

DAYLIGHTING IN HISTORICAL CENTRES: THE CASE OF AN ARCHITECT'S OFFICE IN SEVILLE

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ABSTRACT: Historical towns in Europe usually have as their main feature an extremely dense urban tissue. This, in turn, generates a wide variety of situations which make it difficult to provide adequate light to the inside of buildings. On the other hand, the trend for revitalization of cities often demands a change in the utilization of spaces adding even more difficulties to the case because the previous constraints and standards are heavily modified. Architecture today must face this challenge as a new aim for creativity based on the idea of "design with the environment". Basically, the achievement of the said urban renewal of old towns should not entail the creation of a kind of *enclosure* where sustainability is absent as the conservationists would have it. With this concept in mind, the complex process of building an architect's office was launched, and though the starting situation was that of "a windowless façade", a number of strategies have been devised to provide for sun and light in the working and living spaces. Simulations of the project taking into account the principles of radiant energy transfer have been duly conducted and after some corrections the office was completed and monitored. The procedure yields both the thermal gains and the luminous distribution of the building in order to assess the performance and comfort level on a seasonal basis. Therefore, we consider that the project is a valid example of sustainability in historical cities not merely because of the former but also due to its integration with professional practice and its attempt to address severe urban and political constraints.

Keywords: Sustainability, Daylighting, Urban Retrofit

1. INTRODUCTION

The World Commission on Environment defined Sustainable Development in 1987 as that which intends "to meet the needs of the present without compromising the ability of future generations to meet their own needs."

However, historic settlements in Europe unlike their Asian or American counterparts had their origin in dense neighbourhoods enclosed by defensive walls. This imposed a strict limitation on the patterns of growth of cities that resulted in an urban disposition characterized by narrow streets, row houses and comparatively tall buildings. This situation did not grant due access to sunlight and the questions of light related to fenestration and glazing in buildings lingered for centuries in several cities such as Amsterdam, where even special ordinances and taxation systems were issued for the matter.



Figure 1: Narrow streets where protective measures against excessive sunlight are easily implemented constitute one of the main features of the old city centres in Southern Spain. (View of a shaded shopping lane in Seville in summer)

The former situation is especially “unsustainable” in the ancient cities of Southern Europe, like Seville (Spain), where a substantive portion of the urban fabric stems from medieval or even Arabian traditions of town-making. Such urban models were well-suited to hot-dry climates in which the critical issue of daily life was cooling, and thus, they brought forth a densely agglomerated compound intended to reduce solar exposure.

Nowadays, available scientific information on the climate combined with the architectural knowledge necessary to sustain an optimal relationship with the environment allows us to argue that the historic neighbourhoods in Seville and a great deal of its urban fabric, heritage of medieval epochs, is far from responding to the said optimal conditions.

Especially in terms of daylighting the usual situation is that in which a very low level of solar gains is reached in winter but in summer this is not necessarily an advantage as daylighting levels are inadequate and lead to energy waste.

Today’s architects must face this problem as an exciting opportunity to create projects which are at peace with their surroundings in order to avert the ever-present temptation to suspend the criteria of sustainability in historical centers. Once again we must remember that old towns are the norm in the European setting.

2. OUTLINE OF THE PROJECT

Bearing in mind the aforementioned notions, an architect’s office has been built in the centre of Seville to exemplify suggested itineraries for new proposals and to test the capacity of our simulation method based on the properties of the radiant field as first proposed by Yamauchi and Moon.

The project is worked out from the section, the street is discarded as a luminous source and sun is attracted by means of volume modulations, suitable patios and clerestories. (See Figures 3 and 4)

Under the south-oriented monitor, a close agreement is achieved between the simulated values and measured data obtained throughout the year.

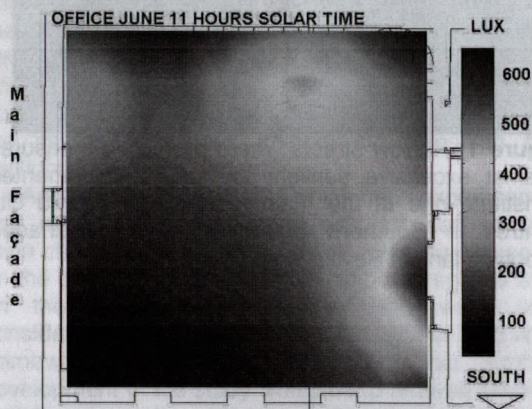


Figure 2: Partial radiation field due to the monitor and patio window over the plan of the office. (In June at 11 hours solar time, illuminance levels range from 700 to 200 lux).

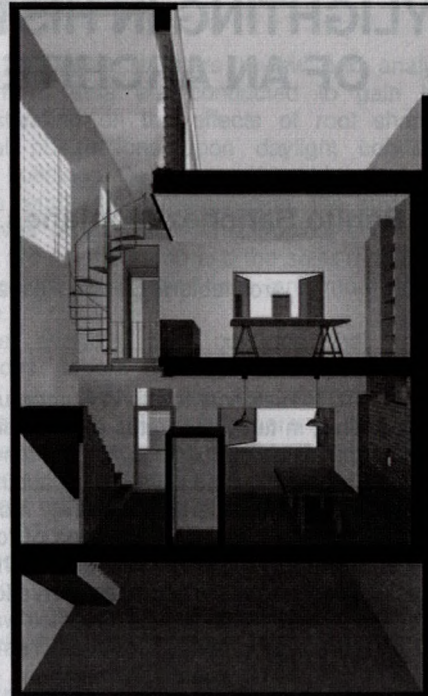


Figure 3: Sectional view of the architect’s office including the South oriented monitor, blinds and its reflection in the said wall. Down: Diminutive façade of the project

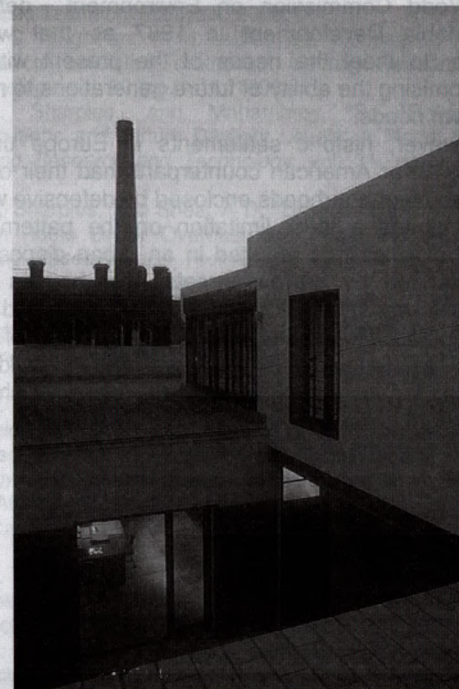


Figure 4: View from the roof of the patio showing terraced roofs and the south oriented monitor.