

URBAN CONSERVATION STUDY BASED ON COMPUTER AIDED DESIGN TECHNIQUES:A CASE OF ZEYREK/ISTANBUL

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ABSTRACT:

Urban conservation process is mainly constituted by documentation of cultural heritage, surveying and evaluation of urban historic quarter, planning and design of spatial organization of the site. Going through this process, architect and planner should evaluate the townscape that this site has its own potential. After the development of computer-aided three-dimensional presentation techniques, evaluation of townscape gained more importance in the urban conservation process. Newly developed computer-aided technologies shorten the time spent and make-work easier than before.

The aim of this study is to evaluate the conservation potential of a historic townscape and to generate a computer-aided three-dimensional model for the conservation of urban historic quarter.

1. INTRODUCTION

Through the urban conservation studies, evaluation of townscape, which gives the main characteristics and visual potential of historic quarter, has gained serious importance.

Parameters of townscape cannot be efficiently evaluated in two-dimensional expressions and representations. Three-dimensional analysis can create opportunities to define parameters of townscape and urban pattern both. Briefly on the three-dimensional analysis more parameters can be understood.

1.1 Aim of the Study

The aim of this study is:

- To evaluate the conservation potential of the townscape of an urban historic quarter,
- To generate a three-dimensional model for townscape restoration and urban conservation by using CAD systems.

1.2 Structure of the Study

This study is mainly formed of three stages (Figure 1). Through the conservation of townscape in Zeyrek Urban Historic Quarter, the first stage is three-dimensional modeling of townscape. This model, forms the base of the next stages.

The second stage is surveying and evaluation of townscape in three-dimensional model. The last stage is developing a proposal for the conservation of townscape of Zeyrek Urban Historic Quarter. At this stage, application decisions for urban conservation follow the evaluation of townscape.

Of all stages, the study constitutes CAD model that represents three-dimensional structure.

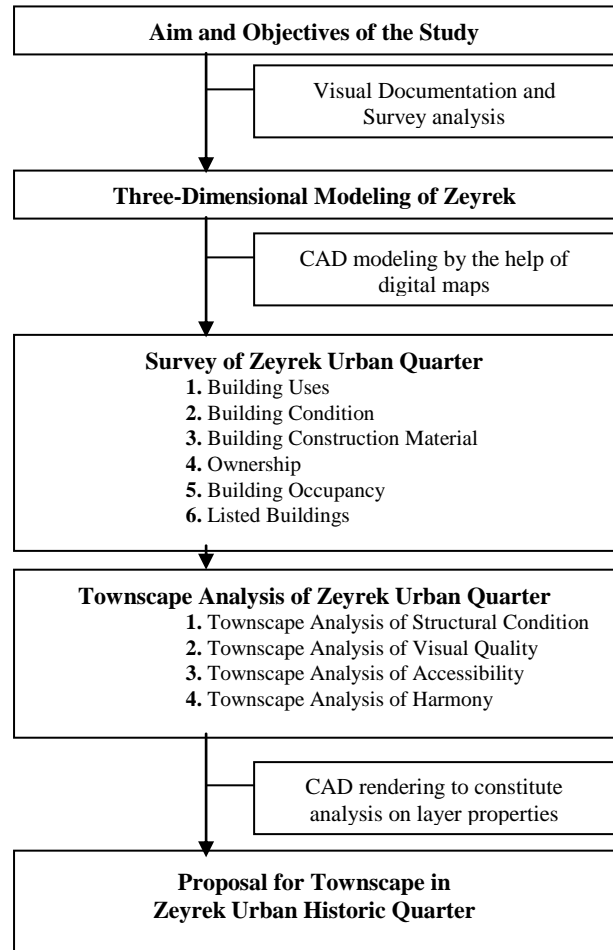


Figure 1. Structure of the Study

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2. THE RESTORATION OF TOWNSCAPE BY USING COMPUTER AIDED DESIGN SYSTEMS

Zeyrek is located in Historical Peninsula of Istanbul on northern coast of Golden Horn. In 1983 Zeyrek, as a quarter of Istanbul was included in the World Heritage List because of historical, aesthetical and architectural characteristics. Most important monument of the site is Mosque of Zeyrek that had been Monastery of Christ Pantokrator on Byzantium Period. Variety on cultural structure of the site is reflected to urban space. Zeyrek has traditional organic pattern that is constituted with authentic timber Turkish houses (Figure 2).

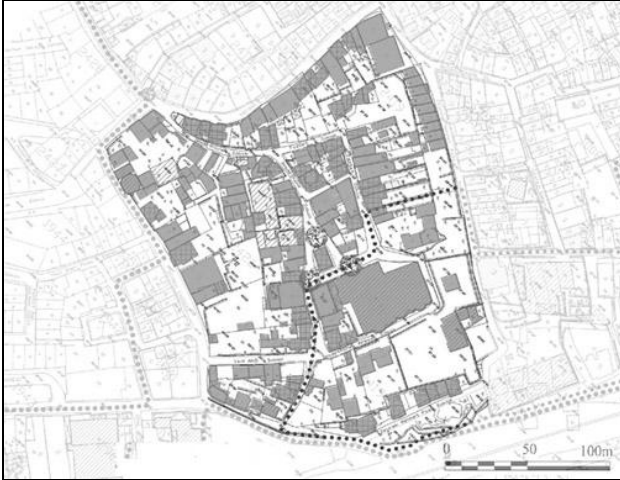


Figure 2. Zeyrek Urban Historic Quarter

2.1 Documentation of the Data about Townscape on CAD

Urban design and conservation projects that involve survey and analysis by using-dimensional data have been used as main references (GÜLERSOY ZEREN, Nuran, TEZER, Azime, YİĞİTER, Reyhan; 2001.), (KARAMAN, Aykut; 1993). Other documentation technique is survey of urban historic quarter.

2.2 Three-Dimensional Modeling of Townscape

Computer aided three-dimensional model gives many facilities and opportunities to be used preserve townscape. This model represents observation on many view ports with various range of scales. Being the aim of this study this model constitutes the base of survey and application studies in urban conservation of Zeyrek.

Three-dimensional modeling of existing townscape is achieved by AutoCAD 2000 (Figure 3). In the process of modeling, the data such as three-dimensional coordinates that is the location on “x,y,z” coordinates of topography, streets and buildings. Data on façade is formed within references that is mentioned in previous part (Documentation of the Data about Townscape on CAD).



Figure 3. Three-Dimensional Model of Zeyrek Urban Historic Quarter

2.3 Survey of Zeyrek Urban Historic Quarter

In the survey and townscape analysis of Zeyrek Urban Historic Quarter three-dimensional data can be legible. So each townscape parameters that are framed on conceptual evaluation of urban space are considered on this model.

Within the survey of Zeyrek Urban Historic Quarter, three-dimensional analysis of Building Uses, Building Condition, Building Construction Material, Ownership, Building Occupancy, Listed Buildings have been developed. In this paper Analysis of Building Uses and Listed Buildings are presented (Figure 4 and 5).

On the computer aided urban model data of each building is constructed on “layer” properties on computer-aided design. Render application is used to create analysis and then output is converted to jpeg format to get the use on a image output.

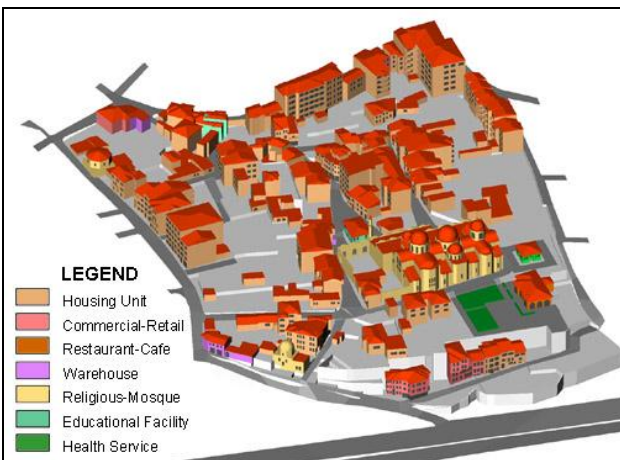


Figure 4. Townscape Analysis of Building Uses in Zeyrek Urban Historic Quarter

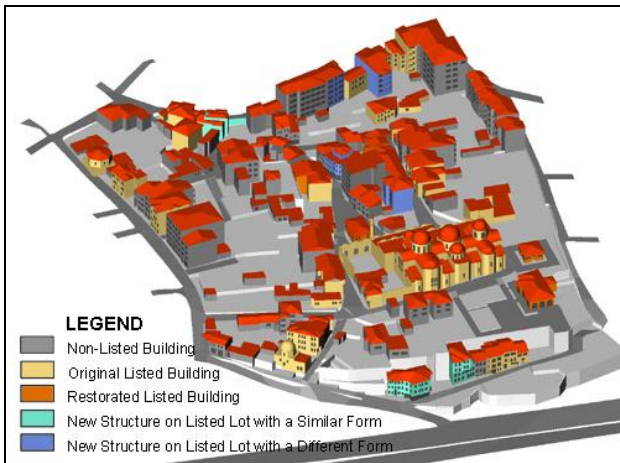


Figure 5. Analysis of Listed Buildings in Zeyrek Urban Historic Quarter

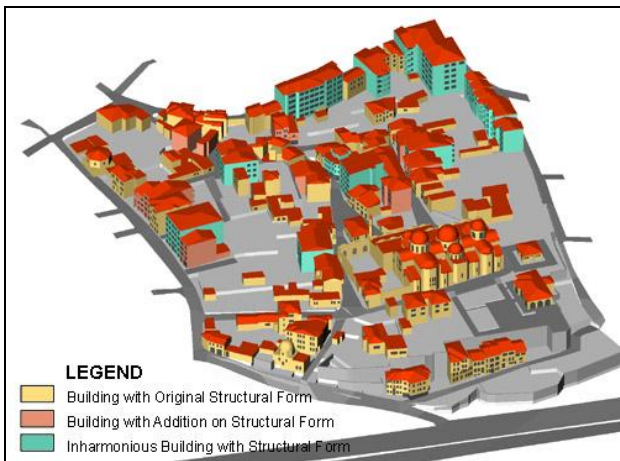


Figure 6. Townscape Analysis of Structural Condition in Zeyrek Urban Historic Quarter

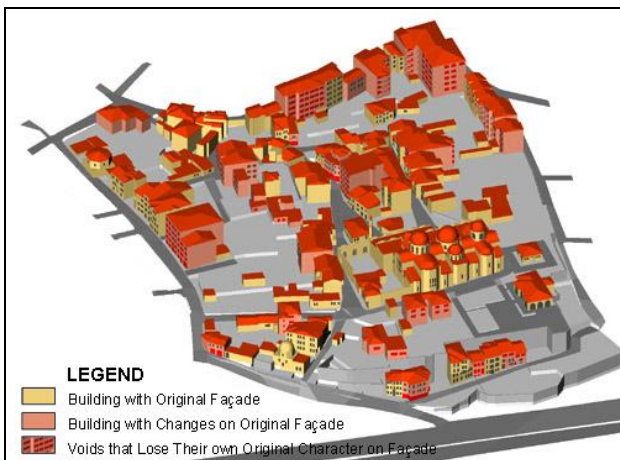


Figure 7. Townscape Analysis of Visual Quality in Zeyrek Urban Historic Quarter

2.4 Townscape Analysis in Urban Conservation

Evaluation of three-dimensional effects throughout the analysis process is important while defining the urban historic quarter on conservation applications. Organic growth of urban space, should be considered with evidences from the past with cultural heritage on these applications.

Designing three-dimensional components is required for creation of cities that can continue to live its own potential.

On Townscape Analysis of Structural Condition (Figure 6), relations of each component's geometric form and relations between each component's structural conditions are identified. Building Proportions, and Building Height are also evaluated on three-dimensional urban model.

On Townscape Analysis of Visual Quality, Façade Characteristics on Zeyrek Urban Historic Quarter are being evaluated as three-dimensional model data. Visual relations in urban space have been considered with visual unity, appropriateness and contrast. Rhythm and proportion relations have been structured on voids of the façade (Figure 7).

Townscape analysis of accessibility makes circulation parameters such as privacy and permeability levels, street pattern, building entrances and front façades be legible on three-dimensional urban model. The relations of ownership pattern that surround the uses of components are identified on this analysis

Analysis of harmony with identity defines the characteristics of component in urban pattern and appropriateness with urban historic quarter.

2.5 Proposal for Townscape in Zeyrek Urban Historic Quarter

Proposal for townscape in Zeyrek Urban Historic Quarter is prepared on three-dimensional model as survey and analysis of townscape. Main headlines through the application decisions on developing proposals (Figure 8):

- After the evaluation of structural condition, building forms are proposed as appropriate as the urban pattern.
- After the evaluation of visual quality, infill applications have been constituted as in harmony with the traditional architectural characteristics.
- After the evaluation of circulation and accessibility, active and effective open public spaces have been arranged.
- Proposals for conservation applications and building uses on listed architecture are evaluated through the urban identity and local architectural characteristics.

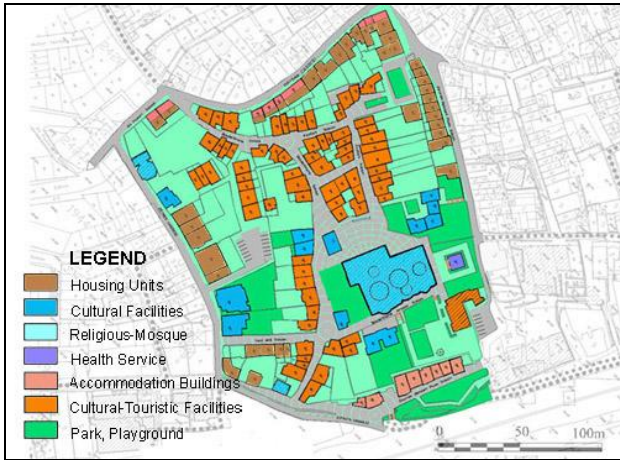


Figure 8. Two Dimensional Proposed Model of Zeyrek Urban Historic Quarter

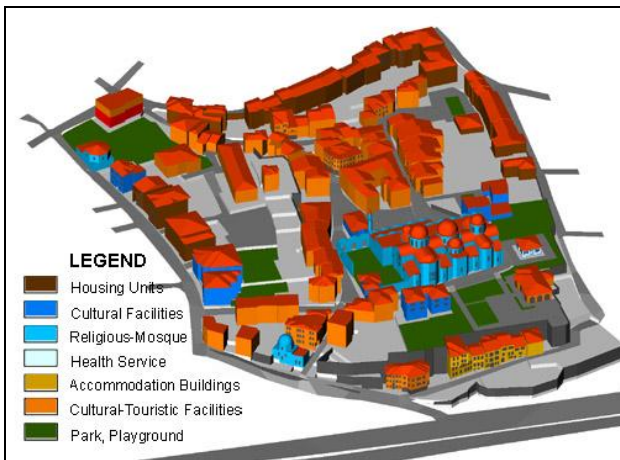


Figure 9. Three-Dimensional Proposed Model of Zeyrek Urban Historic Quarter

While improving proposals for building forms, structural additions are firstly cleaned on listed architecture. Additions such as extension on plan and story heights had made the urban pattern be illegible. Infill applications on building forms have proposed as structural conditions and story heights of buildings on original form are taken (Figure 9).

Designing proposed model of this study is constructed on the model of the current townscape. So additions and changes on the urban structure have been eliminated and proposed building forms are structured on the model.

3. EVALUATION

This study shows that the usage of a computer system expresses flexibility and convenience in three-dimensional evaluation of urban conservation. Using this proposed model can be developed for components of townscape related to urban pattern.

As a result of the case study it is concluded that using computer based three-dimensional model provide more efficient and reliable utilization of resources like time, work etc than traditional two-dimensional methods and enhances the creativity.

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