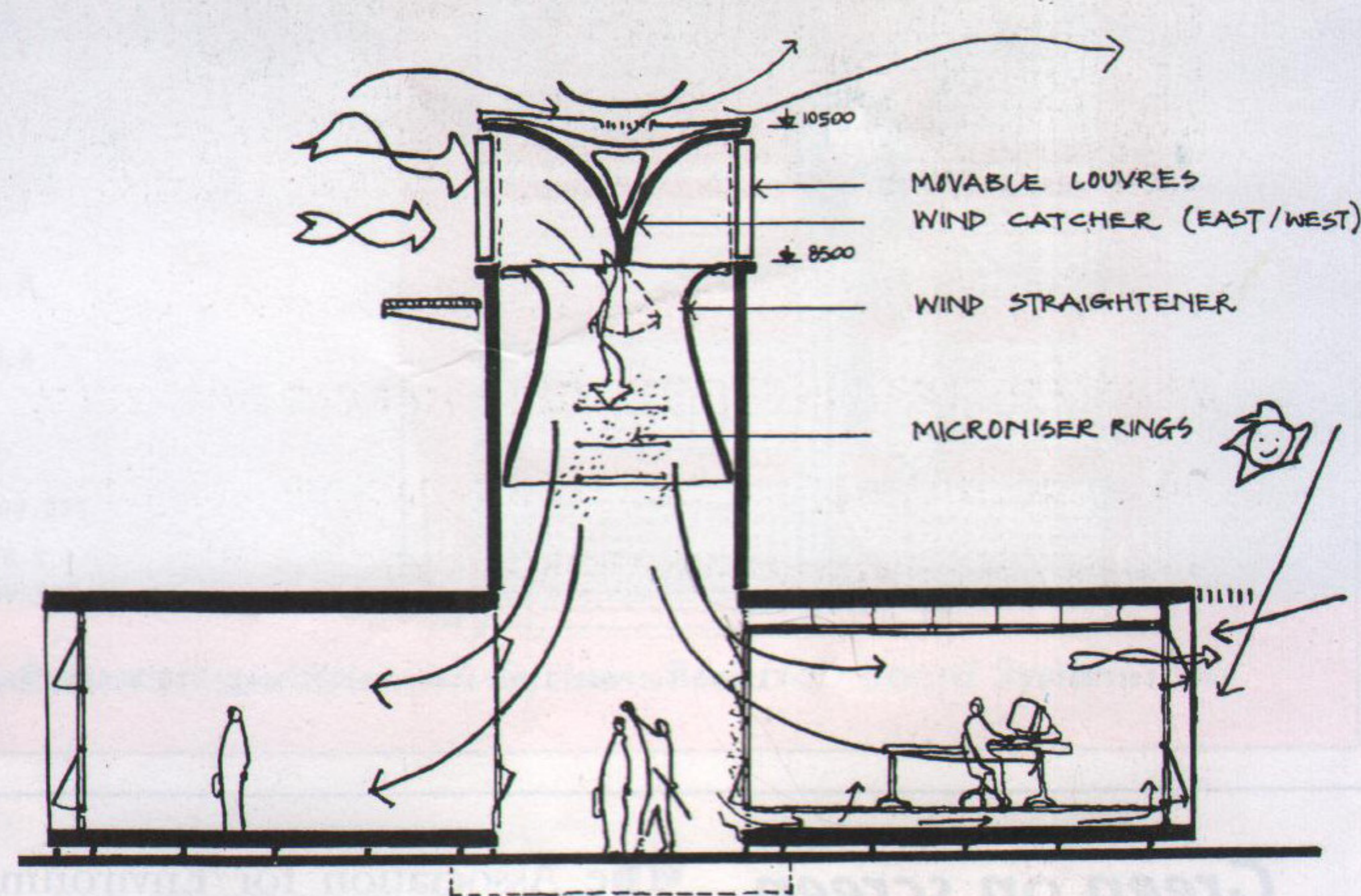
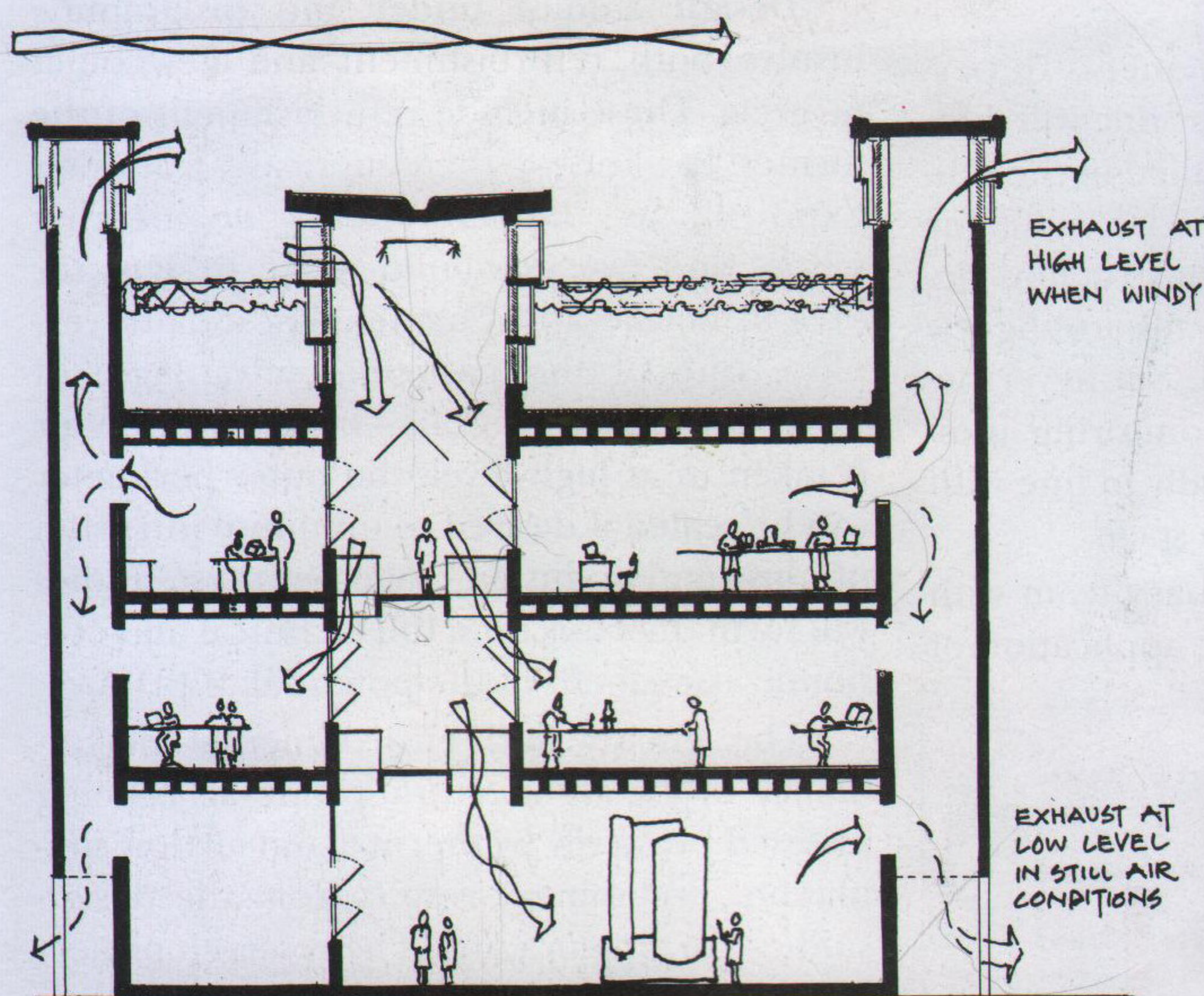


In the UK natural ventilation is widely accepted as an alternative to mechanical ventilation and, sometimes, to air conditioning. This is the case even in buildings where substantial internal heat gains are generated by the quantity of occupants or machinery. In the hotter climates of southern Europe and Asia however there is continuing growth in demand for air conditioning equipment for buildings of this type. The challenge to designers is to find a passive cooling technique which can meet the demands of institutional and commercial

towers at Seville's Expo 92 (AT27), which employed high pressure water misting nozzles to induce downdraught cooling. Compared to air conditioning the benefits of cooling buildings in this way include lower capital, energy and maintenance costs – and no refrigerants are required. But the use of PDEC has substantial architectural implications, not least the transitional space required to promote the distribution of cool air within the building.

At the Torrent Pharmaceuticals research laboratory in Ahmedabad, PDEC is used to

*Climate of change
Could PDEC replace
air conditioning?
Brian Ford reports
on his involvement
in projects in Sicily,
India and Spain.*



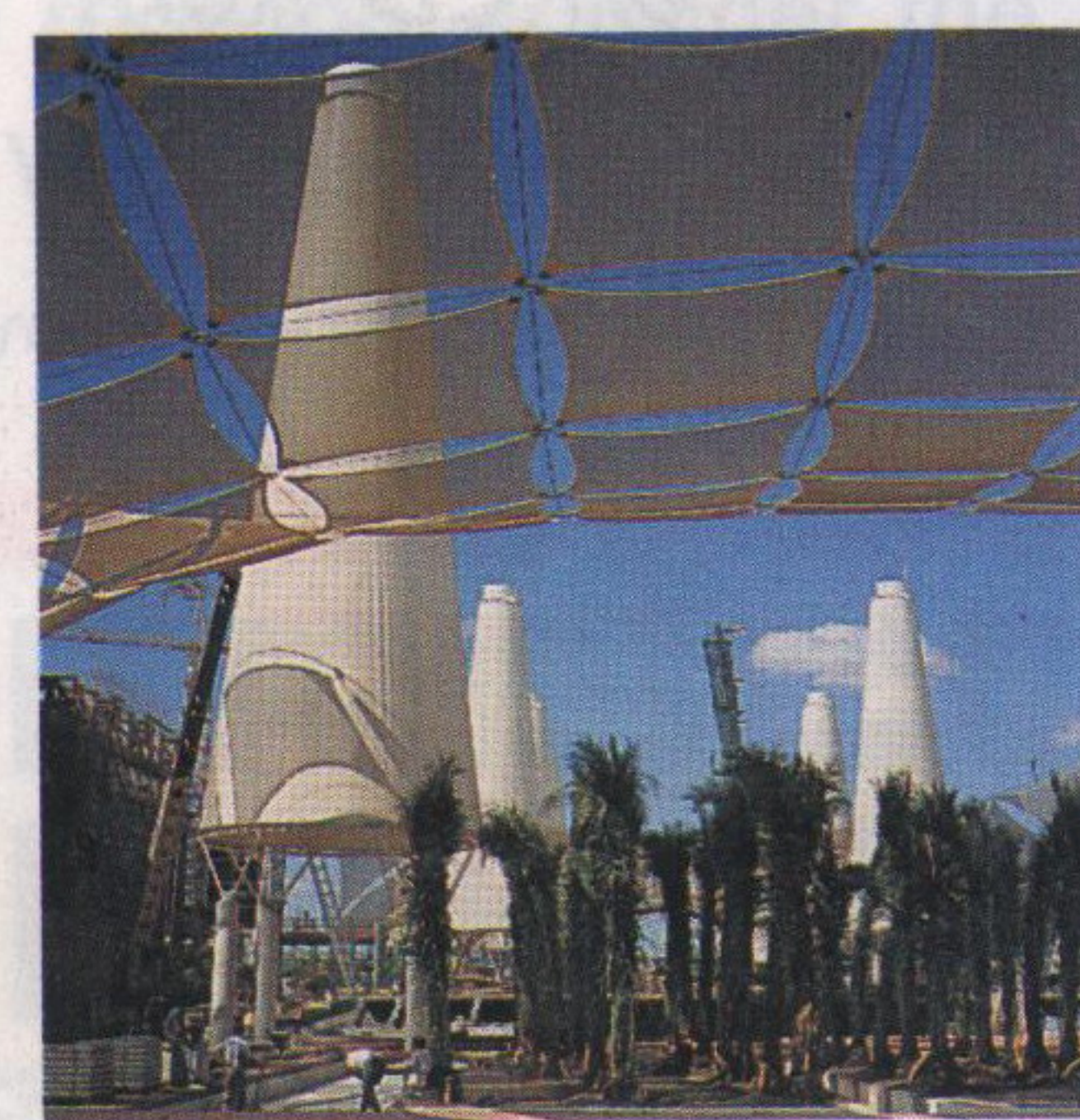
buildings in hot climates, and also simultaneously deal with urban noise and pollution.

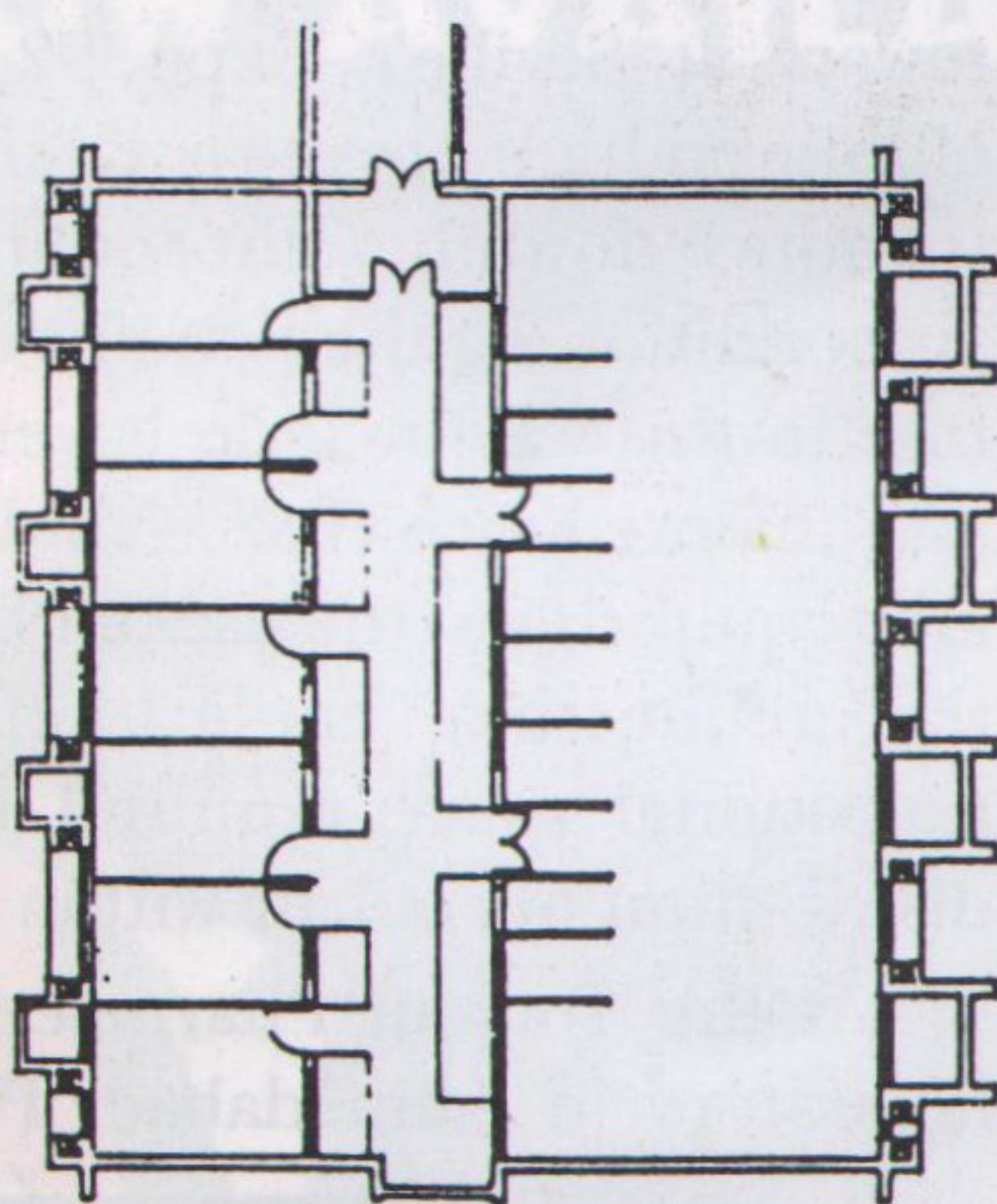
A laboratory complex under construction in Ahmedabad in India, and an EC-funded research project based in Catania, Sicily, suggest that the answer may have been found: passive downdraught evaporative cooling (PDEC). This is a technique that has been used for several centuries in parts of the Middle East, notably Iran and Turkey. The basic principle is simple: wind-catchers guide outside air over water-filled porous pots, inducing evaporation and bringing about a significant drop in temperature before the air enters the interior. Recent applications include the 30 metre high

service a number of laboratories and offices within the complex. A central open concourse on three levels allows evaporatively cooled air to be introduced to laboratories and offices at each level and exhausted via perimeter stacks.

In the first completed laboratory building, the PDEC system is now being commissioned and tested. Preliminary results from ten days' monitoring during April this year indicate that internal temperatures are 10°C below the peak external air temperature and that good air movement is being achieved. The evaporative cooling system and its controls are still being tested and commissioned and a number of modifications will be implemented which

Above Torrent Pharmaceuticals research laboratory, Ahmedabad; PDEC office prototype, Catania.
Below PDEC at Expo 92, Seville.





Above/below Torrent Pharmaceuticals, Ahmedabad: exterior, typical floor plan and CFD prediction of air movement and temperature stratification (John Kendrick/Colt International).

should lead to further improvements in performance. A further period of testing will then follow before the system is installed in the other buildings in the complex, which are due for completion next year. Final construction details of the roof and external walls are slightly different from those modelled, but nevertheless data from preliminary monitoring indicates that performance is broadly in line with predictions made at the design stage.

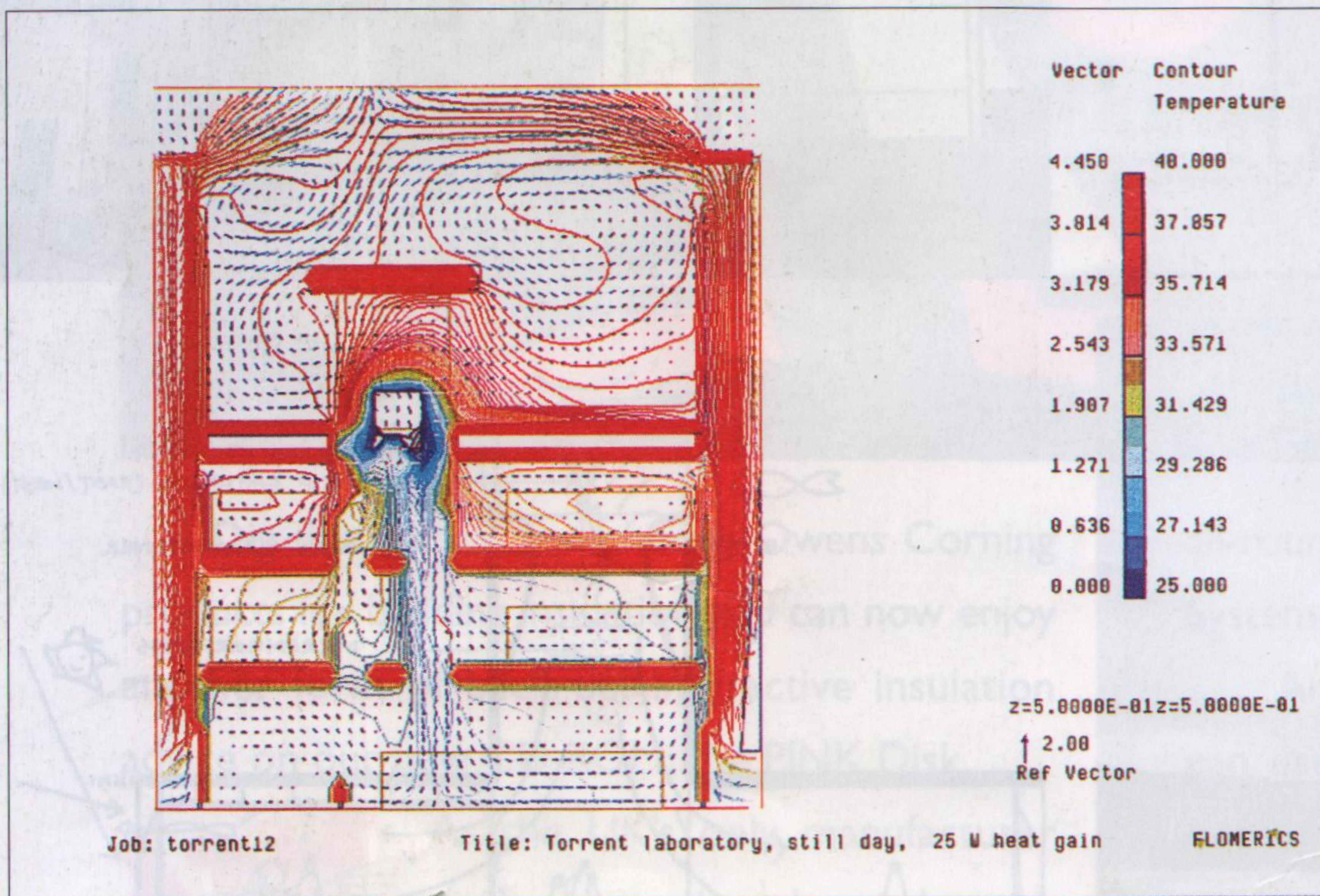
Meanwhile a multi-disciplinary team with EU funding is investigating the application of

PDEC to non-domestic buildings in southern Europe. Three main areas are involved: experimentation/monitoring, architectural design studies and building performance assessment. Following laboratory testing of the 'wind catcher' geometry, a full scale experimental rig, incorporating downdraught tower and linked 'office' space, has been designed by Paris-based architect Mario Cucinella and constructed at the Instituto Conphoebus in Catania. Performance monitoring of the structure is already under way.

Design studies under the programme involve both refurbishment and new build projects. These include refurbishment of the former Pavilion of the Americas at Seville's Expo 92 as the university's engineering school and two new-build office designs for sites in Seville and Catania. These latter explore one of the particular advantages of PDEC for urban locations – because supply air is taken in at high level, the outer perimeter can be sealed if desired to minimise intrusion of noise and pollution. Together these studies will form the basis for a full technical and economic assessment of the potential of PDEC.

The energy and environmental performance of the architectural proposals is being assessed primarily by thermal and airflow simulation. Preliminary results from the design studies are encouraging. The research project has a further 18 months to run before final results will be available, but by this time a full set of results from the building in Ahmedabad will also be available. The performance data from these buildings will be related to a range of climatic regions as part of the process of evaluating the market potential for this new passive cooling technique.

• The EC Joule/PDEC research project is conducted by a multi-disciplinary team comprising architect Brian Ford, Mario Cucinella Architects, the IESD/De Montfort University and ESII/Universidad de Malaga, Conphoebus Institute and controls manufacturer Microlide. Torrent Pharmaceuticals research laboratory is a collaboration between Abhikram Architects in Ahmedabad and Brian Ford (formerly of Short Ford & Associates and now of Brian Ford & Associates).



Green on screen Latest guidance to product selection on CD-Rom

The Association for Environment Conscious Building has issued a new version of its GreenPro electronic guide to eco-friendly products and materials. Now available in CD-Rom as well as floppy disc format, GreenPro 97 includes complete details of individual products by tradename and generic type covering all areas of construction and landscape. As well as products it also includes listings of consultants, contractors, tradespeople etc with proven experience in this area. For ease of use by specifiers the structure of GreenPro reflects that of the building process, with an autodial facility to make direct connection via modem to any company listed.

GreenPro, which is suitable for PCs with at

least 8MB of RAM and 20MB of hard disk space running Windows 3.1x or Windows 95 NT, is part of the data gathering service provided by the AECB. Since it was founded in 1989 the Association has generated comprehensive listings of product data and helped to provide an independent environmental assessment of products and materials, as well as a certification service for individual projects.

The AECB also publishes hard copy information, including a loose-leaf directory of products and services, Greener Building – the latest version of this is due this autumn. Membership of the Association (details: 01559 370908) is open to consultants as well as manufacturers, suppliers and contractors.