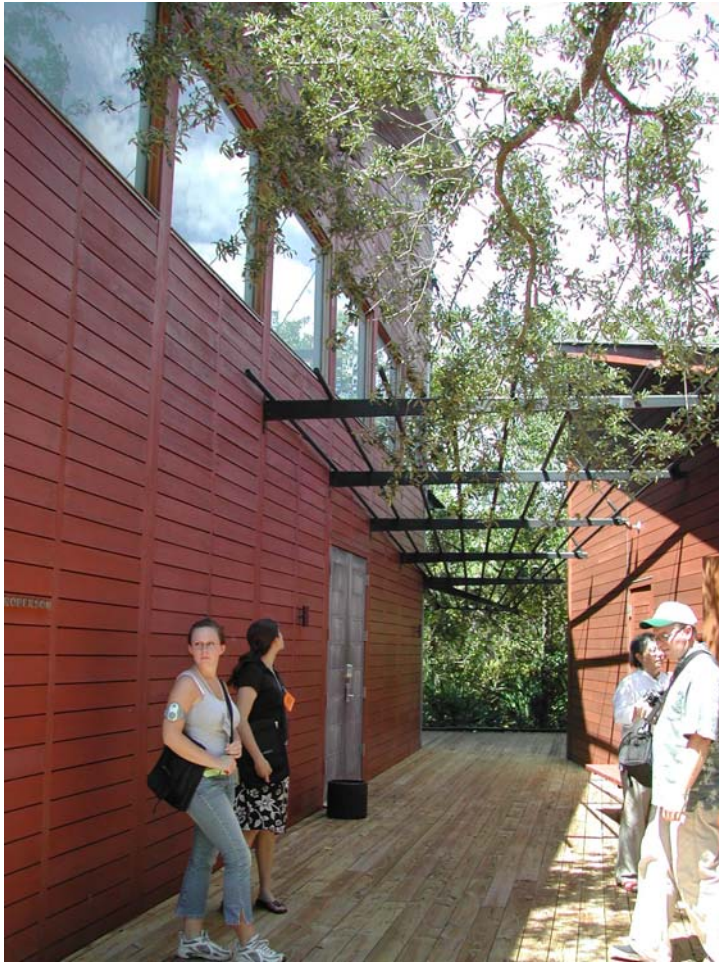
Leesa Mayfield (it's all her fault),
Walter Grondzik

Helene B. Roberson Dance Studio



<http://www.atlanticcenterforthearts.org/artresprog/studios/dance.htm>

Helene B. Roberson Dance Studio



A Happy Facilities Manager?



Research Issues

- Dancers periodically open the doors to the dance studio in the belief that this improves ventilation to the studio.
- The HVAC has no external air intake and relies on 100% recirculation.

Hypothesis

- Opening either the double-doors, the exit door, or the sliding doors for 10 minutes will improve the thermal comfort conditions (air temperature and relative humidity) in the Dance studio.

Equipment and Method

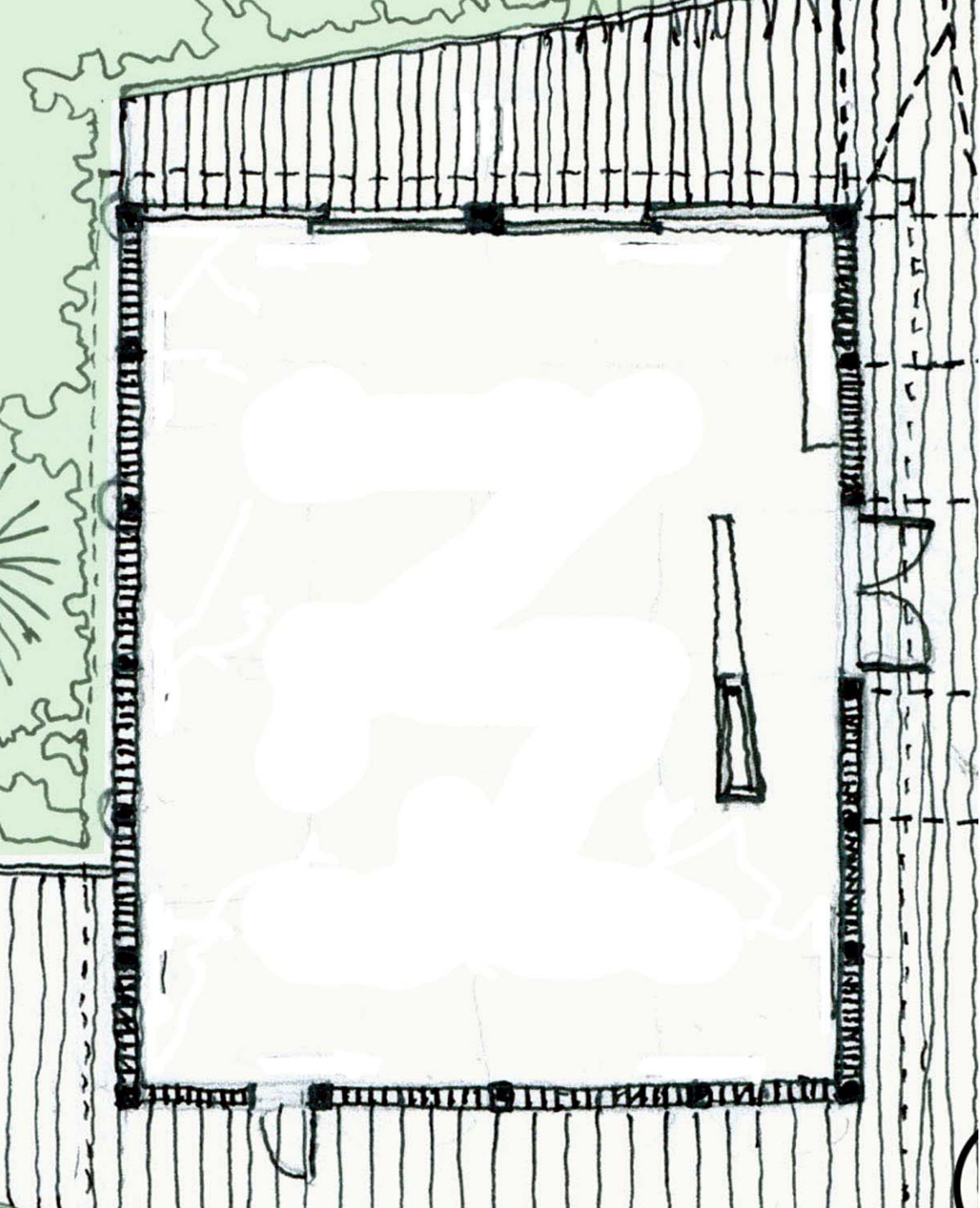


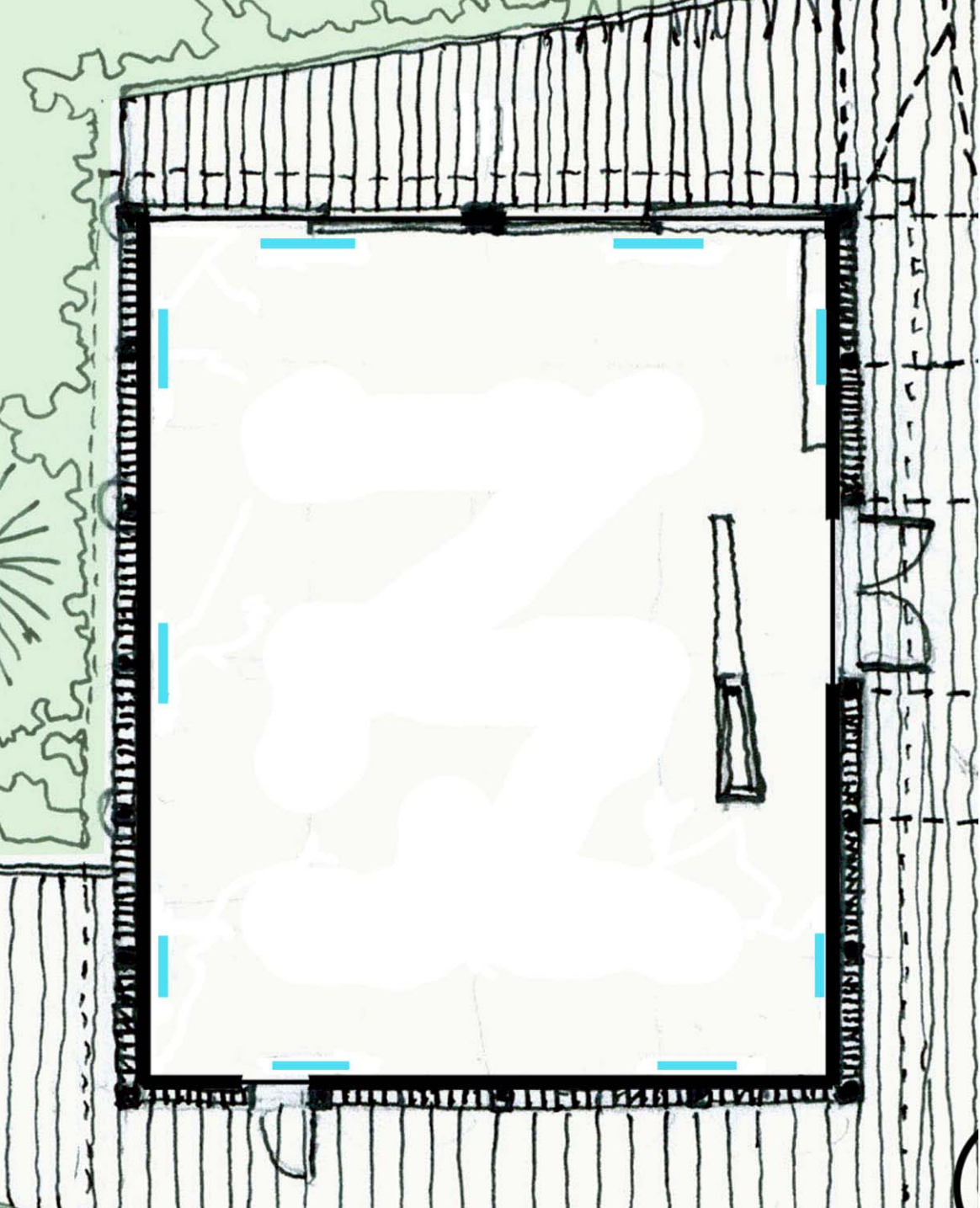
Equipment and Method

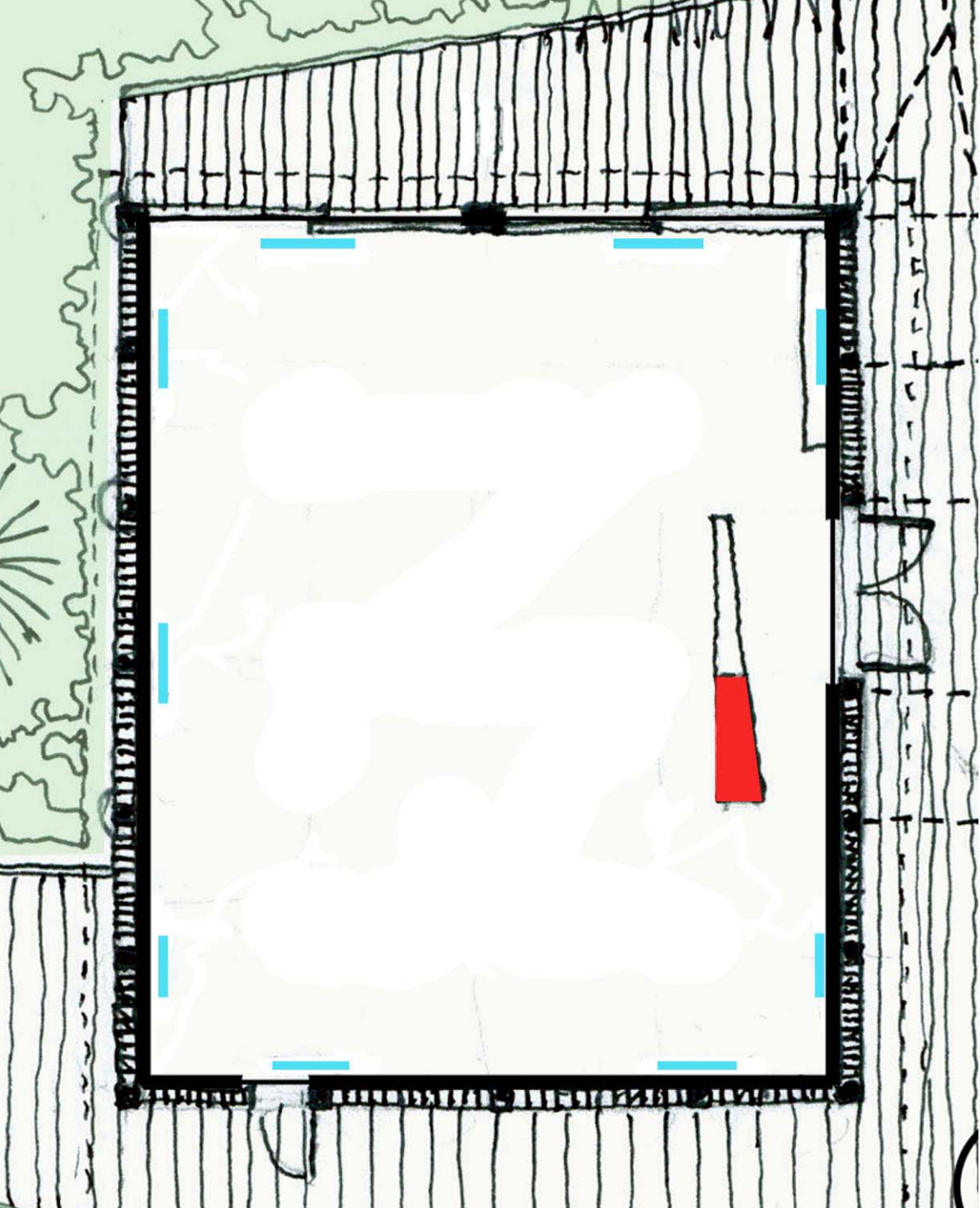


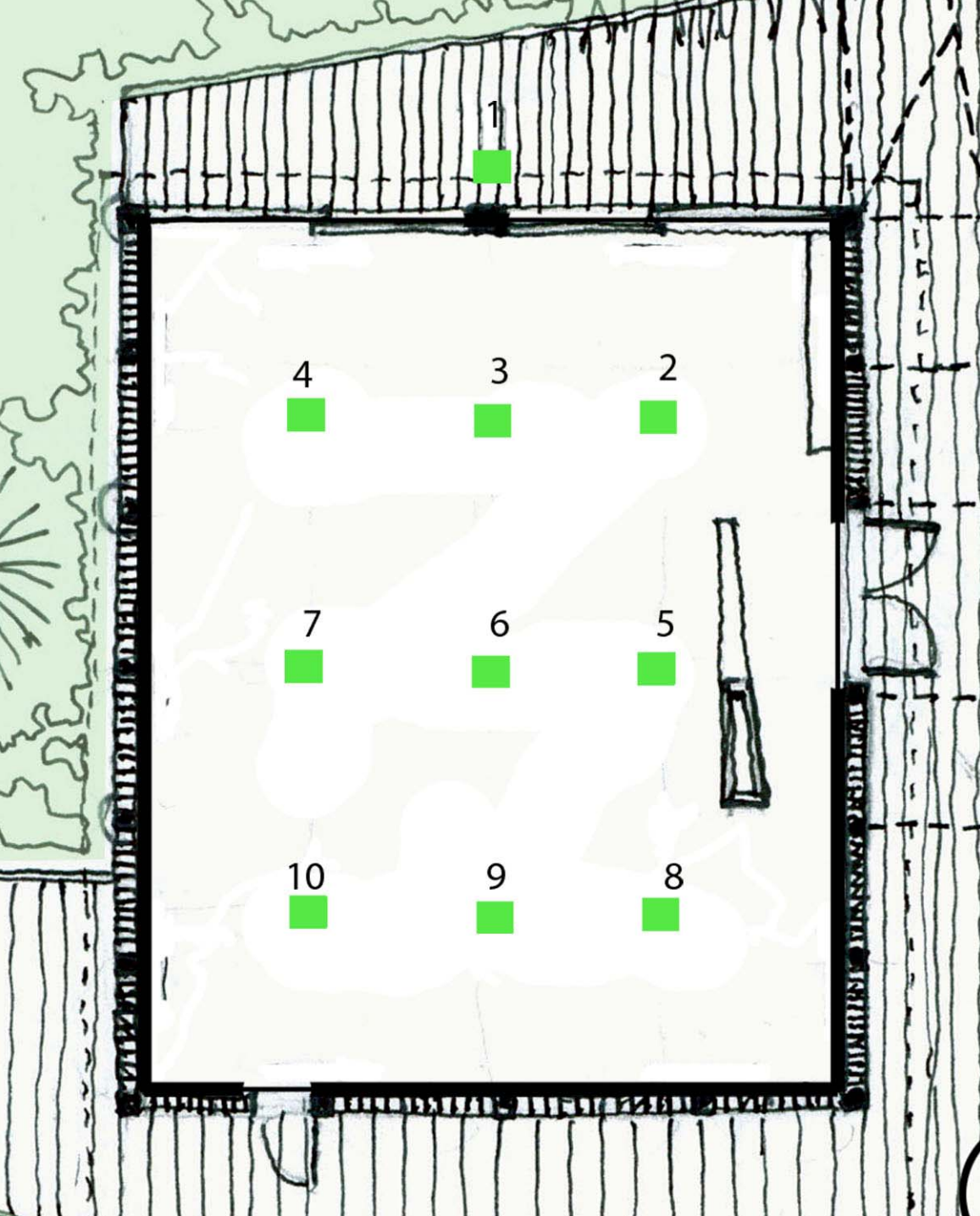
Equipment and Method

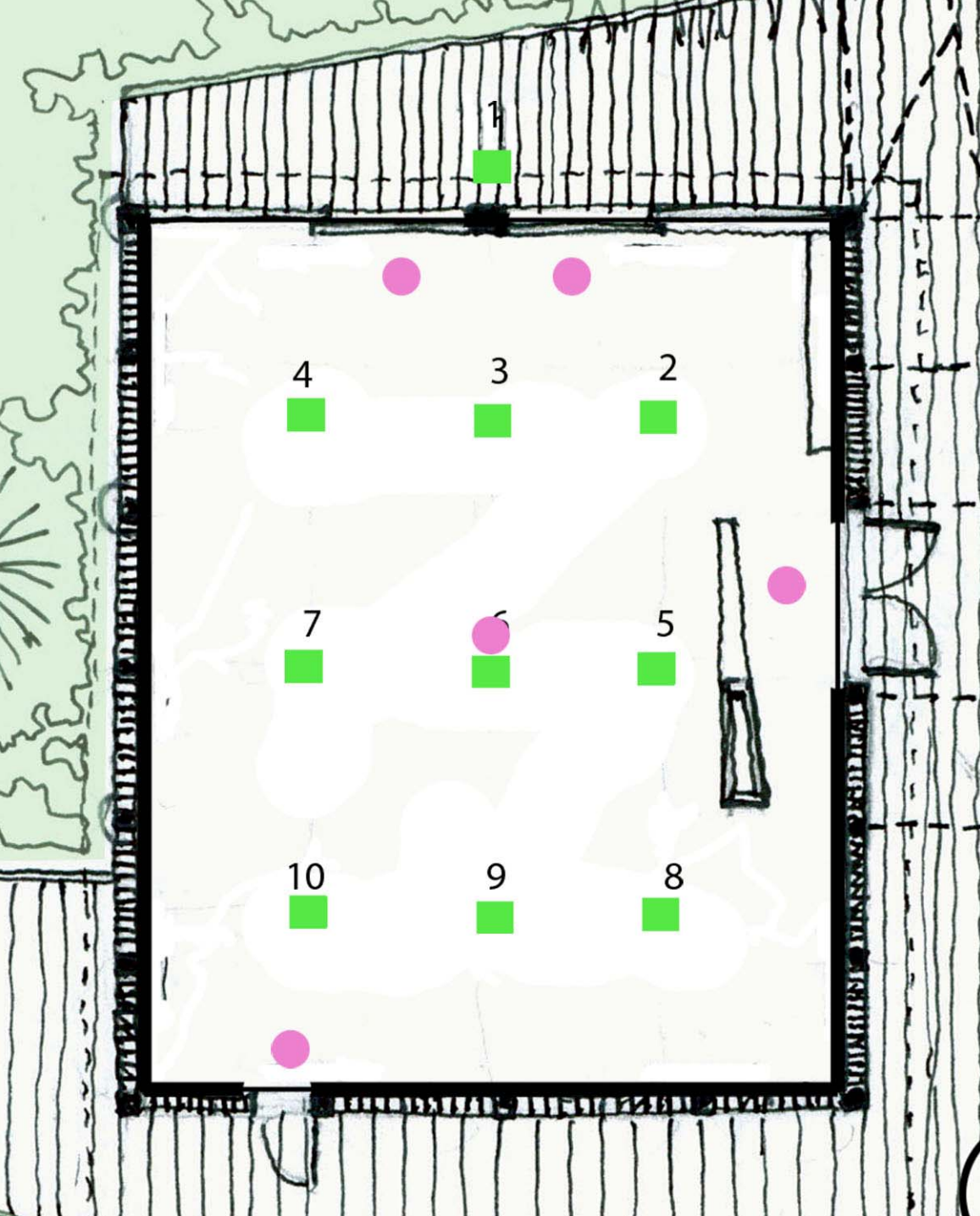












Gathering data

- Data were collected according to the following a.m. schedule:
 - 9:00–9:40—baseline
 - 9:50–10:00—double-doors open
 - 10:00–10:30—doors closed
 - 10:30–10:40—sliding doors open
 - 10:40–11:10—sliding doors closed
 - 11:10–11:20—exit door + $\frac{1}{2}$ sliding door open
 - 11:20–12:20—all doors closed (noon rain)

Double-Doors

- Opening the double-doors causes:
 - Hot, humid air to enter at a higher level straight into the HVAC return.
 - Cold air to flow out at a lower level.



Sliding Doors (2 open)

- Fully opening the 2 sliding doors causes:
 - Hot, humid air to enter at a higher level straight up to the ceiling, and the air flow penetrated about 50% of room depth.
 - Cold air flowed out at a lower level causing bubbles to adhere to the screens.



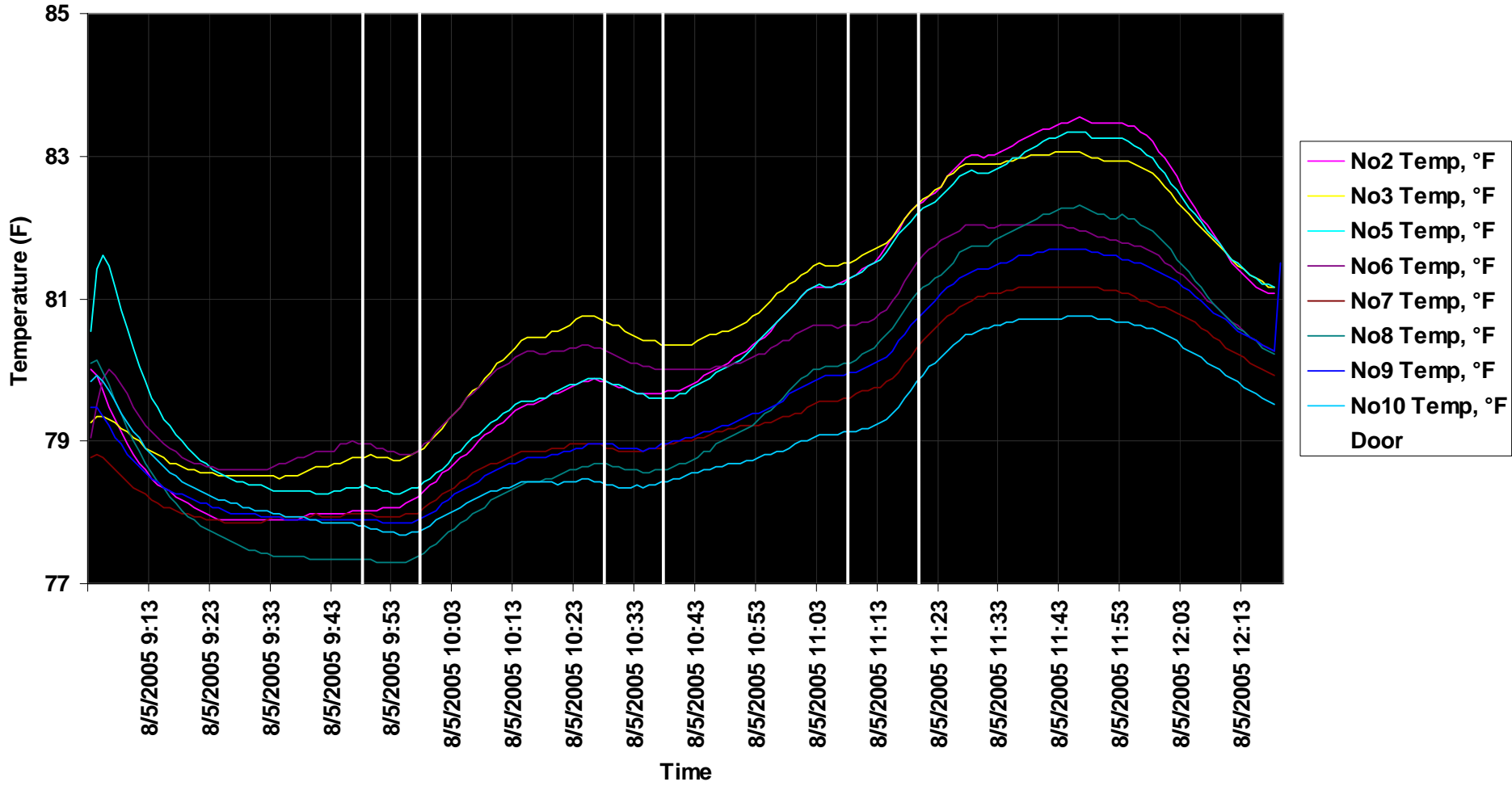
Cross-Ventilation (Exit/Sliding Doors)

- Half opening 1 sliding door + exit door causes:
 - Limited cross-ventilation
 - Cold air flowed out at a lower level at exit door (50% of air supply diffuser extends across door).



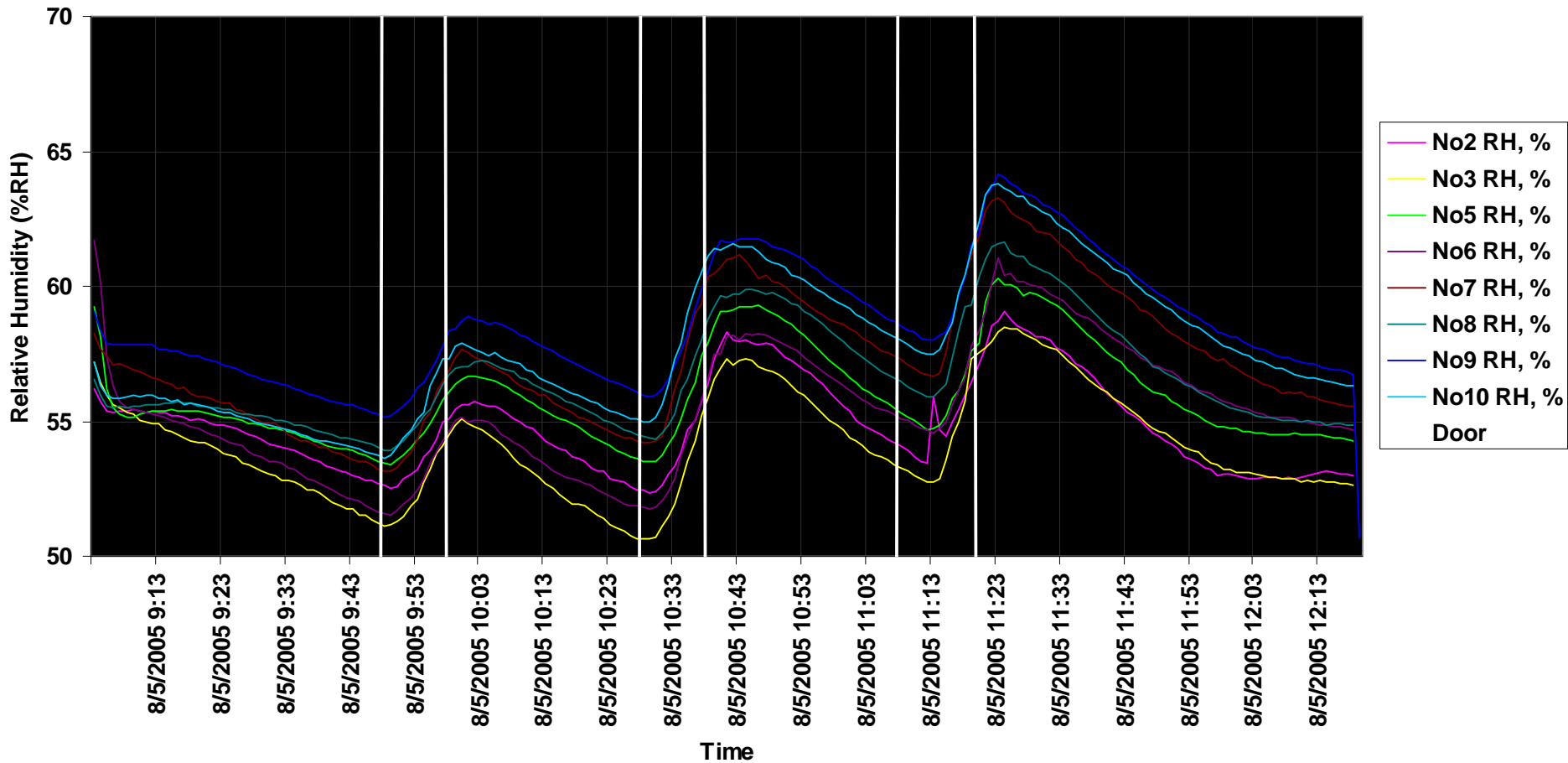
Results

Indoor Temperature Distribution



Results

Indoor Humidity Distribution



Conclusion

- Opening the double-doors to the dance studio is ineffective in improving ventilation.
- Opening the sliding doors alone is ineffective in improving ventilation.
- Creating cross-ventilation between the exit door and sliding door does yield some changes in air movement, but not in thermal comfort conditions.
- The HVAC system lag is inadequate for dancers to be opening any of the doors more frequently than occasionally.
- The mechanical HVAC system should be substantially redesigned and upgraded to allow dancers to operate the doors for improved “perceived” comfort.