ANALYTICAL STUDY USING “GRAPH THEORY “ TO DETERMINE THE OPTIMAL CIRCULATION PATHS BETWEEN A GROUP OF ENTERRELATIONED BUILDINGS

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Abstract

The analytical approach to Architectural Design has been a tremendous tool to achieve formulating the spatial program and the design-concept for the prepared project. This is based on environmental parameters and on users needs. However, the exact location of any building in a layout of specific project according to the intensity of movement and the cost of travel of users, materials and services, needs intensive and time-consuming calculations. Nevertheless, since the late fifties, there have been many computer-based research work, aiming at developing analytical models to handle layout-design problems using computers for the accuracy and speed in locating the design elements in their optimal positions in the layout of the project. This paper aims at developing an analytical method using computer-aided design techniques, comprehensive and interactive enough to be easy to use and comply with the design parameters. The Method is to obtain the optimal circulation paths between a group of interrelated buildings. In this paper, the researcher is trying to develop a comprehensive Mathematical Method to guide the circulation paths design process. This approach would allow any architect user to trace the optimal paths connecting the buildings of a specific project. To determine the optimal location and width of paths among the buildings, the researcher has developed an analytical methods, "Pathway Correction by Relative Relocation of Point-Origin", this method is based upon determining the most probable directions of movements...
within the relational setting of buildings, at one time, then repeats the process of relocating the point of origin on the pathway until reaching the target building. During this process, many analytical processes and calculations are performed by the method, based on the "Graph Theory", which would determine "all alternatives of the optimal paths" between two layout-buildings. The researcher used this method as it can determine all alternatives of the optimal paths between two layout-buildings. Therefore, after completing the optimal allocation of all buildings in the layout, and the application of the method "Pathway Correction by Relative Relocation of Point-Origin" the Model analysis the comparative locations of the allocated buildings, calculates the movement quantities between them, determines the optimal path network in the preliminary layout, and counts the number of standard journeys on each path. The final network of optimal paths is then drawn and plotted to scale on the layout.

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