

# AGENTS OF CHANGE



ATLANTIC CENTER FOR THE ARTS

2005

TEAM PURPLE: vidhi agarwal, nick rajkovich, ginger cartwright, jessica morton, khee poh lam, youngmin kwon

## THERMAL MASS IN FLORIDA?

# HYPOTHESIS:

THE OFF-PEAK USE OF AIR-CONDITIONING TO COOL THE CONCRETE THERMAL MASS IN THE SCULPTURE STUDIO WILL CREATE A THERMALLY COMFORTABLE ENVIRONMENT UNTIL NOON OF AUGUST 5, 2005.



JIM AND ALEXIS PUGH  
SCULPTURE STUDIO

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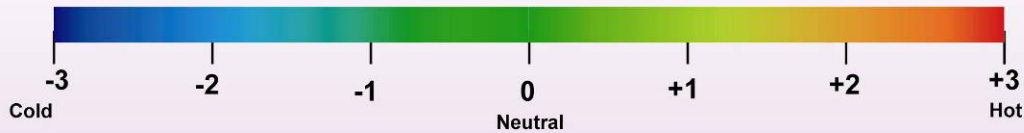
# DEFINITIONS:

OFF-PEAK - 7:00 PM TO 8:00AM

## THERMAL COMFORT - VALUES AS DEFINED IN ASHRAE 2004

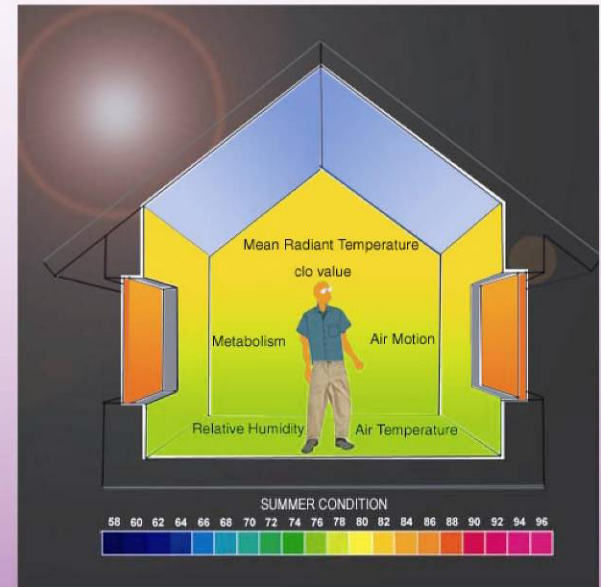
"condition of mind which expresses satisfaction with the thermal environment"

BASED ON PREDICTED MEAN VOTE (PMV) "an index that predicts the mean value of the votes of a large group of persons on the 7-point thermal sensation scale"



$$-0.5 < PMV < + 0.5$$

- Mean Radiant Temperature
- Air Temperature
- Relative Humidity
- Air Velocity
- Metabolic Rate



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# METHODOLOGY:

- Pre-cool the thermal mass of the building using air-conditioning during off-peak hours (7:00 pm to 8:00 am)
- Switch off the air-conditioning at 8:00 am and let the building heat up as the outside air temperature rises.
- Measure air temperature, relative humidity and mean radiant temperature through out the testing period from 7:00 pm August 4, 2005 to 12:00 pm August 5, 2005 at every 15 minutes interval.
- Take instantaneous measurements for air velocity at every 15 minutes and outside and inside wall surface temperatures every hour.
- Measure surface temperatures of the concrete outside in the construction area as a control mechanism to determine that the cooling of the thermal mass in the sculpture studio is a result of air-conditioning.



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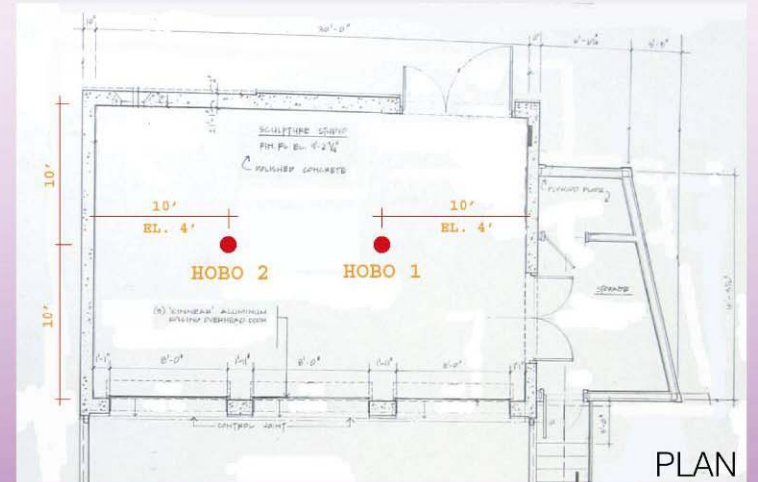
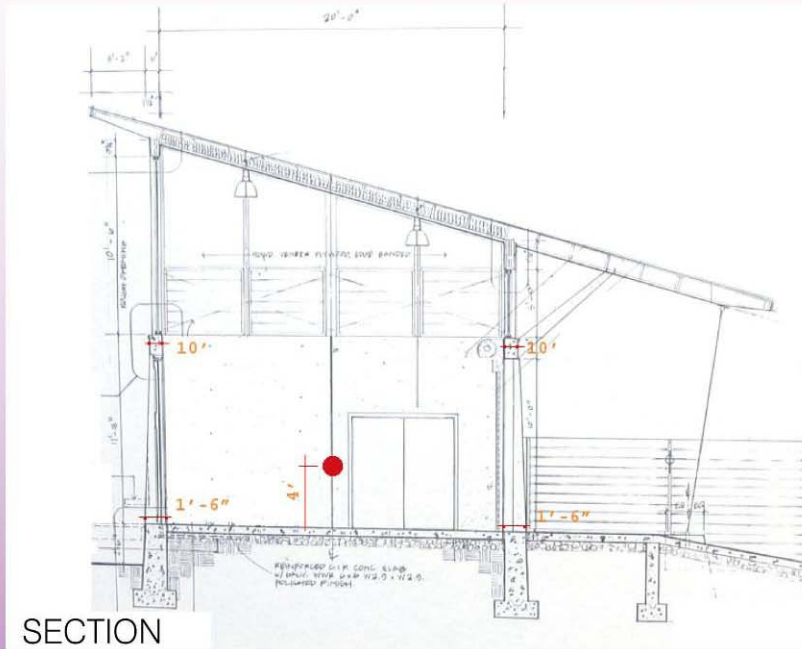
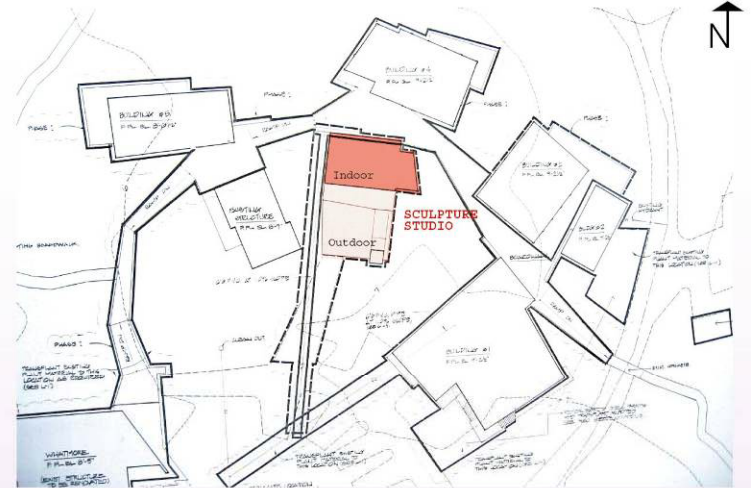
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# INSTRUMENTS:

- 2 HOBOS WITH EXTERNAL THERMOCOUPLES
- INFRARED CAMERA
- ANEMOMETER



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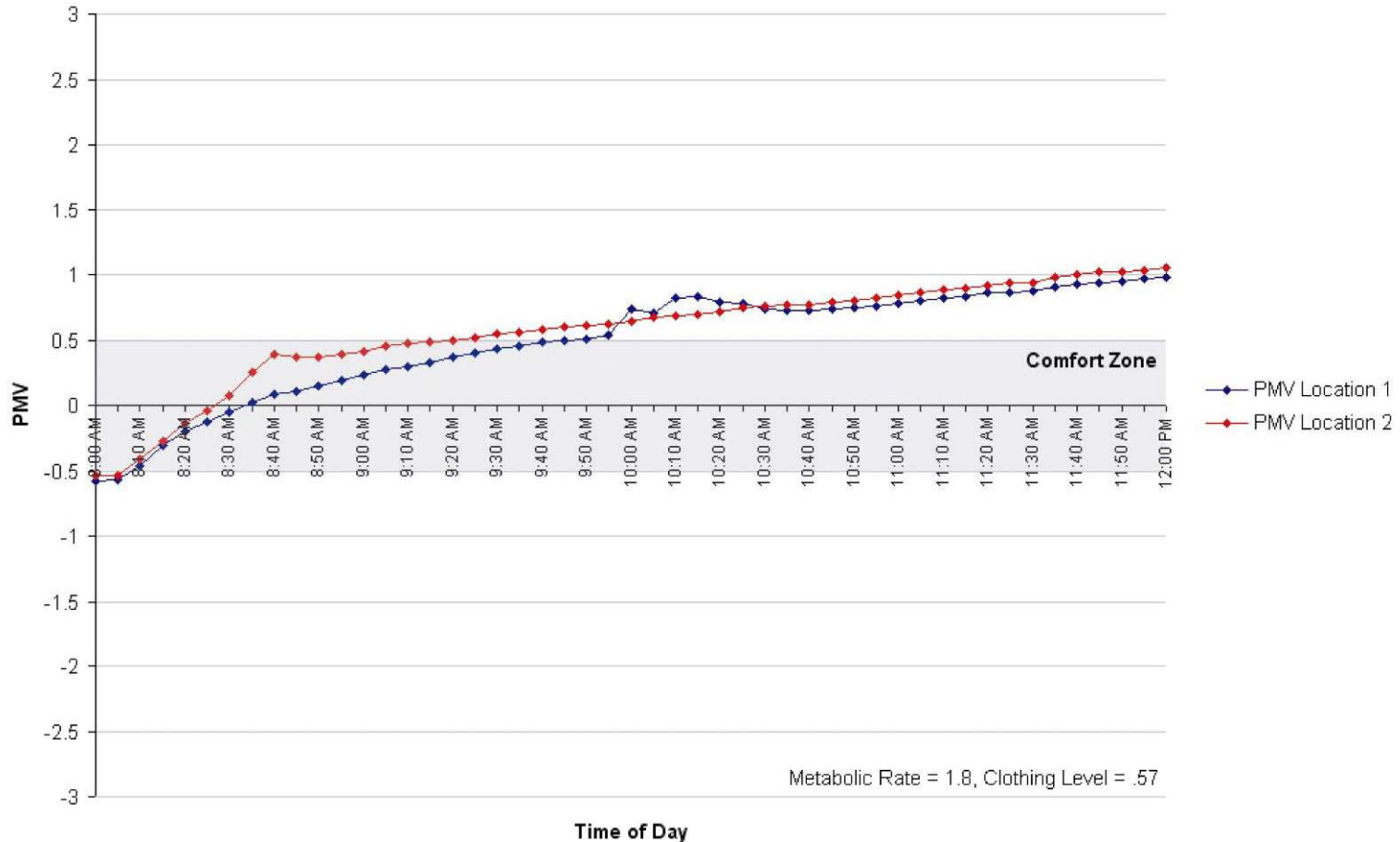
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# RESULTS: MODERATE ACTIVITY

Predicted Mean Vote (PMV) vs. Time



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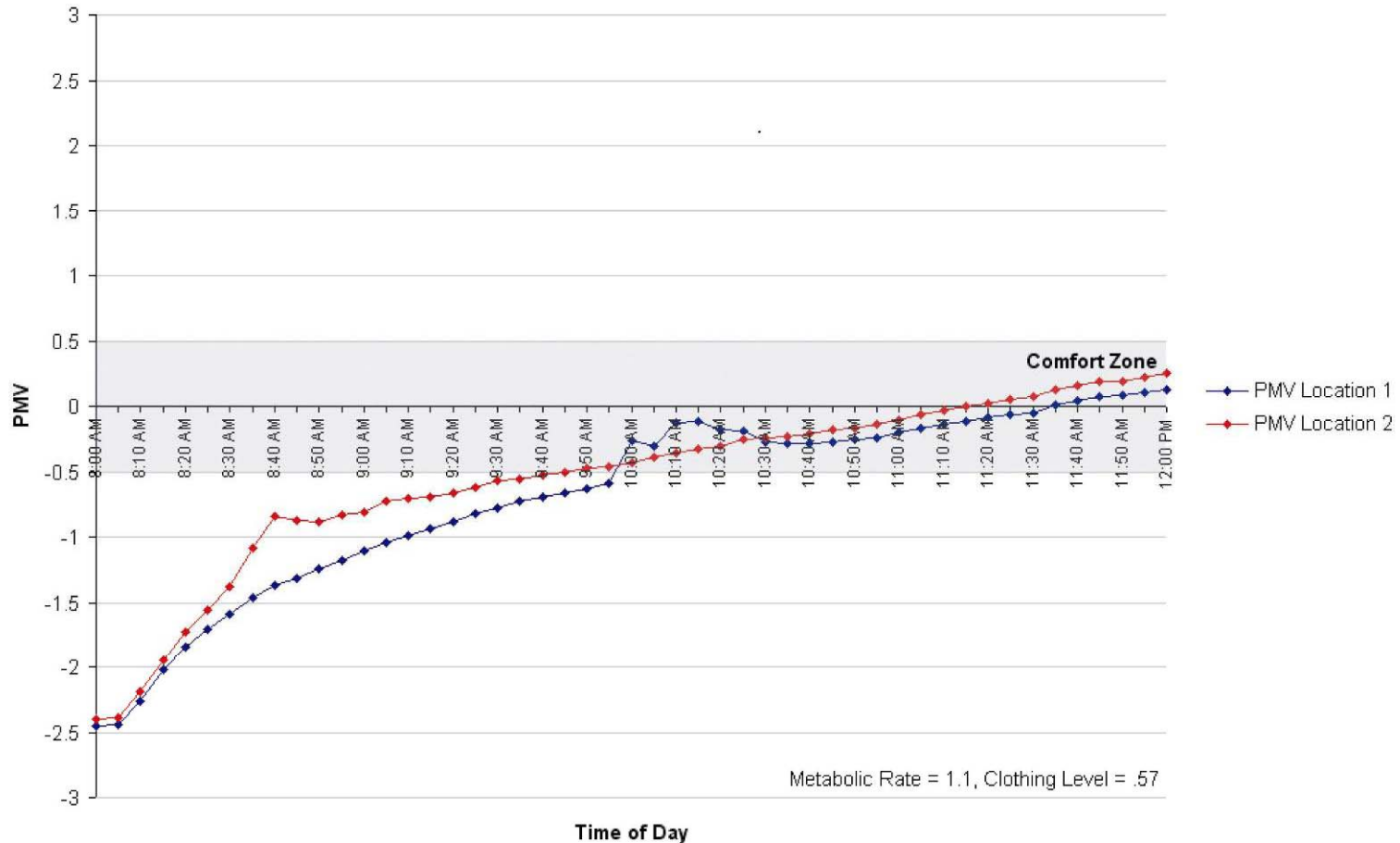
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# RESULTS: SEDENTARY ACTIVITY

Predicted Mean Vote (PMV) vs. Time



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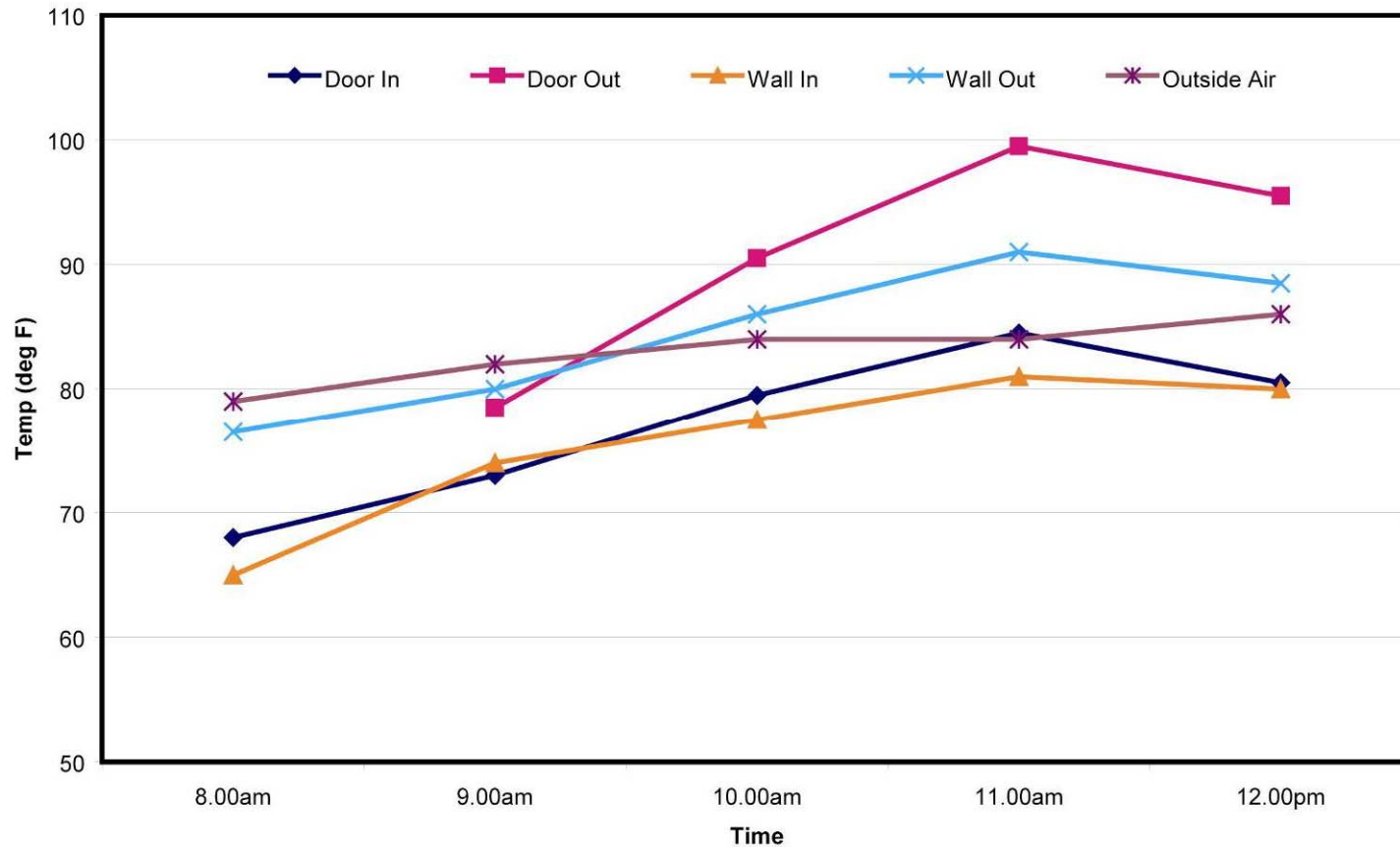
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# RESULTS: SURFACE TEMPERATURE

Surface and Outdoor Air Temperature



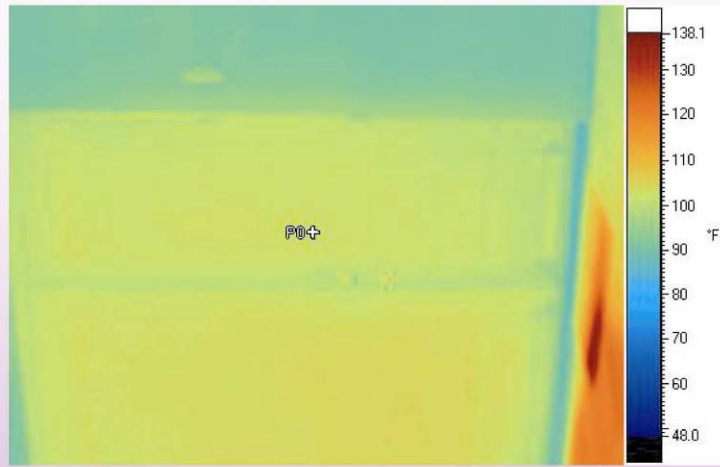
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# RESULTS: SURFACE TEMPERATURE



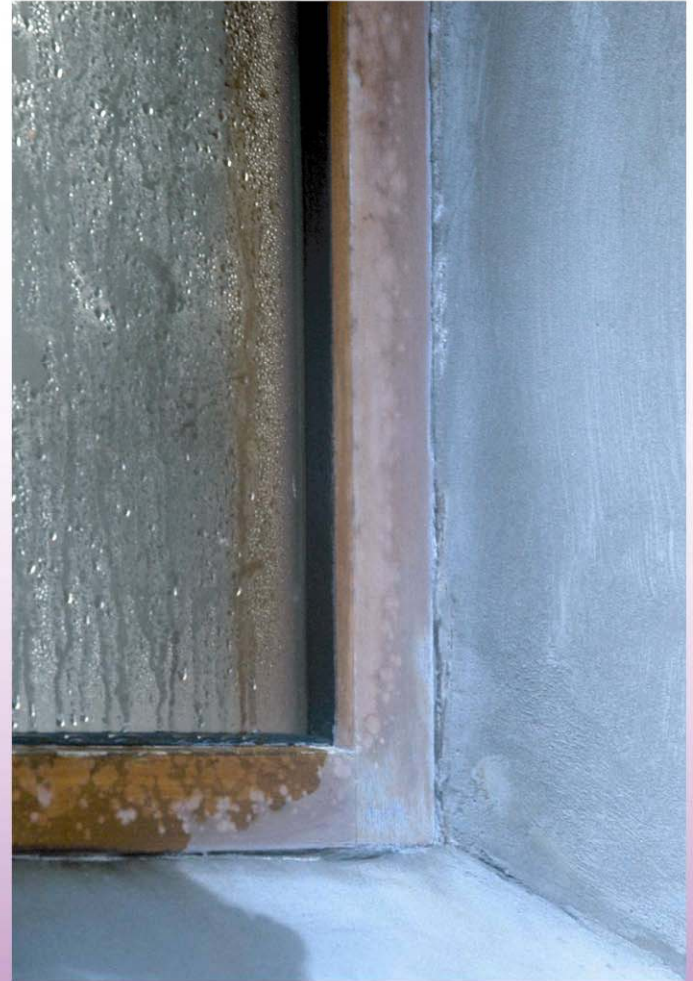
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# CONCLUSION:

THE OFF-PEAK USE OF AIR-CONDITIONING TO COOL THE CONCRETE THERMAL MASS IN THE SCULPTURE STUDIO **DOES NOT** CREATE A THERMALLY COMFORTABLE ENVIRONMENT UNTIL NOON OF AUGUST 5, 2005.



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