RESTORING THE IMAGE OF FRENCH CONCESSION TOURANE (DANANG) USING THE METHOD OF GRAPHICAL RECONSTRUCTION OF URBAN ARCHITECTURAL SPACE

PHỤC DỰNG HÌNH ẢNH CỦA NHƯỢNG ĐỊA PHÁP TOURANE (ĐÀ NẴNG) BẰNG PHƯƠNG PHÁP TÁI ĐỒ HỌA KHÔNG GIAN KIẾN TRÚC ĐÔ THỊ

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Abstract - As a developing country, the process of urbanization has been, is, and will continue to take place strongly in cities in Vietnam. This leads to the original architecture and planning of some cities in danger of being forgotten. For the central areas of old cities, the digitization of ancient architectures plays an important role in preserving architectural and planning heritages. This article emphasizes the method of graphical reconstruction of urban architectural space in the process of digitizing ancient cities in Vietnam. The research approaches the research object by synthesizing, analysing and comparing different input data sources: maps, text documents, survey results, photographic data. Then, the graphics of urban architectural space of ancient cities are reproduced in different steps, from simple to detailed.

Key words - Colonial; concession; graphical reconstruction; Tourane; urban planning

Tóm tắt - Là một đất nước đang phát triển, quá trình đô thị hóa đã, đang, và sẽ còn diễn ra mạnh mẽ tại các thành phố ở Việt Nam. Điều này dẫn đến kiến trúc và quy hoạch nguyên bản của một số thành phố có nguy cơ bị lãng quên. Đối với khu vực trung tâm của các đô thị cũ, việc số hóa các công trình kiến trúc cổ đóng vai trò quan trọng trong việc bảo tồn và gìn giữ các di sản kiến trúc và quy hoạch. Bài áo này nhấn mạnh vai trò của phương pháp tái tạo đồ họa không gian kiến trúc đô thị trong quá trình số hóa các đô thị cổ ở Việt Nam. Nghiên cứu này tiếp cận đối tượng nghiên cứu bằng cách tổng hợp, phân tích và đối chiếu các nguồn dữ liệu đầu vào khác nhau: bản đồ, tài liệu chữ, kết quả khảo sát, dữ liệu nhiếp ảnh. Từ đó, các đồ họa về không gian kiến trúc của các đô thị cổ được tái hiện qua từng bước khác nhau, từ đơn giản đến chi tiết.

Từ khóa - Thuộc địa; nhượng địa; tái tạo đồ họa; Tourane; quy hoạch đô thị

1. Introduction

At the end of the 19th century until the middle of the 20th century, the Vietnamese city of Danang was, in the colonial scheme, a French concession, called Tourane. Following the royal decree of October 3, 1888, the official establishment of the city of Tourane was carried out on May 24, 1889 when the French President signed a decree determining the governmental organization of the city. Although this organizational structure was changed many times later to match the development of the city, the basic characteristics have not changed much [1]. The urban planning of the city was thus carried out according to the Western model and its functionalities. Nowadays, due to the works of urban renewal and expansion, such as the formation of residential areas or the construction of modern buildings, the values of French planning and architecture are seriously threatened.

When accessing the National archives centres in Vietnam and the French overseas colonial archives, original documents on planning maps or original designs of Tourane's architectural works are quite modest, compared to other French colonial and concession cities in Vietnam such as Hanoi, Hai Phong in Tonkin or Saigon and Cho Lon in Cochinchina. Therefore, when looking to the appearance of the ancient Tourane, the reference sources are mainly based on photographic documents.

Tourane during the French colonial period always had "hidden corners". Old photos cannot fully capture the whole image of the city. In terms of space, there are neighbourhoods and streets that are photographed more than others. Likewise, some buildings are photographed more than others. This imbalance creates "hidden corners" in the urban space of Tourane: places that are of little interest. In terms of time, the distribution of photos used to explore the city image is also uneven. The older the photos, the fewer the quantity. In particular, photos taken in Tourane have only become truly abundant since the 1960s, when this city was no longer a French concession. This factor continues to create "gaps" in observing the process of urban and architectural development.

The city has indeed undergone many changes in town planning and urban architecture. Memories of the ancient Tourane in the 1950s only exist sporadically through photographs or short films. The architectural and urban space of the concession is therefore also an object to be studied. To limit these "hidden corners" and "gaps" in the perception of the urban appearance, converting old data about the city into graphic data, through computer software is an option. This study used the method of "graphical reconstruction of urban architectural space" to rebuild the appearance of Tourane at the end of the French rule (1950).

2. Method introduction and input data

2.1. Method introduction

Based on the desire to learn and explore the appearance of ancient Tourane, this research is a process of synthesizing and connecting old information about the urban space of Tourane, and then reconstitute the old

images of the appearance of the city in the late concessional period, in form of computer graphics. By using the basic graphics software (AutoCAD, SketchUp, Photoshop, etc.), the old urban images of Tourane are restored and presented in the form of three-dimensional (3D) images. This is a method of applying 2D and 3D graphics software to facilitate the work of analysing the formation and development of the city during its colonial period. Thanks to this, the architectural space of the old Tourane is restored with urban structural elements that are relatively complete and can be observed visually. This study chooses the landmark in 1950 to restore the image of Tourane urban space, at the end of the French colonial era, as this is the year when legally, the French handed over the Tourane government to the Vietnamese [1]. Due to the limitation of the documentation sources for the period before 1950, this research mainly used data from the following decades (the 1950s, 1960s, and 1970s).

2.2. Input data

The input data for this research is divided into the following groups:

2.2.1. Maps (administrative, cadastral and military maps)

The group of cartographic materials are used to restore the 2D surface of Tourane in the 1950s. In particular, the position and size of each street is determined. It contains information on land uses in urban areas and some other cadastral details (boundaries of blocks and plots, shapes and locations of some important buildings). Among this group of data, the cadastral map of Hai Chau district in 2006, a time when French colonial constructions in Tourane had not been much destroyed. This map includes the entire central area of ancient Tourane, and it is the basic data to build the 2D surface of Tourane in 1950. For old maps, maps adjacent to the 1950 milestone are exploited: Danang subdivision map 1950 (Figure 1), Tourane map 1953 (Figure 2). The process of creating a 2D base map of Tourane in 1950 will be detailed in section 3.2.1.
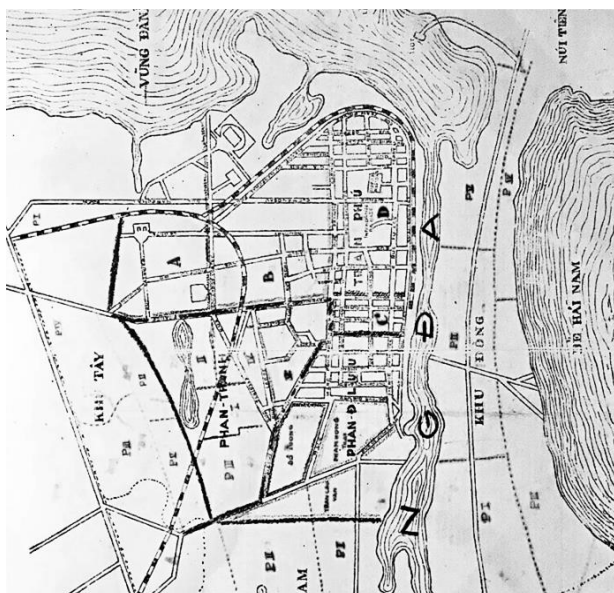

Figure 1. Extraction from Danang subdivision map 1950
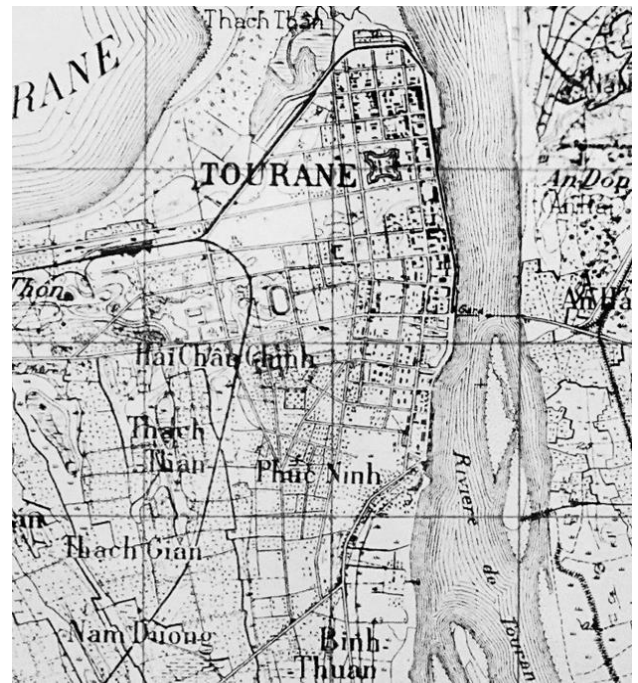*(Source: Administrative Resistance Committee)*

Figure 2. Extraction from Tourane map 1953
(Source: Geographical Service of Indochina)

2.2.2. Text documents (books, publications and other research)

For this research subject, text documents constitute the other reference section, allowing a better understanding of the French impacts on the development of the planning and architecture of Tourane. For this method of graphical reconstruction of the architectural and urban space of Tourane, the use of the above documents is done first by noting the information (data) related to the description of the structure on the urban space of Tourane. Comparing to the 2D map previously created, these notes verify and add additional information on the structure of Tourane urban space such as the grid of streets, public spaces, main public buildings. Some important documents used in this research include studies of [1] and [2].

2.2.3. The results of field experiments and interviews with experts

For the city of Tourane, the architectural and urban space has evolved rapidly since the 2000s. The city did not have many buildings that existed in the 1950s (at the end of French colonization), except for a short part of the road along the west bank of the Han River. However, field experiments remain necessary for this research. Figure 3 shows the locations of French colonial constructions recorded through the research in 2006 [2] and surveys conducted during the period 2017-2020 by the author, on the background or the cadastral map of Hai Chau district in 2006. Above all, these old buildings are the most authentic witnesses of the French colonial period in Tourane, although they are scattered.

In addition, the results of interviews with urban experts in Tourane and elderly residents helped to reinforce missing or unclear information about the city during the French period. The experts contributed to the research are

urban researchers and former residents of Tourane who once lived in Tourane during the period covered by this research in the 1950s and before. Researchers can share their views on the old concession of Tourane; and the elderly can provide special information or material that has hardly ever been published.
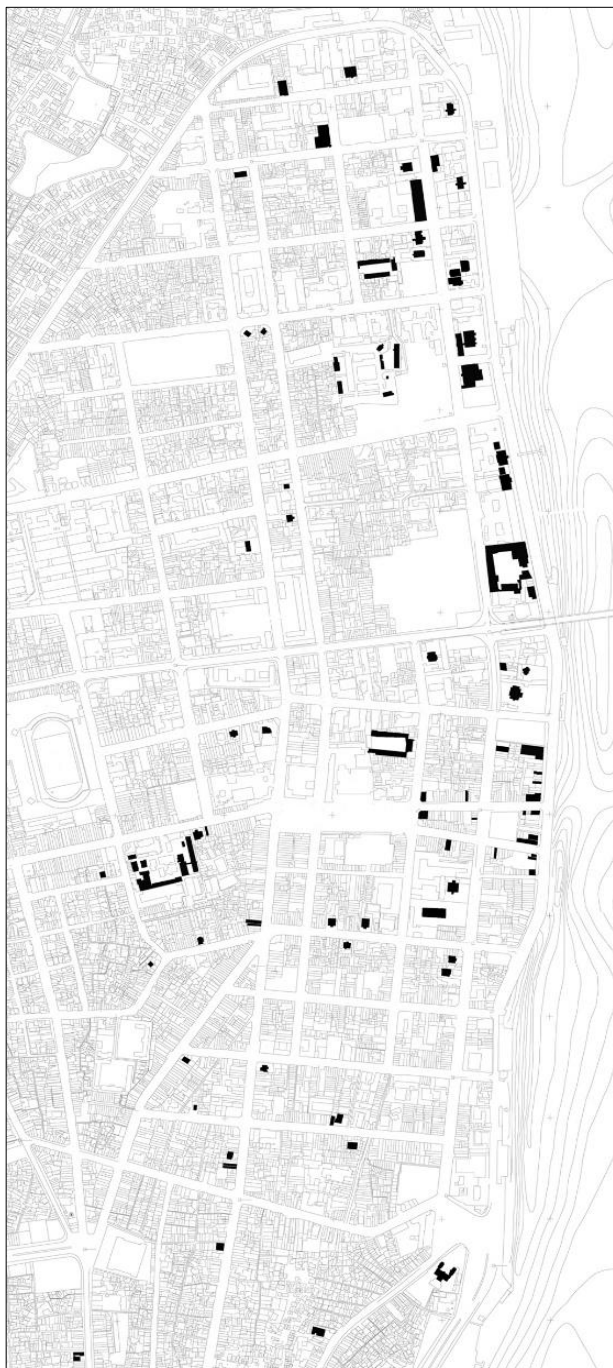

Figure 3. *Cadastral map of Hai Chau district 2006 and the distribution of buildings surveyed in the research in 2006 [2] and in field surveys between 2017-2020 by the author*

2.2.4. Old photographs (photos)

It is a collection of photos of the old city of Tourane, containing information on the space of the city and its constructions. These images are used to identify information regarding the general shape of the urban space, various images of streets and specific buildings during the 3D restoration of the old Tourane. The photos are divided into three groups and show the level of visual information on the urban architecture of Tourane:

* *Aerial and panoramic photos*: These photos can be used to define the architectural and urban space in general. Our research gathered 50 aerial and panoramic photos of Tourane, according to the spatial and temporal distribution. The aerial and panoramic photos of Tourane collected for this group come from the 1950s and earlier (30%), the 1960s (52%) and the 1970s (18%). Not all photos in this group were taken around the 1950s. Therefore, photos from the 1960s and 1970s were checked and compared to standard photos from the 1950s before being used for this method (Figure 4).

* *Photos taken in the street*: The images in this group help to reconstruct street images with a level of detail depending on the number and quality of images collected. This research brought together 155 photos taken in the streets of Tourane (between the 1900s and the 1970s), according to the spatial distribution. Similar to the "aerial and panoramic photos" group, not all photos in this group were taken around the 1950s. Photos from other decades were checked and compared to standard photos from the 1950s before being used (Figure 5).

* *Photos of buildings*: These photos are used to determine the typical architecture of each building. The images in this group help to reconstruct the look of each building separately, with a level of detail depending on the number and quality of images collected. The buildings which are the subject of photos with many illustrative details are listed, including two groups of buildings divided according to their function: public buildings and residential buildings.

+ *Public buildings*: This research identified 63 public buildings registered at the end of the French colonial period (1950) in the centre of Tourane. Public buildings in Tourane were mainly along the river and more concentrated in the north of the central area (Figure 6).

+ *Residential buildings*: This research marks the location of the dwellings built in Tourane before 1950 that existed after 2006 (based on an earlier work in 2006 [2], with additional updates from our work). This research recorded 90 dwellings during the French colonial period in the centre of Tourane which survived after 2006 with basic information (type of dwelling, year of construction, existence, architectural style and original building plan for some dwellings). The residential buildings of Tourane recorded in the surveys are mainly concentrated in the market area. In addition, the southern part of the central zone concentrates most of these dwellings (Figure 7).

By combining maps of the distribution of photos belonging to groups of images, the assignment of image data in this search can be assessed. Similar to the distribution of French colonial investments in Tourane (roads, buildings …), image data on the urban space of Tourane mainly concentrates in the administrative and commercial area along the west bank of the Han River.
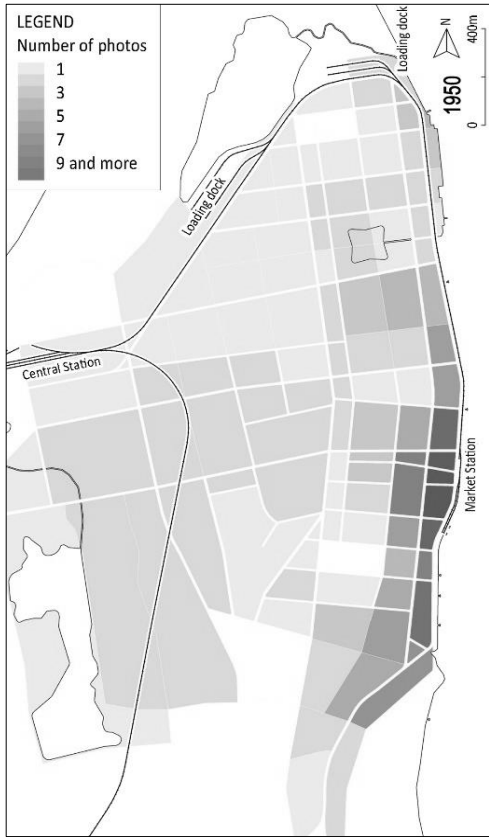
Figure 4. Photos of the group "Aerial and panoramic photos" according to spatial distribution (Author's drawing)
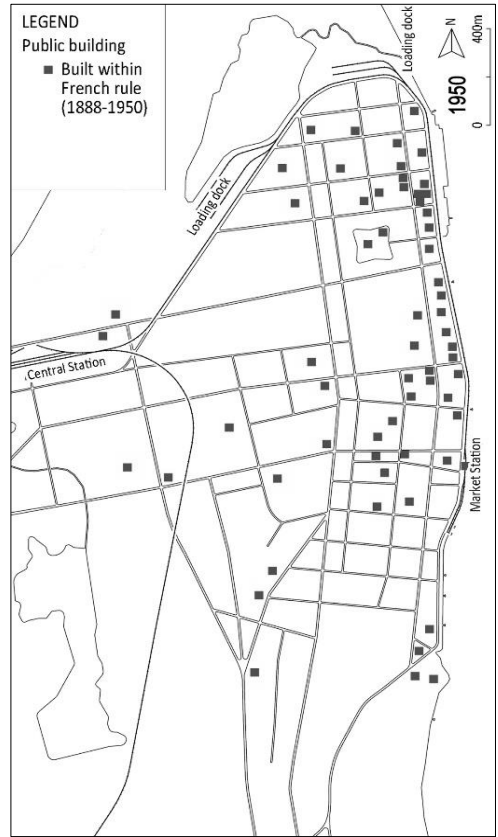

Figure 6. Distribution of data by combining photos of public buildings (Author's drawing)
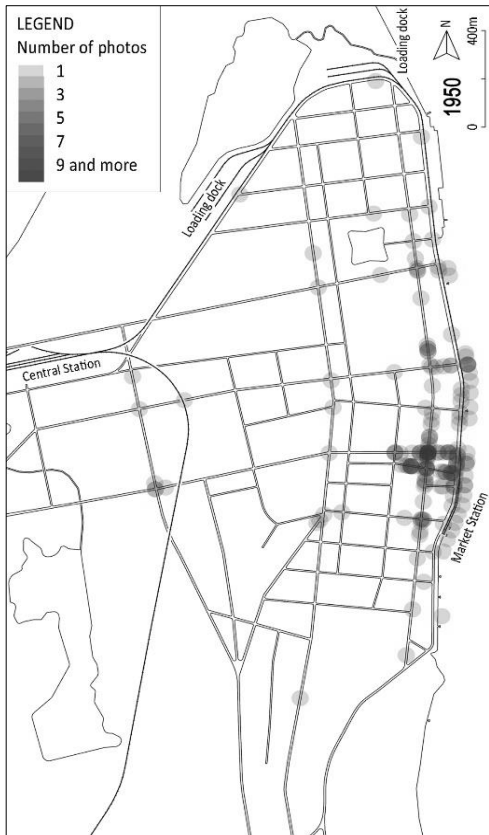

Figure 5. Photos of the group "Photos taken in the street" according to spatial distribution (Author's drawing)
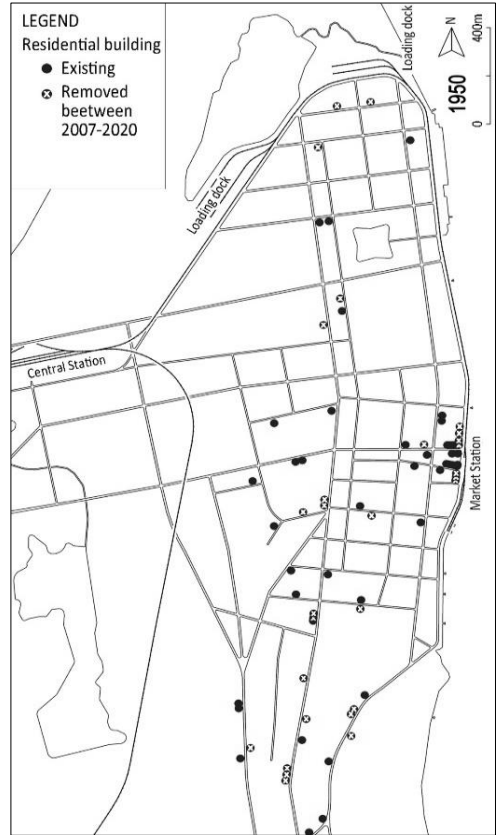

Figure 7. Distribution of data by combining photos of residential buildings (Author's drawing)

3. Data processing and extraction

3.1. The division of graphic areas

From the results of the data synthesis (text documents, results of field experiments, interviews with experts and old photos), this research divides the old concession Tourane into different graphic zones for their reconstruction using graphic software. The division of these zones is based on the level of detail of the data collected. The statistics on the graphic areas are divided, as well as the level of detail of the information displayed on each area, as defined in Table 1 and Figure 8.

Table 1. The level of detail on graphic areas

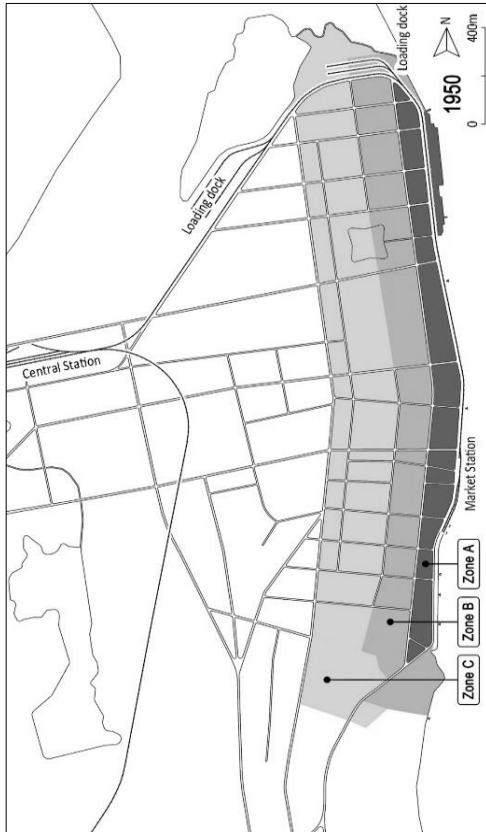| Details shown	Zone A	Zone B	Zone C
- Road and topography (residential areas, fields, sandy hills …)	X	X	X
- Building shape and size (number of floors, size ratio: long, wide, high)	X	X	X
- General architecture (roof shape, balconies, auxiliary buildings)	X	X	
- Architectural details (doors, windows, fences, decorative details)	X		

Figure 8. Graphic areas in the method "graphical reconstruction of urban architectural space" (Author's drawing)

The area covered by the three zones A, B and C is considered the limit of the area graphically reconstructed for Tourane. The road and topography features (residential areas, fields, sandy hills...) are expressed equally for all 3 zones. However, the distribution of the input data, which decreases further away from the riverbank, has resulted in a distinct level of detail for each zone:

+ *Zone A*: The area of the highest level of input data. Constructions in this area are redrawn at the clearest level of graphics, including: building shape and size, general architecture, and architectural details.

+ *Zone B*: The area with a lower amount of input data, with an average level of graphics, including: building shape and size, and general architecture.

+ *Zone C*: The area with the lowest amount of input data and low level of graphics, only including building shape and size.

3.2. Steps of data processing and extraction

After systematizing the input data system, and classifying graphic areas with different levels of detail, this study performs the data processing and extraction process. An overview of this process is shown in figure 9. In the first step, maps, text documents, and results of field experiments are analysed and synthesized to form the base maps in 2D form (2D map). Then, in the second step, this 2D map, as well as the additional data from the first step and the group of old photographs are managed to create graphical perspectives of the city centre (3D model). Finally, in the third step, the results are extracted, including the images of the urban architectural space (3D images).
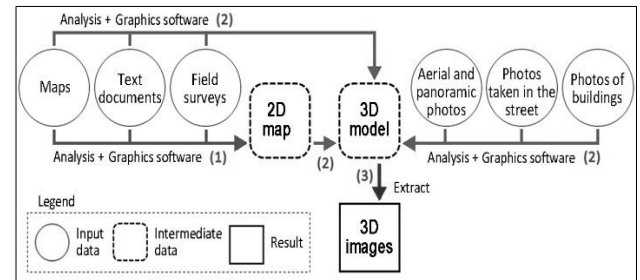

Figure 9. Data processing and extraction of the research (Author's drawing)

3.2.1. Step 1: The creation of base map (2D map)

In this primary step, the most basic data is the cadastral map of Hai Chau district in 2006 (Figure 3), in form of an AutoCAD file. Retained data from this map includes: lines representing natural boundaries (rivers, seas, lakes...), lines representing roads (streets, railways...), boundaries of plots of land.

In the adjustment step, through comparison with the Tourane maps in 1950 (Figure 1) and 1953 (Figure 2), the changes of natural boundaries and the existence of streets are corrected. In addition, the length and width of each street are checked for further adjustment. The database for this adjustment is from the website of Danang City Party Committee [3]. The result of this step is a 2D base map of Tourane in 1950 (Figure 10). This operation is performed through the AutoCAD software.

Figure 10. The creation of Tourane 2D map (Author's drawing)

3.2.2. Step 2: The creation of graphical perspective of city centre (3D model)

After having shaped the 2D map of Tourane 1950, it remains to define the specific architecture of each building, and then each quarter. First, the location of buildings on the city plan is detected. For buildings determined to still exist as of 2006 (based on research by [2]), their boundaries are marked on the 2006 cadastral map. For buildings that no longer exist as of 2006, determining its plan was done through various means: consulting older maps of Tourane, estimating based on photographic data (Figure 11). AutoCAD software continues to be used for this step.
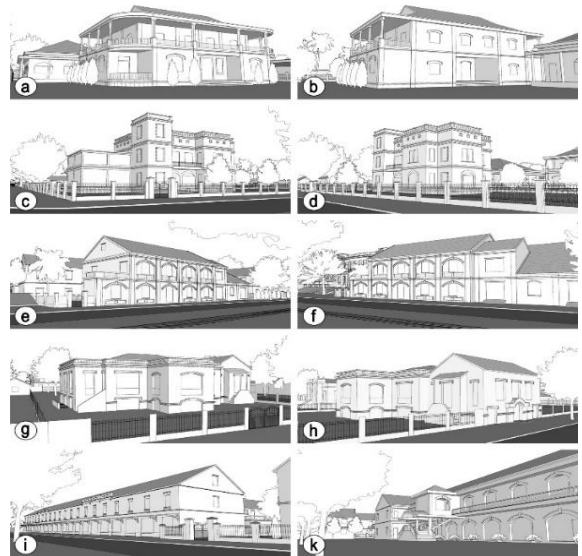

Figure 11. Example of the location of buildings on Tourane 1950 map (Author's drawing)

The next move in this step is the redrawing of the buildings in the centre of Tourane, with different levels of graphic detail (as classified in section 3.1). Our research begins with measuring (for existing buildings) and extracting documents (for destroyed buildings). For buildings that no longer exist and without design

documents, the reconstruction will be based on photographic data related, according to the basic principle of comparing the proportions of neighbouring houses and the proportions of different parts of the same house. Obviously, the error of graphics in the second case depends on the level of detail of their input data.
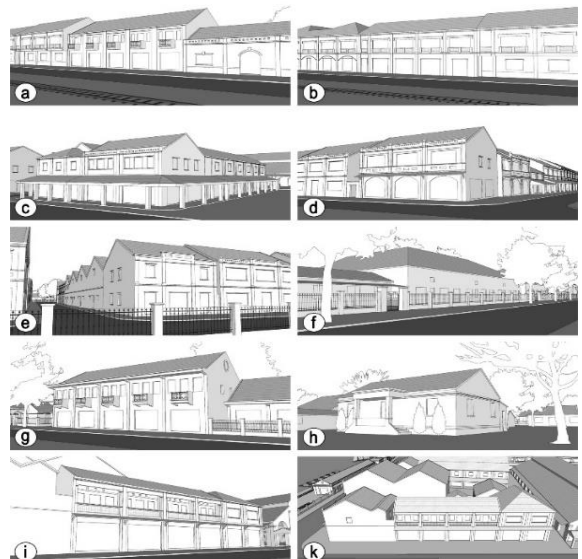
In this step, the 2D data was exported to SketchUp software to form a 3D model of the 1950 Tourane. Some images obtained from graphical reconstructions of ancient buildings at Tourane are shown in figure 12 (for public buildings) and figure 13 (for residential buildings).

Addresses of current locations:
a, b: 32 Bach Dang; c, d: 34 Bach Dang; e, f: 58 Bach Dang;
g, h: 18 Tran Phu; i, k: 35-43 Tran Phu

Figure 12. *3D graphical perspective of several public buildings (Author's drawing)*

Addresses of current locations:
a: 82-90 Bach Dang; b: 100-106 Bach Dang; c: 120 Bach Dang;
d: 124-128 Bach Dang; e: 134-136 Bach Dang; f: 09 Tran Phu;
g: 83-91 Tran Phu; h: 172 Tran Phu; i, k: 03-09 Hung Vuong

Figure 13. *3D graphical perspective of several residential buildings (Author's drawing)*

Finally, after establishing a natural background system, streets, buildings... elements relating to urban architectural space are added to complete the 3D model of Tourane in 1950: walls, fences, trees... Once again, photographic data plays a key role in determining the location, shape, and size of these additional details. Some illustrations for the 3D model of Tourane 1950 processed with the SketchUp software are introduced in Figure 14.
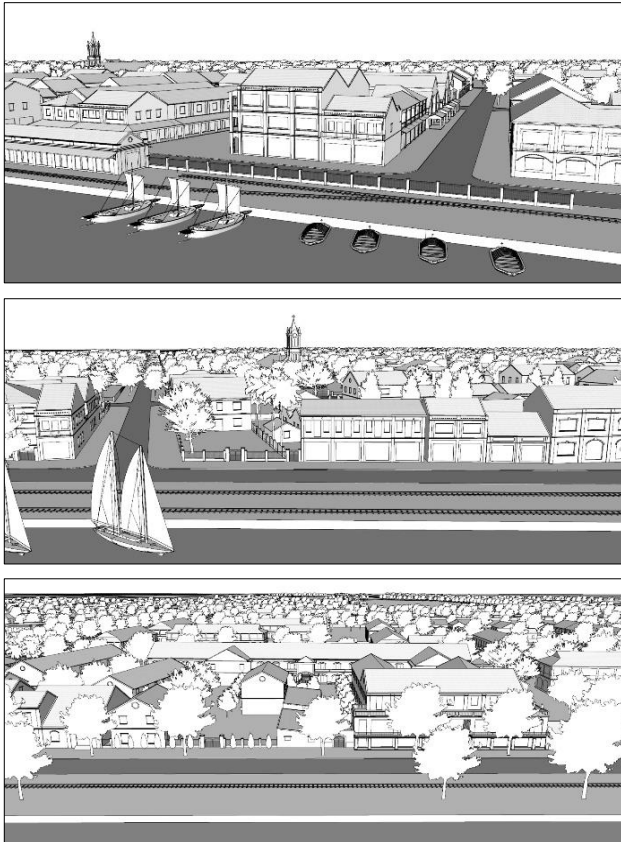

Figure 14. Illustrations of 3D model of Tourane 1950 on SketchUp software (Author's drawing)

3.2.3. Step 3: The extraction of urban architectural space (3D images)

Once the drawing of the 3D model is complete, the final step of the research is carried out. This is the step of extracting (rendering) images from the 3D model of Tourane 1950, using SketchUp software. Extracted images can be post-processed using Photoshop software, to further enhance the detail of the illustration.

Graphic images (3D images) are created corresponding to different quarters on the surface of the central Tourane area. The architectural and urban space of these quarters was the most vivid image of the urban appearance. For each quarter, the most characteristic physical elements are recreated: streets, buildings, trees… This method makes it possible to visualize the urban scenes of Tourane from all angles, including those which do not have been archived

through photographic material. In this section, the areas selected for graphic reproduction correspond to the functional areas of the concession Tourane [4], as shown in Figure 15.

Figure 15. Graphic representation of different areas of Tourane in 1950, from north to south (Author's drawing)

4. Conclusion

The result of the method of "graphical reconstruction of urban architectural space" allows the visualization of old buildings and quarters that no longer exist today. From detailed views of buildings to general views of quarters, the urban architectural space of Tourane at the end of the French rule period (1888-1950) was reconstituted by the graphical images. These graphics explore the memory of a concessional city, which was accessible only through old photos and archival documents.

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