

Design Analysis of the Courtyard Building Morphology Based on a Bioclimatic Assessment in Hot Arid Region

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Abstract — This paper aims to solve a design dilemma between a specific building's morphology and a hostile climate conditions. In hot and dry regions, courtyard building is the most building designs used to face such extreme climatic factors especially hot air temperatures. In the search of the optimum courtyard building form that can be passively adapted to extreme climate conditions, an on-site measurement campaign has been conducted, using a digital monitoring instrumentations, to record: air temperature, relative humidity, illumination levels and wind speed values in an existing courtyard buildings samples with various morphologies for both summer and winter seasons in order to extract morphological indicator values which will be used later in building's conceptual process by designers. The important findings are related to the existing of a reversed formula using extreme climatic factor values to calculate the optimum morphological indicators for the best courtyard building design in hot and dry regions.

Keywords — Courtyard building morphology; Bioclimatic design; On-site measurement campaign; Hot and dry climate