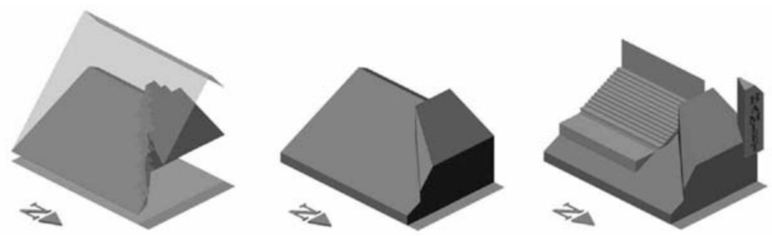


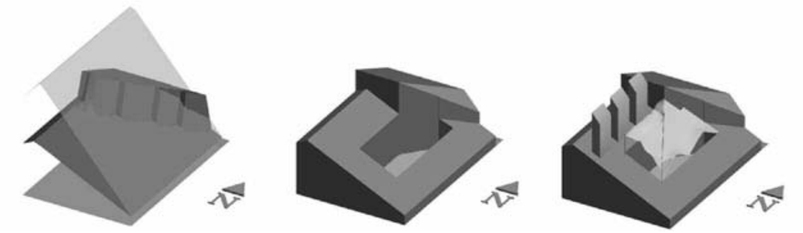
Functional Changes: (Left) Winter and summer envelopes; (Middle) Diagrammatic building—winter mode; (Right) Diagrammatic theater and marquee—summer mode. (Computer drawings by Karen Kensek in "The Interstitium: A zoning strategy for seasonally adaptive architecture" by Knowles and Kensek 2000; 774. In K. Steemers and S. Yannas, eds., *Proceedings of PLEA 2000: Architecture, City, Environment*.)

the summertime addition of folding rooms, screened for warm-weather sleeping or recreation. When combined with roof gardens, the result is an important enrichment of urban life.

In the illustration of functional changes, the low winter and higher summer envelopes are each designed to provide 6 hours (9 a.m.–3 p.m.) of direct sunshine to neighbors. The winter envelope has a complex shape, but a single plane dominates the higher summer envelope. The difference of shape results from shifting sun angles. Low winter rays from the sun approach the site from the southeast at 9 a.m. and from the southwest at 3 p.m. By contrast, higher summer rays come in from nearly due east at 9 a.m. and due west at 3 p.m. When shadow fences follow the rectangular grid of the 1785 US Land Ordinance, the useful portion of the summer envelope is, for the most part, a single plane.

The interstitium, besides accommodating the flexible use of space, can act as a shield, a zone of defense against climatic extremes. Shading devices that rise during the summer months for comfort in outdoor spaces or to cool the roof and reduce air-conditioning loads can come down in winter. In some climates, such as Hawaii, rain catchers might rise for protection from downpours and to catch precious fresh water. Such shields might be as small as a parasol or as large as a circus tent, operated manually or completely automated with a kinetic device responding to sun, wind, or water.

Ventilation stacks can rise above the winter roofline allowing



Climatic Adaptations: (Left) Winter and summer envelopes; (Middle) Diagrammatic building—winter mode; (Right) Diagrammatic ventilation stacks and courtyard cover—summer mode. (Computer drawings by Karen Kensek in "The Interstitium: A zoning strategy for seasonally adaptive architecture" by Knowles and Kensek 2000; 774. In K. Steemers and S. Yannas, eds., *Proceedings of PLEA 2000: Architecture, City, Environment*.)

for interior heat to be vented in summer. Structures resembling large awnings or umbrellas can shade and ventilate the courtyard. Hence, the summer landscape might unfold with clusters of diamond-shaped sails or kites floating motionless and weightless above the rooftops. The winter landscape might collapse inward, appearing lower and smoother than in summer. All such means are expansions of ways people have traditionally achieved comfort while conserving energy.

Large deciduous trees, valued for both climate control and beauty, can be accommodated by the interstitium. Studies have shown a summertime difference of as much as 42°F (23°C) in urban surface temperatures between those well shaded by trees and those in direct sun. Unfortunately, conventional solar-access zoning can work against trees. Clearly, evergreens do need to be limited to the winter envelope to avoid harmful overshadowing of neighboring properties. Otherwise, for trees that lose their leaves in winter, there is no reason why they shouldn't rise in maturity to fill summer boundaries of the interstitium.

Courtyards and the Interstitium

Courtyard buildings, because they are so common throughout the world, deserve special attention for the advantages they offer as an urban type. In making a strong supporting argument for the courtyard, architect John Reynolds has described its many traditional