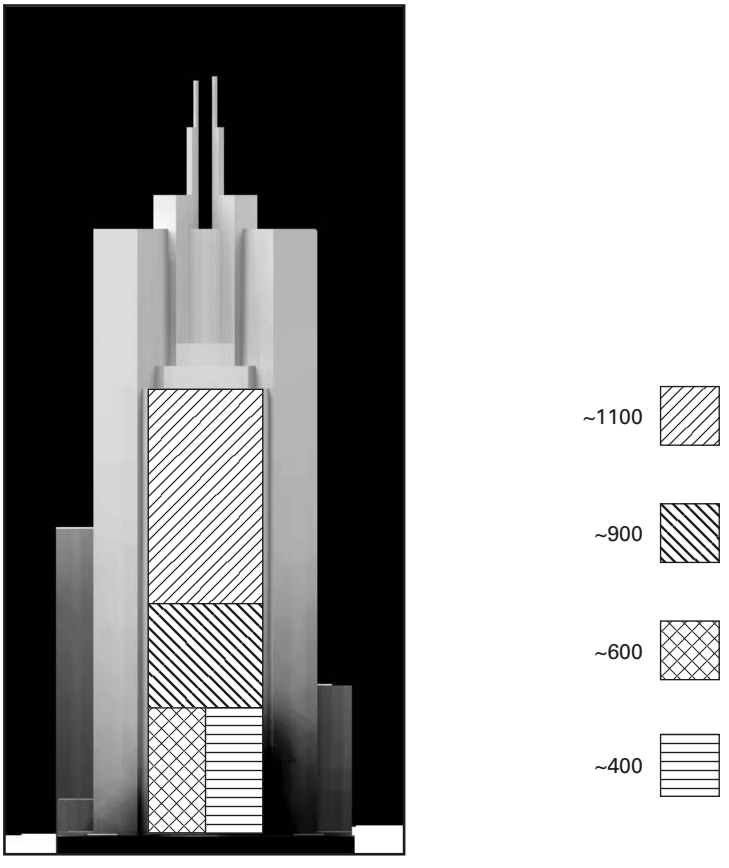

Figure 19.8
Solar access responsive façade configurations.

could be configured to be *responsive* to the local solar access. The example in Figure 19.8 shows how a facade might be apportioned into regions of broadly similar solar access. The notion of 'inhomogeneous' facade configurations may not be immediately welcomed by some in the, traditionally conservative, construction industry. Here perhaps, the lead could be taken by those architects that are attracted by new design possibilities. A facade design that is responsive to the local solar access should be seen as *enriching* architectural possibilities as well as providing a more energy-efficient building.

Components of solar access

In addition to total annual irradiation (or illumination), ICUE can produce images showing components of the total which can further inform our understanding of solar access. For example, images can be generated to show any of the

following: the maximum possible number of sun hours; the irradiation (or illumination) resulting fromsky only; the irradiation (or illumination) due to inter-reflection between buildings, and so forth. Furthermore, seasonal or monthly images can be generated in addition to annual totals. The simulation data can also be processed to generate a time series of irradiation (or illumination) data for any point, or collection of points, in the image.

The prevailing temporal aspect of solar access could be investigated by comparing images processed to show the total annual irradiation for the before-noon and after-noon hours separately. The subtle effects of inter-reflection between buildings can be revealed by different mapping images created using building models with different reflective properties.

Government agencies have responded to calls from various quarters to promote 'green' spaces in the cities. The amenity aspects of green spaces are usually the foremost in these discussions. However, in dense urban environments a key consideration is the availability of daylight to support plant growth and survival. Plant species for shaded 'green' areas could be selected on the basis of the predicted levels of the photosynthetic component of total annual irradiation. Here perhaps knowledge of the seasonal components would be helpful too. Assessments of the available area and prevailing illumination for planting could be carried out at a city-wide scale (see Figure 19.5).

Conclusion

The notion of 'solar architecture' has existed since the dawn of architecture itself. In 400BC, Socrates is believed to have considered solar design principles in house construction (Butti and Perlin, 1980). For low-rise domestic and small dwellings, it is true that Socrates' observations still have relevance today. However, it is also true that the evaluation paradigm for solar architecture has changed little since the Socrates' time; it is still essentially qualitative and woefully inadequate for the design and evaluation of buildings in urban settings. Knowle's observations bear repeating: '*Our cities are non-directional. Our buildings are undifferentiated by orientation to the sun. They stand static, unresponsive to the rhythms of their surroundings.*' Design principles that are heedless of the character and quantity of solar access in urban settings will not produce buildings that maximize energy efficiency. By equating solar access with total annual irradiation we give it a definite meaning. Thus we create a much needed criterion with which to evaluate solar architecture on a quantitative basis. The new schema presented