

# Architectural Design for Re-functioning Historic Ottoman Warehouses: Case Study in Istanbul

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**Abstract:** Restoration of historical buildings is important because they maintain cultural and historical continuity and transmit the cultural and social values from our precedents to future generations. Historical buildings need to adapt themselves to a changing cultural, social, economic, and political context. In this paper re-functioning project of a historic Ottoman, warehouse is presented. The aim of the project is to re-gain this historical structure for public use by re-newing it to the modern comfort level and making the required functional changes. The main structural system of the warehouse consists of thick masonry stone walls. The idea in the proposed restoration project is to build a two-story steel structure inside the available volume of the warehouse. The columns of the new steel construction run parallel to the existing structural system of the historic building and are fixed at their base to the existing building foundation. Hence, there is no connection between the proposed steel structure walls and the existing masonry walls, and this will save the historic fabric of the warehouse. The project proposal shows the details of planned restoration stages, the process of programming the new interior space, construction materials, and lighting and ventilation solutions. Furthermore, in this project, two- and three-dimensional computer drawings were used. Finally, the proposed parallel steel structure is able to regain the warehouse and renew it to be used as a modern housing and workshop.

**Keywords:** *historical buildings; architectural; heritage; restoration; re-functioning; adaptive reuse*

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## 0 Introduction

Historic buildings are resources of spiritual, cultural, social, and economic value. They provide the settings on which our lives are passed, and they are needed to provide the essential link that humans make between past and future<sup>[1,2]</sup>. Usually, historical structures loss their function during the time. The conservation of a historic building is directly related with the sociocultural conditions. Good architectural conservation design project should have the ability to connect today's existence with the pasts within an objective framework. Historical structures that have lost their function a long time can be survived using re-functioning restoration technique. The Gare D'orsay in Paris constitutes a typical example of re-functioning restoration where the railway station has been converted to a museum<sup>[3]</sup>. Another example is the prison and detention historic building in Istanbul was converted to a "congress hotel" called now the Four Seasons Hotel. In this paper, a re-functioning restoration project of an Ottoman warehouse building is proposed to reuse the building as an office workshop or a residential building. In this project, it is proposed to build a two-story steel structure inside the available volume of the warehouse without affecting the original structure of the warehouse. The architectural design of the new steel structure aims to create interior space, use new construction materials, and propose lighting and ventilation solutions.

## 1 Physical properties and indoor analysis of the warehouse

The case study building is located on the Kuleli Street in Çengelköy on the Asian side of the Bosphorus-Istanbul.

Front and side views of the building are shown in Figure 1. The building consists of several building blocks built side by side with the plan area of 225 m<sup>2</sup> (i.e., 9 m × 25 m). The total building height is about 10 m. The main structural system of the building is thick masonry walls. The existing building has no roof. That is the building can be considered as rectangular prism with some windows and doors that connect it to the outside space. Nowadays, the building is used as a place by television series. Space in space concept was used to construct a place inside a four open walls. The place contains many volumes independent of each other as shown in Figure 2.

## 2 Details of the restoration and re-functioning project

The proposed restoration and re-functioning project consist of two parts as follows:

### 2.1 Part 1: Stone walls cleaning and restoration

It is proposed to apply the following restoration stages to be applied for existing stone walls:

- Cleaning stage: Include cleaning the window that filled with stone, and remove the plants on the facades and walls. Furthermore, walls will be sprayed to prevent germination.



Figure 1. General view of the historic warehouse; (a) front view, (b) side view<sup>[4]</sup>



Figure 2. (a-c) Existing space used by television series

- Strengthening stage: This stage includes a rebuild of the collapsed walls and strengthening the existing walls by spatial mortar.

### 2.2 Part 2: Construction of a new steel structure

Many sketches were made for the interior space from the process of programming the space as a housing and workshop to create [Figure 3] the best, and the best design was detailed in two and three dimensions (3D). A two-story steel construction with a dilatation share of 5 cm was established within the main structure<sup>[5,6]</sup>. The reason for this 5 cm space between the masonry walls and the new steel structure is to prevent any damage of the masonry walls during future earthquake ground shakings. The new steel structure was built within the boundaries of historical construction as shown in Figure 4. Since the main structure has a long rectangular plan and thick walls, considering the need for natural ventilation and daylight, the interiors of the building have been built on the basis of the courtyard and garden. In addition to the courtyard and garden openings on the first floor, there are terrace windows with remote control. The reason why the terrace is preferred in the structure is not to disturb the appearance of the facade.

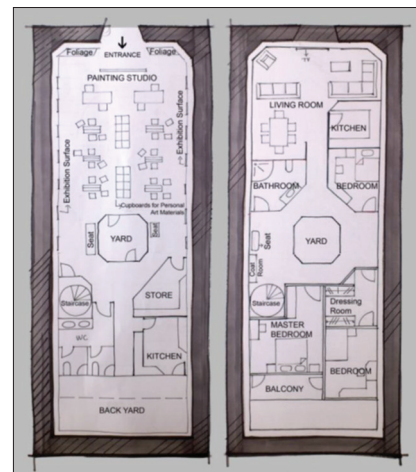


Figure 3. One of the sketches in the design process/Ground floor and first floor sketch works for indoor alternatives

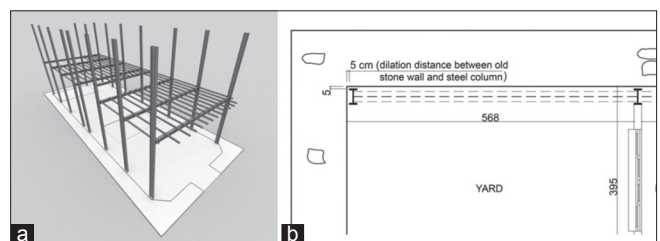


Figure 4. (a) Three-dimensional view of the steel structure, (b) masonry walls steel structure expansion joint details



Figure 5. Architectural plans of the ground floor and first floor

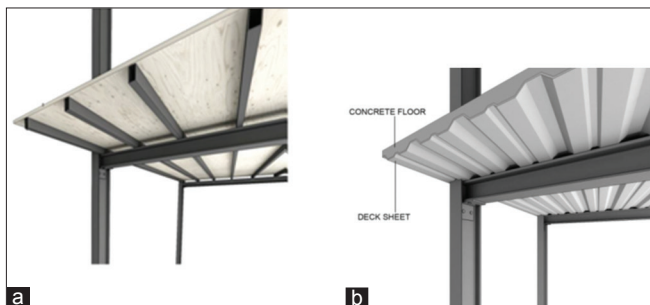


Figure 6. (a) Flooring solution for dry floors, (b) Flooring solution for wet floors

In this project, volumes planned to be on the ground floor are office, patio, painting studio, wet areas

(WC and kitchen), storage, and back yard. Volumes planned to be on the first floor are living space (sitting - dining), bedrooms, and wet areas (bathroom and kitchen) as shown in Figure 5.

### 3 Interior design

In this project proposal, the main function of the ground floor is a drawing workshop, which serves as the largest square meter area and opens into wet areas and gardens. The ground floor entrance is made of a large wooden door. The entrance opens to a glass office and waiting area. The courtyard is located next to the office. The

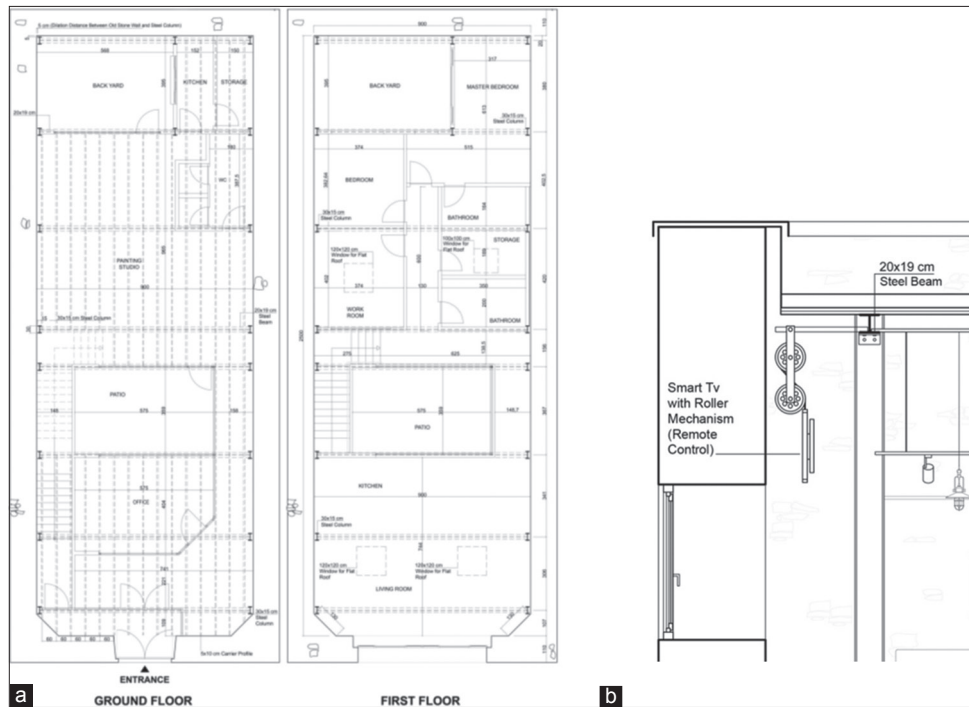


Figure 7. (a) Plan view of the steel structure, (b) Smart TV system

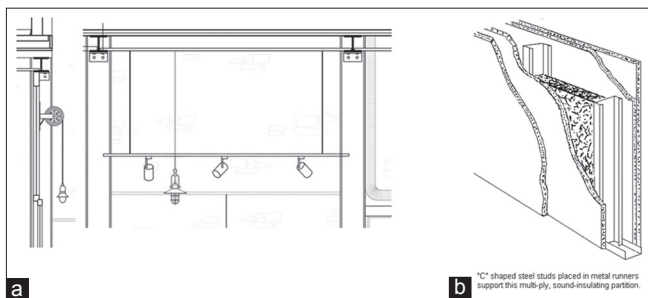


Figure 8. (a) Direction adjustable spots, (b) three-dimensional view of cold formed steel wall

courtyard is considered as one of the two breathing areas of the building. The garden and courtyard, which can be called the light and oxygen tube of the building, are of vital importance for the building. When we head to the left from the main entrance, we reach the first floor, which serves as a residence, with double girder, intermediate platform, and wooden step stairs. The hall that meets us first is divided into two branches, the first of which opens to the living area (hall and kitchen) and the second to the bedrooms, study room, storage, and bathroom. The light and ventilation of this second area are provided by the garden. In the project design process, floor construction solutions were designed for wet and dry floors in consultation with an architecture construction company. 5 cm × 10 cm steel box profiles are placed on the dry ground, and water trap is placed on wet surfaces. The roof of the first floor is considered

to be completely wet floor, and steel trapeze sheets are preferred as a ceiling as shown in Figure 6 and 7a. While natural lighting is provided by garden and courtyard, roller and industrial type lighting elements accompanying the gross atmosphere of the space are considered for artificial lighting. In addition to these elements, direction adjustable spots were preferred as shown in Figure 8a. Furthermore, in the first floor, remote-controlled TV system with the reel mechanism was installed. This system was designed to move up and down to not narrow the view of the windows that open on the Bosphorus as shown in Figure 7b. Wood-like ceramics are used on the ground floor where the circulation is high, and travertine is used on the garden and courtyard floor. Tiled oak parquet was preferred in all areas; however, wood-like ceramic is used on the wet first floor. Especially in the first-floor interiors where drywall walls are used intensively, cold-formed steel walls are preferred as shown in Figure 8b. Figures 9 and 10 show 3D views of the interior design.

## 4 Conclusions

Based on the architectural design and the re-functioning restoration technique used in this work the following conclusions are drawn:

- Historical structures that have lost their function a long time can be survived using re-functioning



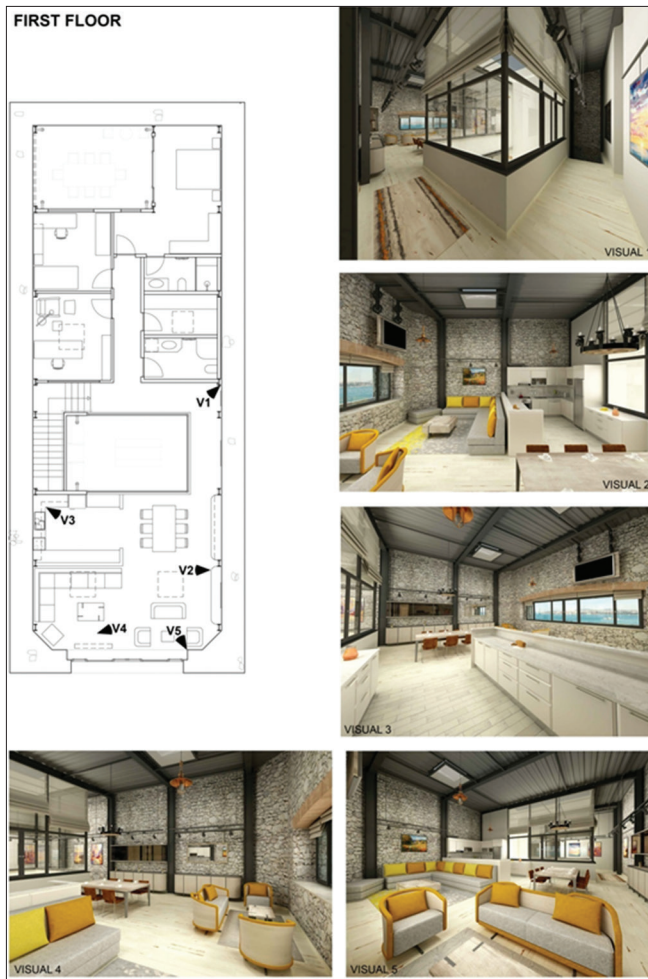


Figure 9. (a-c) Ground floor interior design

restoration technique. In this technique, it is very important to choose the right function for the building and to make appropriate programming for architectural and interior architecture design.

- In the re-functioning restoration technique, it is not appropriate to install a mission that cannot be carried by the historical building structure or cause damage to the original architectural fabric.
- The proposed parallel steel structure is able to regain the warehouse and renew it to be used as a modern housing and workshop.
- The proposed steel structure frames can be easily constructed and installed at the site. To save the building's historic outer view fabric, the steel frames are not positioned in contact with the historical walls, but they are parallel to them from their interior side.

- Difficulty in this project is the appropriate planning for natural lighting and ventilation solutions. The courtyard system, which has been used as a savior in the history of architecture, was preferred in this project.
- In fact, we can describe the structure as a “semi-loft” place due to some features. Lofts are converted from warehouses, factories, etc., to home office or home/workshop. Actually lofts are old industrial buildings due to their first building purpose. For this reason, they have high ceilings and wide square meter. With these aspects, we can say that the loft structure category intersects with our design.
- Within the scope of the project, an interior architectural language was formed from stone walls, steel system, and industrial lighting. Furthermore, light colors were preferred on the



**Figure 10.** First-floor interior design

furniture, floor and plasterboard walls, to give simple style, and to abstain from gloom and eye irritation.

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