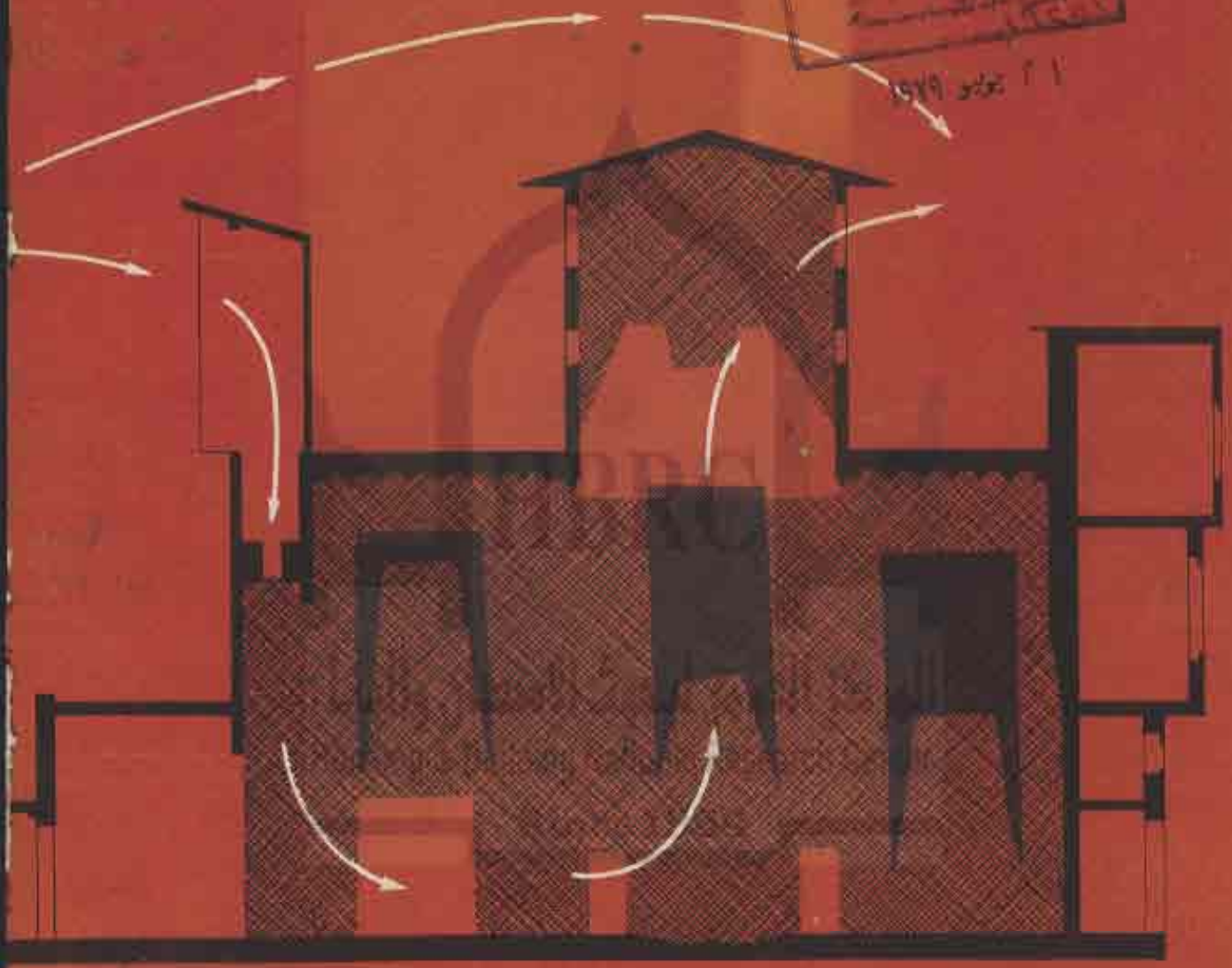
VENTILATION OF WIDE-SPAN SCHOOLS IN THE HOT, HUMID TROPICS



EDUCATIONAL BUILDING REPORT 6

UNESCO REGIONAL OFFICE FOR EDUCATION IN ASIA
BANGKOK THAILAND

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VENTILATION OF WIDE-SPAN SCHOOLS IN THE HOT, HUMID TROPICS

by Ishwar Chand

UNESCO REGIONAL OFFICE FOR EDUCATION IN ASIA
BANGKOK, THAILAND

The cover drawing is a stylized representation of a uni-directional wind catcher which is an element of traditional house form found near the coasts from Karachi to Cairo.

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FOREWORD

This study was carried out at the Central Building Research Institute, Roorkee, as a project sponsored by Unesco. The Chief Investigator was Dr. Ishwar Chand, Scientist of the Efficiency of Buildings Division in the Institute.

I would like to thank Dr. N.K.D. Choudhury and Mr. R.D. Srivastava, Scientist Co-ordinators of the Institute, who took an active interest in the project and made some useful suggestions. Thanks are also due to Mr. D.J. Vickery, Principal Architect, Unesco, for his active interest in the project and for making useful suggestions during its progress.

DINESH MOHAN
Director
Central Building Research Institute
Roorkee, India

Roorkee, India
19 November 1975

ABSTRACT

Monograph; deals with ventilation of wide-span schools in tropical zones of high humidity; describes experiments with models to study air movement in buildings with and without internal partitions; considers effect of plan form and adjacent buildings on air movement; discusses landscaping and effect on air movement as well as air movement induced by ducts.

This abstract is prepared using descriptors from the Unesco Educational Facilities Thesaurus. The entry can thus be recovered mechanically from Unesco's Computerized Documentation Service facility in Paris, where it is stored.

SUMMARY

This report describes studies on natural air motion induced in wide-span educational buildings. It includes a discussion on the influence of air motion indoors on various factors such as the span of buildings, orientation in relation to outdoor wind, open spaces such as courtyards, plan form, semi-partitions, external projections, adjacent buildings of different heights and landscape elements. A brief description is given of the low-speed wind tunnel and the experimental procedure adopted for this study. Investigations carried out to determine the magnitude of air motion induced by 'stack effect' are also described.

It is shown that buildings can be oriented to the prevailing wind at any appropriate angle between 0^{o} and 30^{o}. When the wind is incident obliquely at angles greater than 30^{o}, the occurrence of dead pockets, that is, wind shadows, may be avoided by providing vertical projections on the wind-facing wall. In building units having openings tangential to the incident wind, air motion indoors can be enhanced by locating another unit in an end-on position on the downstream side. An L-type, continuous lineal arrangement helps to augment air flow in the long wings of buildings.

The leeward half of a wide-span building is a region of very low wind speed. In this part of the building, higher air motion is induced by using semi-partitions with a 0.3-metre space underneath and set across the incident wind.

Air motion in a building shielded by another building of equal height is less than that in a similar unobstructed building. The shielding effect is considerably diminished if the shielded building is taller than the shielding one.

Shrubs and hedges reduce the air motion indoors but trees planted at a distance three times their height in front of the building help to promote air motion in the leeward portion of the building. Earth mounds with a slope of 10^{o} on the upstream side are good promoters of air motion in buildings located on mounds.

It is also established that in a hot humid climate, air motion induced by stack effect in buildings of normal design is too small for comfort.

The report gives design guidelines for inducing air motion and provides diagramatic representations of buildings in relation to air flow patterns.