

Minimize the Travel Time

November, 2006

Problem provided by the Editor

Under new building codes, some building designs minimize the travel time from an extreme corner of the top floor of a building to the lower most opposite corner on the ground floor of the building.

Consider a multilevel rectangular building with square floors (a square base) each of the same size. If each level is 8 feet high from floor to floor, if the average speed of walking is 5 feet per second, and if the average elevator speed is 20 feet per second, find the dimensions of the building that minimize the travel time to opposite corners of a building (top to bottom and diagonally from one extreme corner to the other). Allow the following assumptions and constraints in addressing the problem. The total square feet of floor space is to be $80,000 \text{ ft}^2$. A person walking across any floor walks without backtracking in hallways that are perpendicular to each other as pictured in the example. The average speeds are maintained. There is no time lost waiting on elevators.

