Spanish toldo. But at a scale to match a midrise office building or multiple housing, the courtyard cover would doubtless require electrical motors and gears that need not operate especially fast and that can be efficient to run.

Courtyard covers might vary dramatically in opacity, texture, color, and construction. For example, they might be translucent as the Spanish toldo or striped as some Bedouin tents, smooth as a circus tent or textured as a veil, white or tinted. They might move as a whole piece on a collapsible frame or in sections pulled along spanning wires. All such differences of design would tell a more complete story of a place than just a simple outline.

The four designs illustrate renewed possibilities for a ritual courtyard life corresponding with natural rhythms. This is true for buildings in general, but perhaps it is especially so for commercial offices where workers spend so much of their time in cities. Office buildings have generally been designed to keep workers at their desks, but laptop computers and cell phones now make it possible to move around. There is no reason why workers can't just as well do at least some of their work in a courtyard garden with flowers and trees, with the sounds of birds and water, and with winter sun to warm them and summer shade and breezes to cool them. Why not offer a choice of working inside or out, at a desk or on a garden bench? The change of surroundings can make people more, not less productive. Clearly, different climates suggest alternative approaches but why deny the option where the setting makes it possible?

Flexible architecture can deepen the experience of seasons and enrich social patterns, but orientation makes a difference. People can at all seasons enjoy courtyards elongated north and south. Winter draws sharp contrasts under the open sky: garden fountains, streams, and pools glisten; hands, arms, and faces are warmed in the bright sun. In summer, the details of winter lose

their sharpness under filtered light. In either season, people enjoy access to nature in an expanded common room, a regular release from small offices.

On the other hand, people are more likely to avoid winter conditions in a courtyard that is elongated east and west. Even in the Mediterranean climate of Los Angeles, office workers may regularly come forth only when the cover is again raised for ventilation and shading: late spring, summer, and early fall. (One unexplored option to rectify this undesirable condition would be to remove some building mass on the south.) Furthermore, the courtyard example is only one instance of a dynamic architectural adjustment under the interstitium. The challenge to designers is to conceive of others.

Looking to the Future

The benefits of solar-access zoning can be realized around the world. The results of the Los Angeles studies, done at 34°N, can apply directly to any city at approximately the same latitude either north or south of the equator. Some of these are Baghdad, Tehran, Kabul, Lahore, Osaka, Tokyo, Buenos Aires, and Santiago. For cities at other latitudes, the size and shape of the solar envelope will vary, but the basic principles hold.

Investigations of the solar envelope have also been done in places at latitudes other than 34°N. The most northerly location is Bratislava at 48°N, where a mixed-use study was made in 1993 at the Slovak Technical University. The most southerly site is Honolulu at 21°N where, between 1999 and 2000, two separate hillside-housing studies were made at the University of Hawaii at Manoa. Design and development requirements were met in each case, confirming the value of solar-access zoning within a broad belt from at least 50°N to 50°S.