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### **An Approach to the Problem of Building Size** Shorter, G. W.

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TECHNICAL NOTE

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to be held in Berlin, April 1964.

SUBJECT AN APPROACH TO THE PROBLEM OF BUILDING SIZE

The problem concerning building size is whether it is desirable on grounds of fire hazard to impose limitations on height or area of buildings or compartments within them, and, if so, what those limitations should be. The following remarks are intended to define only those parts of the problem that need study and indicate how they might be studied. It will be assumed:

- (a) the life hazard in large buildings can be disregarded and the problem approached solely from economics because, owing to the standard of construction, life loss from fire during the last half-century has been predominantly in small buildings.
- (b) that there will continue to occur in large buildings outbreaks of fire that cannot be controlled before the compartment of origin is substantially destroyed.
- (c) that in most such cases the fire will be stopped at the fire walls and floors that define the compartment.

In these circumstances it would be logical to permit buildings of unrestricted height and area, provided there are appropriate restrictions on compartment size. It remains to consider what these restrictions should be.

In this Note, a group of compartments will be referred to as a "building", although the argument is the same when the compartments are in separate buildings. Any such "building" is erected for a purpose, and the optimum compartment size is that which minimizes the total cost over a long period of achieving this purpose and of replacing the fire losses that

will occur. If insurance premiums were computed on a strict economic basis the optimum would minimize the sum of the premium and the annual cost of building and content.

Without knowing how premiums are arrived at, all that can be attempted here is some remarks on how the cost of fires should be estimated.

It is plausible to speculate that the probability of a serious outbreak, one that will burn out the compartment, is proportional to the size of the compartment. If so, an important component in the cost of fires is proportional, not to compartment value, but to its square.

Before one can go any further, it would be necessary to have statistics of a kind that probably do not at present exist, or if they do, are not publicly available. To collect them, the first step would be to conduct a census of buildings over a certain size, and to classify them by occupancy and by compartment size. Records would then be maintained of their current value, including contents. All fires causing loss would need to be reportable.

In this way it would be possible to estimate the optimum size of each class of compartment. It would be too restrictive to make this the largest permissible size, but perhaps the maximum could be set at two or three times the optimum.