

Evaluation of the Traditional Theory that Taller Ceiling Heights Provide Cooler Spaces

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Tradition has manifested a belief that taller ceiling heights produce cooler spaces. This cooling occurs because the warmer air molecules rise to the highest elevations, while cooler air molecules settle. Optimum ceiling heights are not known that insure appropriate stratification of air temperatures for inhabitation. Today, construction and cost factors control ceiling heights rather than air temperature. Also, mechanical air conditioning provides inhabitants with uniform temperatures throughout a residence, which results in uninhabited portions of rooms, e.g., above head heights, being over conditioned, and not allowing natural convection currents to regulate temperatures. Using the federal guidelines, 78°F for cooling and 68°F for heating as standards, determine the appropriate ceiling heights that insure these temperatures for the inhabitation zone, floor level to six feet above finish floor. Various means of conditioning the air will be employed: a) passive means only, b) ceiling fans to stratify, and, c) mechanical means to establish the guideline temperatures and determine % increase in energy consumption, e.g. compare an eight foot ceiling height with a twelve foot height and determine which required more energy to maintain the requisite temperature. Because the research and demonstration house contains room whose ceiling heights vary from eight feet to seventeen feet, it is possible to incorporate sensors in every room. Also, the dining room will have an operable ceiling that will be raised and lowered so to measure heights between those other rooms.

PROPOSAL



The MSU Southern Climatic Housing Research Team is a collaborative effort involving Architecture, Civil Engineering, Electrical Engineering, Forest Products, Landscape Architecture, and Mechanical Engineering. The MSU Southern Climatic Housing Research Team is affiliated with the Coalition for Advanced Wood Structures (CAWS) as a partnership with the USDA Forest Service, Forest Products Laboratory in Madison, Wisconsin. CAWS is a partnership between universities, industry and government to advance research for wood structures related to residential, non-residential and transportation uses.

