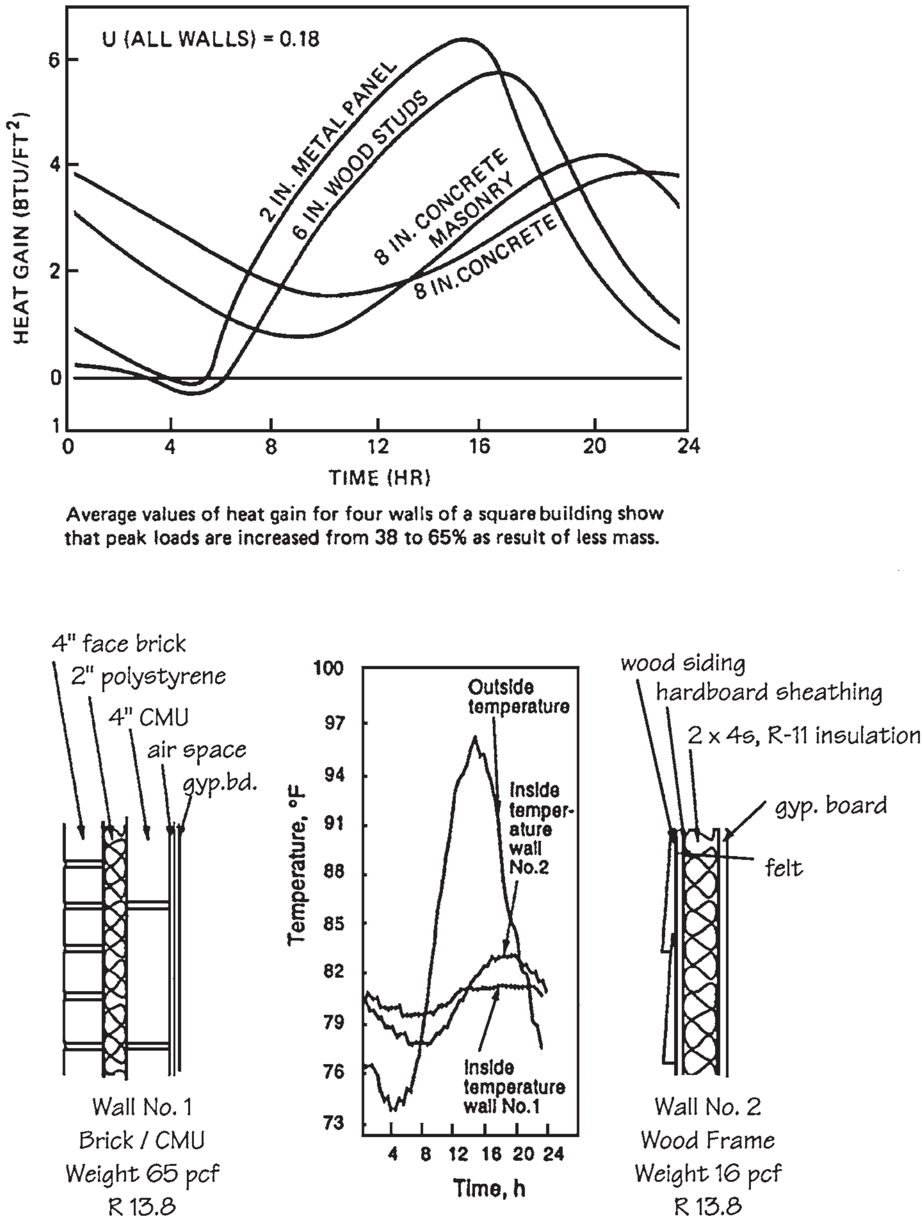

Figure 8-27 Interior temperature comparison and heat-gain curves for various wall types. (*From Mario J. Catani and Stanley E. Goodwin, "Heavy Building Envelopes and Dynamic Thermal Response,"* Journal of the American Concrete Institute, *February 1976.*)

peak heating loads. It was found that, although the effects are not as dramatic for winter conditions, peak heating load requirements decreased as the weight of the building walls increased (*see Fig. 8-29*).

Test buildings have been used to validate computer programs for dynamic heat-loss calculations by comparing them to actual measured heating loads. The National Institute of Standards and Technology (NIST) conducted a series of tests on a full-scale building erected in its environmental chamber where both temperature and humidity can be controlled. The study also

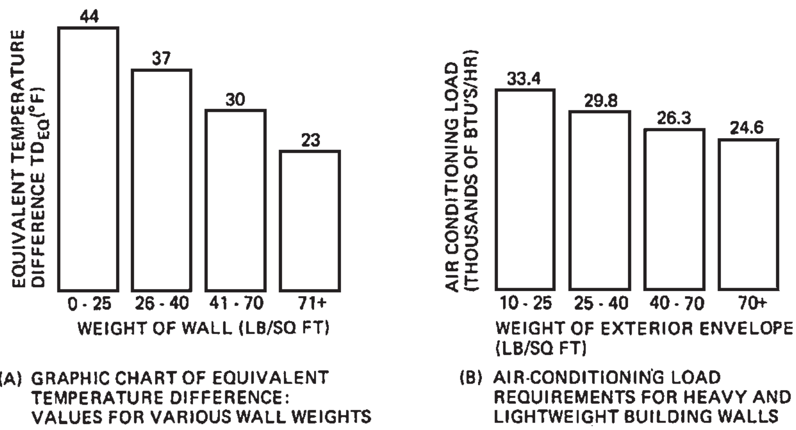

Figure 8-28 Effect of wall weight on heat transfer and air-conditioning load. (*From National Concrete Masonry Association,* TEK Bulletin 82, *NCMA, Herndon, VA.*)

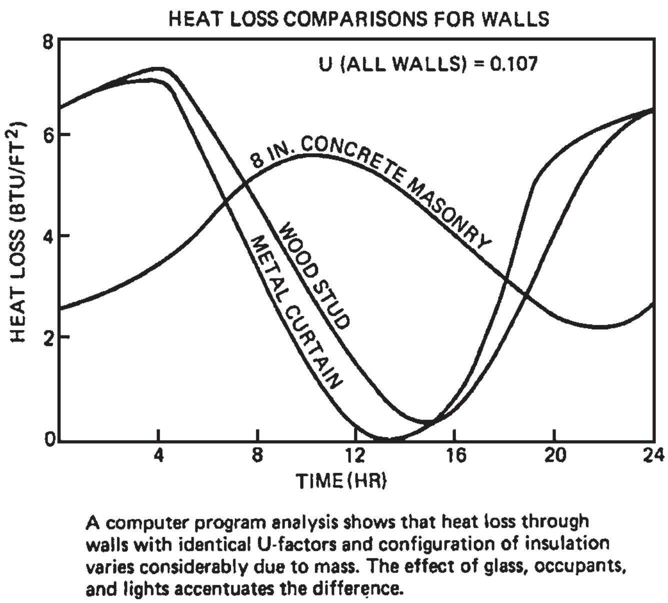

Figure 8-29 Catani and Goodwin's heat-loss curves for various wall types. (*From Mario J. Catani and Stanley E. Goodwin, "Heavy Building Envelopes and Dynamic Thermal Response,"* Journal of the American Concrete Institute, *February 1976.*)

compared maximum heat flow rates predicted by the steady-state and dynamic methods with actual measured heat flow (*see Fig. 8-30*). Steady-state calculations were an average of 52% higher than measured results.

8.5.2 The *M* Factor

The computer programs developed by ASHRAE and NIST for dynamic heat-loss calculations are so complex that they do not easily translate into a simple