Digital Preservation of Historic Building*

- A case study of the historic building Wuri Municipal Government Building in central Taiwan

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Abstract—**The concept of cultural heritage preservation changes as the digital technology advances. Earlier, physical preservation played the major role in such an effort while documentation in the forms of literature and image played a complementary role. Article 16 of the Venice Charter 1964 sets forth the importance of records and files in the preservation effort. As various digital technologies are growing mature, a door is therefore opened to multiple options for the preservation of cultural heritage.**

Through the case study of the historic building Wuri Municipal Government Building located in central Taiwan, this study discusses major issues with the application of the knowledge obtained from the traditional skills and computer media, and other issues with computer-simulated history as the preservation of historic building.

Keywords—cultural heritage, digital preservation

Fig. 1 Wuri Municipal Government Building in 1932

Fig.2 Wuri Municipal Government Building in 2014

I. INTRODUCTION

Wuri Municipal Government Building is located in central Taiwan, in a township called Wuri which was first developed as a small agricultural township in 1716. In 1900 the rice milling and sugar refining industries began to take form and grow gradually. Wuri was a small and simple township, but complete in every detail. In 1920, the independent Wuri administrative district was established, and Wuri Municipal Government Building was completed in 1932. It was further appointed as a historic building in 2004. The main structure of the building has been preserved intact until today (Fig. 1 and 2). This building has undergone various municipal departments. The interior space and floors were altered to meet the requirements of those departments. This study documents the building in three forms of image, i.e., 2D static, 3D static, and 3D dynamic images, depending on the types of image.

The application of 2D static image can be further refined to the following categories: photos, picture, and figure. 3D Modeling is the most employed technique in the application of 3D static image on building, in which the space and design of building is presented in three dimensions. 3D modeling reconstructs the physical 3D object by using 3D data collected for digital presentation on a computer. Dynamic image consists of digital information such as video, animation, etc. Different from 3D static image, dynamic images includes the element of "time" and is a presentation done for a purpose.

Digital Archive is often applied for the purposes of presenting spatial information, site culture, etc., and is presented through dynamic image presentation (Lin, 2011). Dynamic image is particularly the fittest for the media that is accessible to the general public.

II. RESEARCH METHOD

The digitalization process of historic relics or building still involves a survey and draw process to construct the basic information of a building. Software like AutoCAD may be employed for the documentation while interviews, collection of historic photos, etc., may be employed to document the usage of the building throughout the ages (Fig. 3, 4, and 5), as well as the size of the floor, material and changes of interior space. In addition to documentation of drawings, the interview transcript, and the photos of the building now and then, may also be attached (Fig 6 and 7). The interior architectural detail can be documented with section views and detail drawings (Fig. 8), as the basic information necessary for future maintenance or re-build.
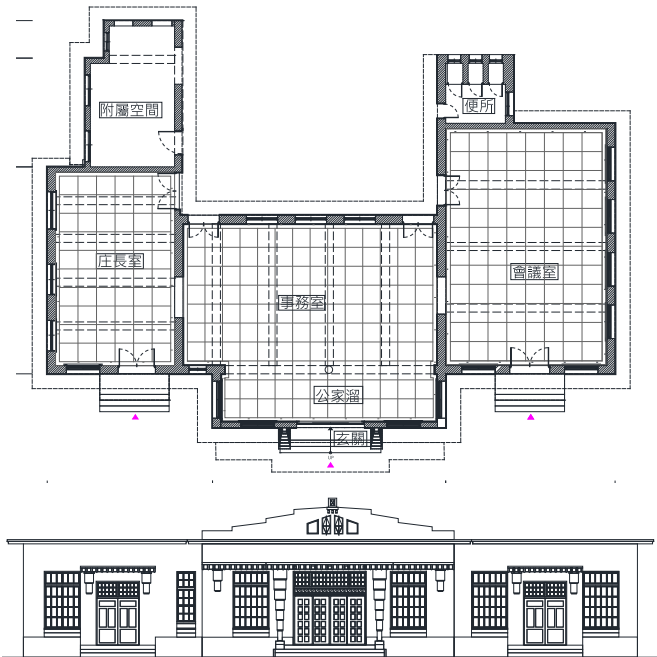

Fig. 3 Spatial use and elevation of Wuri Municipal Government Building in 1932
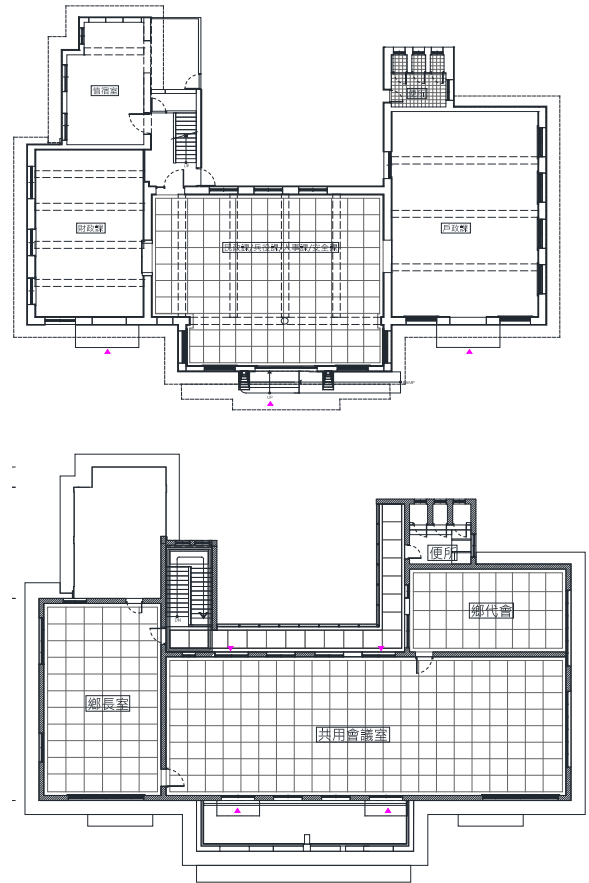

Fig. 4 Spatial use and addition of the second floor of Wuri Municipal Government Building in 1950
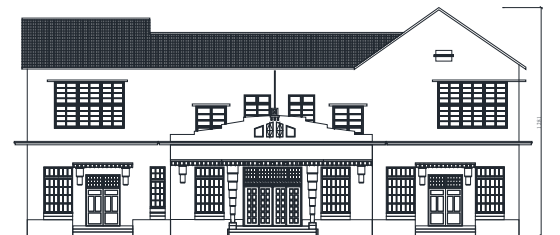

Fig. 5 Elevation of Wuri Municipal Government Building post 1950

Fig 6 Photos of the old Wuri Municipal Government Building

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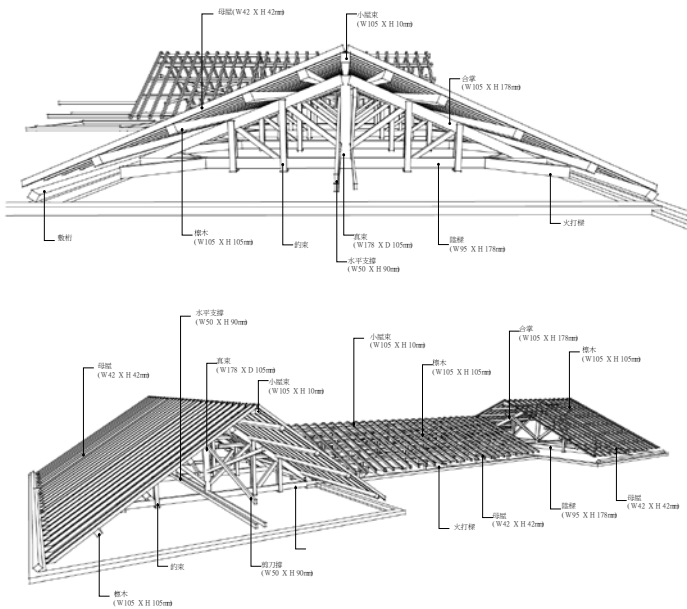Fig 7 Photos of today's Wuri Municipal Government Building

Fig 8 2D simulation image of roof truss of Wuri Municipal Government Building

Most people cannot easily understand the knowledge embedded in architecture through a completed 2D static image. The video simulation of the space of architecture can be done with 3D software. Visual closeness to the historic relics or building may thus be generated initially (Fig. 9).

Fig. 9 3D static image simulation of the appearance of the completed Wuri Municipal Government Building

3D image simulation as elevation of building and a very useful research tool for the history of building (Fig. 10). Earlier, 2D drawings were used to show the structure of the building for the ease of construction; today, Software like SkechUp and Lumio is used more often to understand the whole structure of the building.
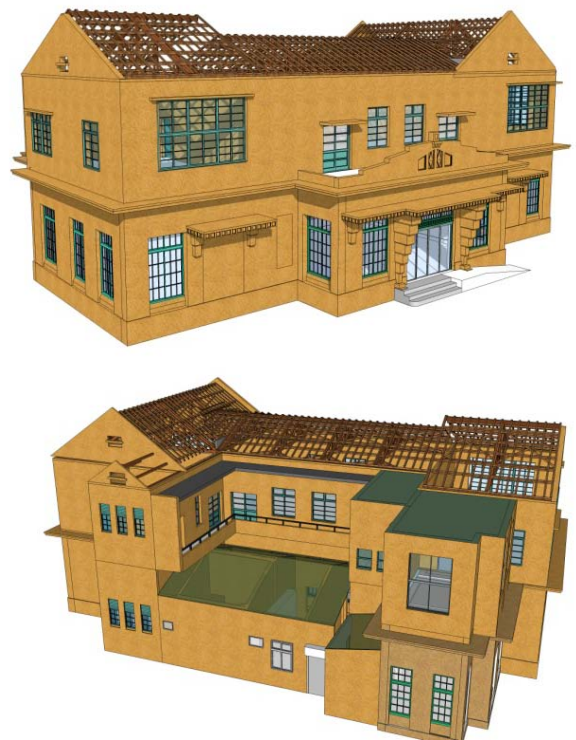

Fig. 10 3D static image simulation of today's Wuri Municipal Government Building

Further application allows the prediction of the change of sun shine v.s. seasons for the whole area, which can be used to further understand the considerations evaluated for physical environment (Fig. 11).

Fig 11 Sun shine simulation of the old Wuri Municipal Government Building

III. OVERALL PRESENTATION OF DIGITAL ACHIEVEMENT

The major presentation methods used in the virtual reality navigation of historic relics or building are 360 or 720-degree panoramic photography. The user can have an immerse experience without a personal visit to the site.

Fig. 12 VR Image of Wuri Municipal Government Building

IV. CONCLUSION

The significance of digital technology does not only lie in the preservation of literature through the use of interactive space simulation technology so as to complement the space presentation previously done with text narration, 2D image, and photos; but also in permanent preservation of valuable literature made possible by digital technology.

The knowledge thus obtained can be stored and spread speedily in the form of digital file for the purpose of cultural education and the passing-on of the cultural legacy.

Emphasis on digital preservation of historic building and relics does not necessarily mean to neglect the importance of physical preservation of historic building or relics, or cultural heritage, but provides a feasible way of showing the importance of documenting and preserving historic heritage.

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