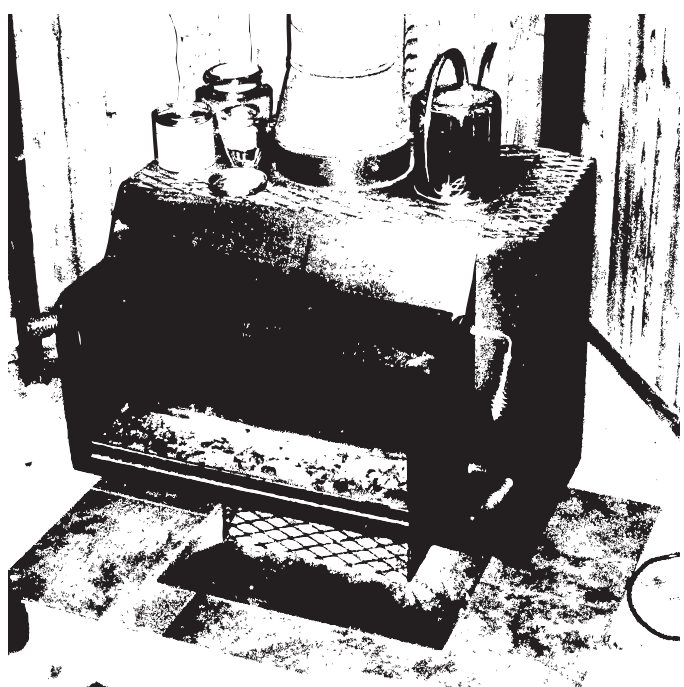


BREEZE? NO WAY!

ENVIRONMENTAL CONTROL SYSTEMS CASE STUDY: EUGENE, OR

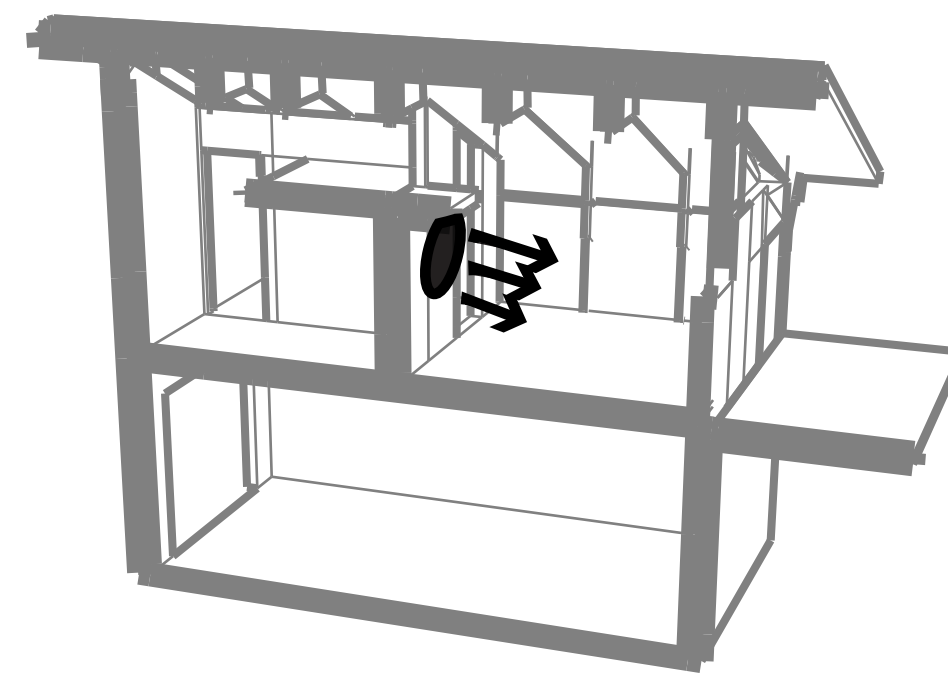
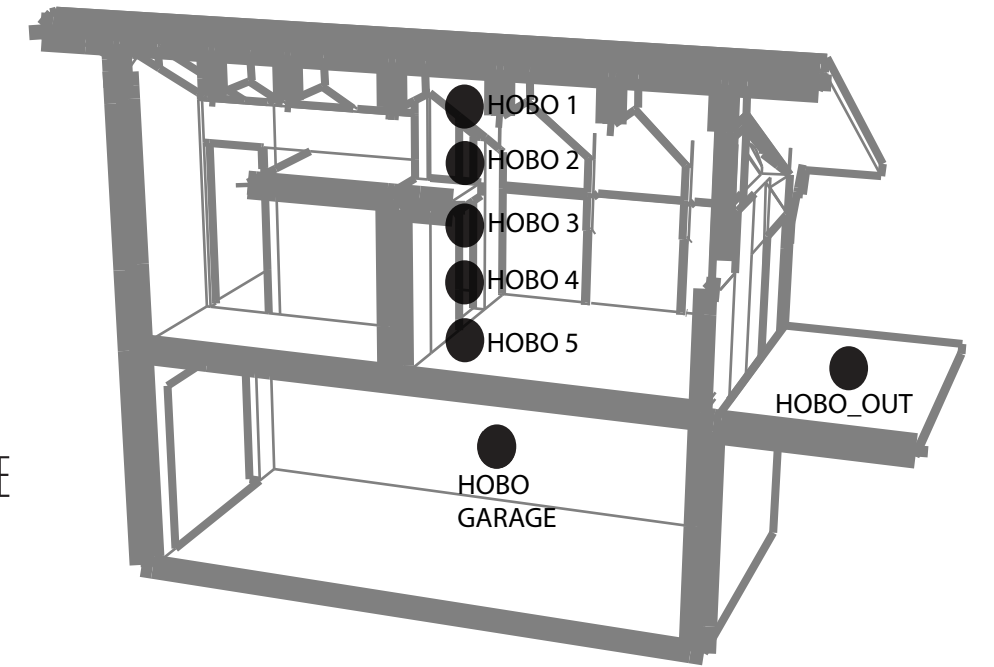
INTRODUCTION

OUR INVESTIGATION OF THERMAL PROPERTIES IN A HOME LOCATED IN EUGENE, OREGON WAS PROMPTED BY REPORTS FROM THE APARTMENT'S SOLE RESIDENT OF A LARGE TEMPERATURE DIFFERENCE BETWEEN SLEEPING QUARTERS AND THE MAIN FLOOR. WE DECIDED TO EVALUATE ITS HEATING CONDITION. HER REGULAR HABIT FOR HEATING THE APARTMENT WAS TO KEEP HER THERMOSTAT SET JUST WARM ENOUGH TO PROMOTE COMFORT IN THE BREEZEWAY. UNFORTUNATELY, THIS MADE FOR EXTREMELY COLD TEMPERATURES ON THE MAIN FLOOR IN THE LATE EVENING, THROUGH THE NIGHT, AND IN THE MORNING. HEATING THE APARTMENT TO MAINTAIN COMFORT ON THE MAIN FLOOR MEANT HOT AND SLEEPLESS NIGHTS.



HOBO PLACEMENT

FIVE HOBOs WERE STRUNG FROM THE CEILING, HANGING AT THREE FOOT INTERVALS: $6''$, $3''$, $6''$, $9''$, AND $12''$. ADDITIONAL HOBO COLLECTORS WERE PLACED OUTSIDE ON THE PORCH AND IN THE UNHEATED GARAGE BELOW THE APARTMENT.



FAN PLACEMENT

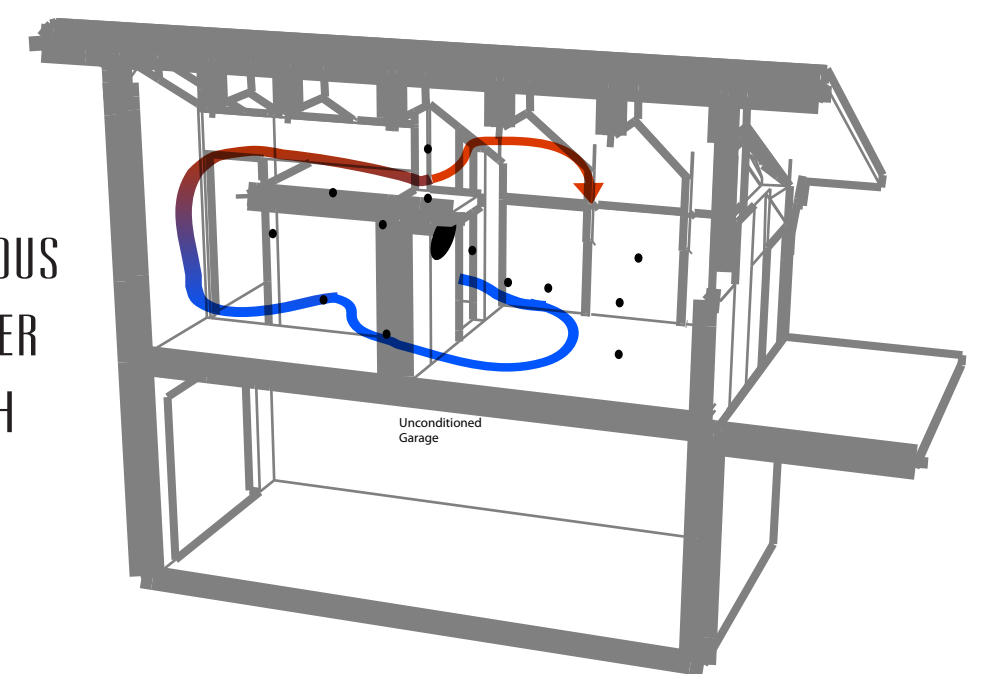
AFTER COLLECTING DATA UNDER NORMAL HEATING CONDITIONS, WE BEGAN TO INTRODUCE MEASURABLE AMOUNTS OF CIRCULATION WITHIN THE APARTMENT. WE PLACED A SMALL HOUSE FAN IN THE SPACE AND RAN IT ON A "LOW" SETTING FOR A TWELVE HOUR PERIOD.

HYPOTHESIS

INCREASING CIRCULATION IN THE APARTMENT WITH A SIMPLE HOUSEHOLD FAN WILL DECREASE THE DIFFERENCE IN DRY BULB TEMPERATURES BETWEEN FLOOR AND CEILING AIR BY A MINIMUM OF 50 PERCENT.

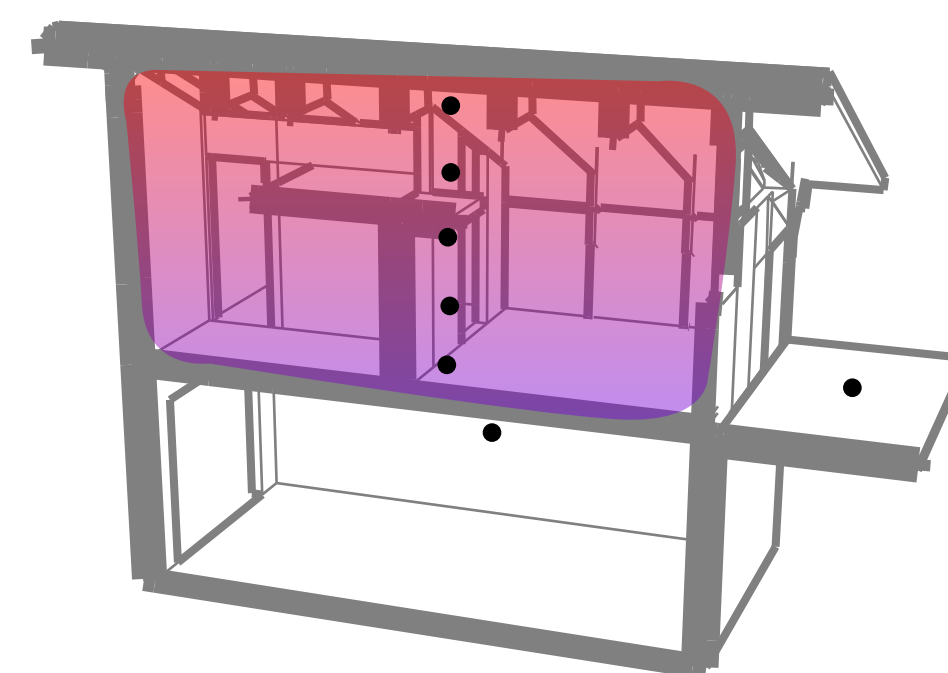
AIR CIRCULATION

ANEMOMETER READINGS WERE TAKEN AT VARIOUS POINTS. AFTER RECORDING THESE ANEMOMETER READINGS, WE MAPPED AIR CIRCULATION, WITH THE FAN RUNNING, USING THE BUBBLE TEST.



METHODOLOGY

ALL TEMPERATURE DATA COLLECTION WAS PERFORMED OVER TWELVE-HOUR PERIODS. TWO CONTROL EXPERIMENTS WERE RUN UNDER THE FOLLOWING "NORMAL" CONDITIONS: THE OWNER AGREED TO SET HER THERMOSTATS TO A COMFORTABLE/NORMAL SETTING (REPORTED AS 57°F WHICH WOULD REMAIN SET FROM NINE O'CLOCK P.M. UNTIL NINE O'CLOCK A.M.); WINDOWS WERE TO REMAIN SHUT FOR THE DURATION OF THE COLLECTION PERIODS; THE OCCUPANT KEPT HER NORMAL SLEEPING PATTERN INTACT. WE SELECTED THIS PERIOD FOR COLLECTION TO ASSURE THAT ACTIVITY LEVELS AND OTHER INTERNAL LOAD FLUCTUATIONS WERE MINIMIZED. WE COLLECTED DRY BULB TEMPERATURES FOR EACH TWELVE-HOUR PERIOD USING SEVEN HOBO DEVICES.

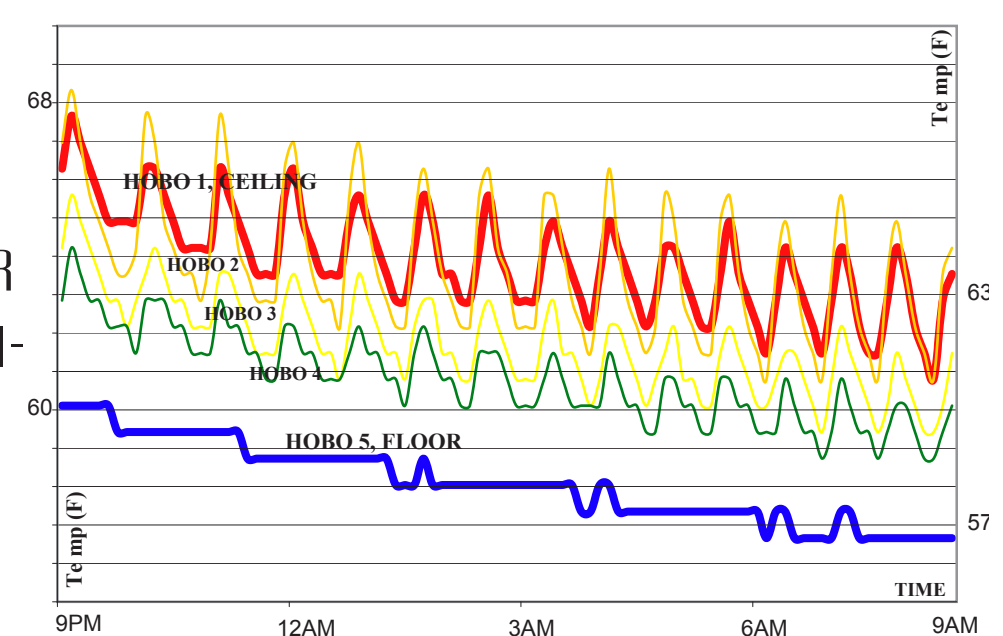


STRATIFICATION

WHEN HEATING A HOME, IT IS IDEAL TO HEAT THE ENTIRE SPACE TO A CONSTANT TEMPERATURE. IN THE APARTMENT WE TESTED, THE TEMPERATURE AT THE FLOOR STRATUM WAS SIGNIFICANTLY LOWER THAN THAT AT THE CEILING STRATUM.

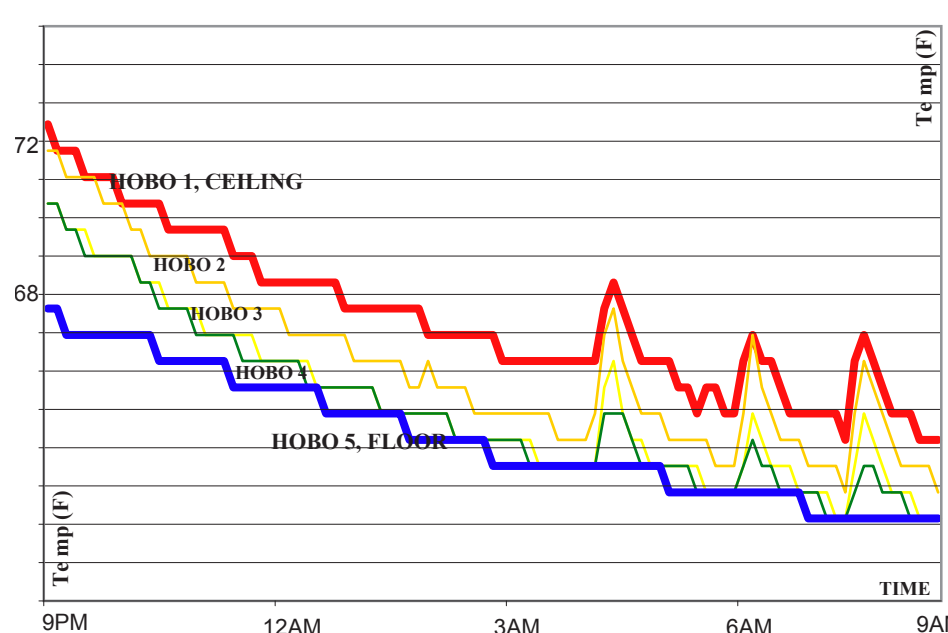
CONTROL NIGHT

THE DIFFERENCE IN TEMPERATURE (FROM FLOOR STRATUM TO CEILING STRATUM) WAS APPROXIMATELY 6 °F.



CONCLUSION

WITH A SIMPLE HOUSEHOLD FAN, WE WERE ABLE TO DECREASE THE DRY BULB TEMPERATURE STRATIFICATION BY APPROXIMATELY 50%.



FAN NIGHT

THE DIFFERENCE IN TEMPERATURE (FROM FLOOR STRATUM TO CEILING STRATUM) WAS APPROXIMATELY 3 °F.