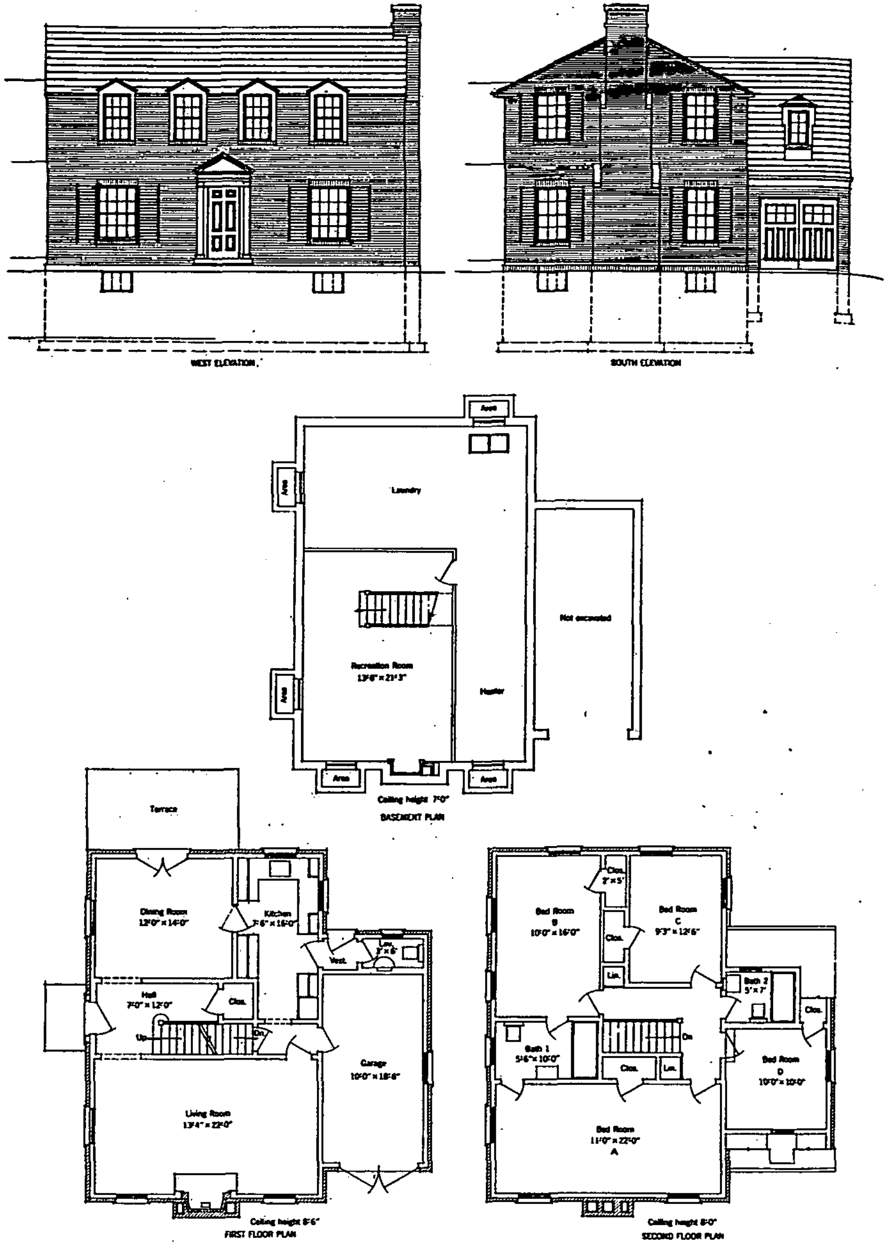

FIG. 1. ELEVATIONS AND FLOOR PLANS OF RESIDENCE

interior material is cold when people enter a building, the radiation of heat from the occupants to the cold material will be greater than is normal and discomfort will result. (See Chapter 2.)

RESIDENCE HEAT LOSS PROBLEMS

Example 2. Calculate the heat loss of residence shown in Fig. 1 located in the vicinity of Chicago. Assume inside and outside design temperatures to be 70 F and −10 F respectively. The attic is unheated. Assume ground temperature to be 45 F. Estimate infiltration by crack method, assuming average wind velocity to be 12.5 mph during December, January and February. No wall, ceiling or roof insulation is to be figured in this problem, but all first and second floor windows are to have storm sash. The building is constructed as follows (transmission coefficients (U) in parentheses):

Walls: Brick veneer, building paper, wood sheathing, studding, metal lath and plaster (0.28). Walls of dormer over garage, same except wood siding in place of brick veneer (0.26).

Attic Walls: Brick veneer, building paper, wood sheathing on studding (0.42).

Basement Walls: 10 in. concrete (0.70).

Roof: Asphalt shingles on wood sheathing on rafters (0.56).

Ceiling: (Second floor): Metal lath and plaster (0.69).

Windows: Double-hung wood windows with storm sash (0.45). Steel casement sash in basement (1.13).

Floor (Bedroom D): Maple finish flooring on yellow pine sub-flooring; metal lath and plaster ceiling below (0.25).

Floor (Basement and Garage): 4 in. stone concrete on 3 in. cinder concrete (0.64).

Solution: The calculations for this problem are given in Table 3, and a summary of the results in Table 4. The values in column F of Table 3 were obtained by multiplying together the figures in columns C, D and E. The heat losses are calculated to the nearest 10 Btu. See reference notes for Table 3 for further explanation of data.

Attention is called to the summary of heat losses (Table 4) of the uninsulated residence (Fig. 1). As storm windows are used in this instance the *glass* and *door* transmission heat losses of 19.5 per cent are relatively small. The infiltration losses (12.0 per cent) are also comparatively small in this case because the storm windows serve substantially the same purpose as weatherstripping. In this problem, the wall, ceiling and floor transmission losses comprise 68.5 per cent of the total. If the building is insulated, the relative heat loss percentages will materially change. (See Example 3 and Table 5.)

Example 3. Calculate the heat loss of residence shown in Fig. 1 based on the same conditions as in Example 2 but insulated throughout as follows (coefficients in parentheses):

Walls: Brick veneer, 25/32 in. insulation board sheathing, studding, 1 in. insulation board lath and plaster (0.14). Walls of dormer over garage same except wood siding in place of brick veneer (0.13).

Attic Walls: Brick veneer, 25/32 in. insulation board sheathing on studding (0.28).

Walls Adjoining Garage: Plaster on 1 in. insulation board, studding, metal lath and plaster (0.18).

Basement Walls (Recreation Room): 10 in. concrete, furring strips, ½ in. insulation board (0.26).

Roof: Asphalt shingles on wood sheathing on rafters (0.56).

Ceiling (Second floor): 1 in. insulation board and plaster; ½ in. insulation board on top of ceiling joists (0.15).

Windows: Same as Example 2.

Floor (Bedroom D): Maple finish flooring on yellow pine sub-flooring; ½ in. insulation board and plaster ceiling below (0.18).

Floor (Under Recreation Room): 4 in. stone concrete, 1 in. insulation board and 3 in cinder concrete (0.22).

Solution: The procedure for calculating the heat losses is similar to that for Example 2. A summary of the results is given in Table 5.