FORTIFICATIONS IN VIETNAM: THEIR HISTORY, DEVELOPMENT, AND
HERITAGE VALUE

By
Mr. Nguyen Minh HIEU

A Thesis Submitted in Partial Fulfillment of the Requirements
for Doctor of Philosophy ARCHITECTURAL HERITAGE MANAGEMENT AND
TOURISM (INTERNATIONAL PROGRAM)
Graduate School, Silpakorn University
Academic Year 2022
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By	Mr. Nguyen Minh HIEU
Field of Study	ARCHITECTURAL HERITAGE MANAGEMENT AND TOURISM (INTERNATIONAL PROGRAM)
Advisor	Associate Professor Kreangkrai Kirdsiri, Ph.D.
Co advisor	Associate Professor Alici Antonello

Graduate School Silpakorn University in Partial Fulfillment of the Requirements for the Doctor of Philosophy

.... Dean of the Graduate School
(Assistant Professor Sathit Niratisai, Ph.D) (Acting)

Approved by

.... Chair person
(Professor Dr. William Chapman)

.... Advisor
(Associate Professor Kreangkrai Kirdsiri, Ph.D.)

.... Co advisor
(Associate Professor Alici Antonello)

.... Committee
(Associate Professor Chotima Chaturawong, Ph.D.)

.... Committee
(Associate Professor Chaisit Dankitikul, Ph.D.)

.... External Examiner
(Professor Emeritus ORNSIRI PANIN)

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Throughout the history of human civilization, any nation's existence has had to go through the marks of wars and conflicts. The fortification is an architectural element representing the military construction genre throughout that process. Depending on the characteristics of geographical location, urban planning, military science, and war doctrine, the shape of the fortification differs significantly between Western civilizations such as Roman, France or China, and India. With the unique geographical position located at the converging edge of the Asian continent as well as the starting point of the Western colonization progress, Vietnam has almost all the essential features and morphology of different types of military landscape architecture in the world; such as the complex fortified towers in the Indian style, square-shaped citadel of the Chinese style, fortification based on natural formations and especially the Vauban star-shaped citadel. The forms of overlapping fortifications contain exceptional cultural landscape heritage values. Through the bibliographic method, observation method, and meta-analytical method, the thesis aims to form a data system on the existing military landscape in Vietnam from the founding of the country to the present, including citadels that have been completely destroyed. There by clarifying heritage values and its contributions in shaping urban cultural identity. (Chapters I, II, III).

In parallel with establishing a data system on fortifications in Vietnam, the thesis also aims to propose a new perspective on restoration thinking in conservation. In the context of the development of scientific achievements, the establishment technology of multi-dimensional virtual reality models allows the simulation and restoration of ancient monuments in digital form. This restoration does not cause physical damage to the existing layer of monuments, so it is possible to simulate many different layers with different ages of the same monument and transform them through the artificial device. On the other hand, it can be seen that this form of restoration opens up more flexible ways of applying the Venice Charter, which requires accurate data when restoring monuments. Instead, hypotheses can also be reasonably applied when doing conservation. By proposing a feasible model for multi-layered digital preservation of military landscape with a prototyping method, the thesis points out the urgency of forming a new theoretical basis for restoration to implement to the existing heritage conservation documents. (chapters IV, V).

ACKNOWLEDGEMENTS

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INTRODUCTION

Research motivation

A nation's civilization is indoctrinated and preserved for generations by the cultural values it creates and the process of protecting those values from the dangers of invasion from hostile powers. It is easy to mention military architecture, such as the system of bunkers, armory, and barracks. However, the most typical thing to be mentioned is the fortification system. The legacies of great value in terms of historical and cultural aspects need to be preserved and promoted. Because not only self-value of defense, the fortification has surpassed this limit and become a living relic storing the quintessence, effort, and mindset of an entire period of history.

With nearly 4000 years of national formation and expansion timeline, Vietnam has formed a system of military architecture stretching across all parts of the country, from mountains, forests, and plains to borders and islands. Throughout that process, the introduction of citadel design forms from Chinese, Indian, and Western civilizations followed and intersected with indigenous design thinking. Citadels monuments in Vietnam have also become shaping factors for the development of urban areas from ancient to modern. This is the most concrete evidence for the sublimation of military architecture values crystallized on the rolling of a historical wheel. However, if we do not know how to cherish and preserve, these rolling circles will also crush all good values as a cruel law of nature. After thousands of years of existence, the citadel monuments in Vietnam have had to cope with the wear and tear of time, the destruction of human hands, and the inadequate recognition of historical and artistic values of art and science. More than ever, Vietnam's fortification system needs urgent protection and research to clarify its inherent values so that they can be brought to a wider audience instead of being limited to a handful of researchers. This is also one of the important reasons for implementing the research topic about the **Cultural values of Vietnamese fortifications**.

In addition, the power of science and technology and the stormy integration process have opened up completely new approaches to conservation and restoration. Faced with the opportunities and challenges of the new era, how can modern technology be applied but still follow the Charter and International documents in conservation work without losing authenticity? The answer can only be obtained after we have a careful and thorough study of not only the tangible architectural aspects but also the cultural values hidden within the ruins or even the layer has been completely destroyed. Because cultural values are the messages traveling through time that the ancestors have sent to posterity. Only when fully aware of those messages can we preserve and exploit cultural values for the future. At the same time, it is possible to apply those valuable results, which are summed up in practical experience, to create urban faces in the integration period but still have the very own identity of the Vietnamese nation. The research direction of **multi-layered interpretation** was chosen for the same purpose.

In summary, the subjective desires, as well as the urgent requirements of the practical situation as described above, have motivated students to choose to research the topic: **"Vietnamese Fortifications: Their Cultural Values and The Multi-layered Interpretation of Military Landscape"** and conduct the Ph.D. Thesis for the **Architectural Heritage Management and Tourism** program at Silpakorn University, Thailand.

Literature review

Vietnam takes advantage of both trading and military activities in terms of geography, with one side being the sea and the other being the mainland. Vietnam always faces the craving for possession from neighboring nations. Throughout history, Vietnam has experienced thousands of military campaigns. The evidence of war periods is the fortifications that still exist today. The

magnificence and the hidden cultural values of this particular type of architecture have been mentioned in some research below.

The book "Vietnam's ancient citadels," published in 1983 by Professor Do Quang Ninh, systematized the existing fortifications that remain in Vietnam. The author uses the formulation based on the construction date. Although the goal of the research was to serve archeological activities, the study focused only on the unearthed or excavated monuments for optimal use of the limited funding by the Soviet Union.

The publication named "Vauban Citadel in Vietnam," published in 2010 by Pham Tan Long, systematized the architectural data of Vauban-style fortification in Vietnam and the comparison with the Vauban style in Europe. However, this study aims to build a database of architecture, so the author only focuses on the statistics of Vauban in Vietnam without mentioning other architectural fortification styles or research into the conservation and exploitation of military architectural heritage values.

In "Vietnamese Architecture through Dynasties," Dr. Nguyen Dinh Toan outlined Vietnamese architecture's most common architectural styles through feudal dynasties. Because the main purpose of this article was to study all types of works in general terms, there is no analysis of architectural features of the military fortification or military landscape.

The publication "FAQs on the ancient citadel and tunnels of Vietnam" of the Vietnam People's Army mentions the ancient citadels that exist or have existed in Vietnam. With a natural and charismatic way of writing, the author guides the reader through specific issues and suggestions for each case study. However, since it is a compilation based on the layout of each particular question, the style of this publication can not be systematic about the layout of the space/time or comparable with other architectural forms from other countries.

In the publication "Landscape Heritage in Vietnam" (Ripesi Editore, Ancona, 2011), a group of author, including Fausto Pugnaloni, Cecilia Carlorosi, Le Ngoc Van Anh, and Francesca Ottavio, focused on two main themes. The first was the religious area of Vo Thanh and Van Thanh Temple, situated on the River Huong shores in the north of Hue Citadel. The second was the votive temple system on South Central Coast, including the Cham cultural monuments. The investigation was fragmentation because of various research features. However, this research's result greatly contributed to the understanding of Champa culture.

Ph.D. thesis of Dr.Võ Ngọc Đức (UniVpM, Ancona, 2019) about "Vietnam Citadel system under the Nguyen Dynasty and the case of Quang Tri Citadel" (UniVpM, Ancona, 2012), "The quality of Hue Citadel in the urban development of Vietnam, approach from Architectural Heritage and Landscape Value" systemized and listed general characteristics of Vietnamese fortification system under Nguyen dynasty. The case study of the Quang Tri citadel and Hue citadel were analyzed deeply. However, the citadel systems in the previous period were not considered.

Thus, through several related studies, there is a need to receive, supplement and expand the thesis "FORTIFICATIONS IN VIETNAM: THEIR HISTORY, DEVELOPMENT, AND HERITAGE VALUE." The abovementioned research generalizes the system and is also a valuable source for the author to review.

3. Research methodology
3.1 Bibliographic method
3.1.1 Historical source:

This is the approach to tracing the origins and transformations of the dynasties that existed in Vietnamese history in order to identify the sources and

characters of culture, architecture, and urbanism. Additionally, it uses historical references to establish relationships between architectural styles and urban forms from various countries with diverse cultures and origins.

The study is based on those primary historical sources:

- The first source is a collection of books such as "Hoàng Lê Nhất Thống Chí" (皇黎一統志 / Records of the Unification of Imperial Lê), "Đại Nam Nhất Thống Chí" (Dai Nam Comprehensive Encyclopedia), "Đại Nam Thực Lục" (Chronicle of Greater Vietnam) by The Association of History of the Nguyen Dynasty (Quốc Sử Quán Triều Nguyễn). These archives detailed the official geographical record, the genuine history of Dai Nam (Vietnam's old name), and Dai Nam's military campaign.

- The second source is also significant; it is the collection of archive photos taken by the French during Indochina's colonial time. Documents of feudal Vietnam are not much preserved in Vietnam due to the influence of studying during the two times of the Chinese Cultural Revolution. However, the Musée d'Orsay Paris is still very well stocked with these precious documents, and this will be an extremely useful bibliographic source for related research.

- Additionally, other studies conducted by eminent historians such as Inrasara, Do Van Ninh, Do Bang, Ngo Van Doanh, and Pierre Bernard Lafont, as well as data from the Nation Monuments Conservation Center, contribute to our understanding of the construction and transformation of Champa cultural, urban and military landscape.

3.1.2 International Charters / Local laws on preservation and restoration, cultural landscape, tourism

One of the primary references for explaining and proposing conservation should be the international charter on preservation and restoration, heritage sites, and cultural tourism. These regulations are the foundation for path suggestions that have been approved and followed by many foreign scientists.

Using international charters, agreements, and Vietnamese laws and regulations as a bridge between history and the present allows for formulating suggestions. There are occasionally contradictory views and principles, based on the values of history, heritage, and the climatic and cultural characteristics of the Orient, to apply the appropriate Charter to generate viewpoints, principles, and ideas for peaceful use of multi-layered military landscape development.

3.2 Observation method

This method is a comprehensive site survey data collection - based on measurement, archival research, and interviews - that aims to capture the identity of Vietnamese fortifications and urban change, such as monument demolition and ecological structure. Additionally, layout mapping and diagramming methods using graphic tools (AutoCAD, Sketchup, Photoshop, Google Earth) assist us in clearly understanding the location, layout, scale, and modeling of the architectural metamorphosis of the military landscape. The spatial space is dissected to study and analyze the various characteristics such as history, practical use, and visual art. After all, they are compared to ascertain the scientific basis for and explain each space's relationships, values, and characteristics.

3.3 Meta-analytical method

Based on sequencing data from bibliographic and historical data sources, the meta-analytical method is a tool to sequence and systematize all these data into a unified data system throughout, by synchronic and chronological comparison. From there, it serves as a basis to fill the gap of previous studies, which often only focus on aspects of Vietnamese citadel and urban areas with Chinese, Champa, or Western Vanban nuances without the correlation of influence and overlapping between these forms.

3.4 Prototyping method

The description or reconstruction of a heritage entity - especially architectural heritage - will not be able to be as detailed and specific as shown in the form of 3D/4D modeling. However, in the context that the military landscape of Vietnam has been changed, damaged, or even disappeared, the restoration using graphic technology will show specific views with clear correlation. At the same time, the databases of this prototyping method are also the premise for applying multi-layered interpretation to reconstruct all the time-varying but spatially overlapping fortifications. Therefore, this method will not violate the provisions of the currently applicable conservation Charters based on digital platforms.

3.5 Research aims

The research's objective is to ascertain the identity of the fortifications system in Vietnam, including feudal style, Champa style, colonial architecture, and also modern warfare from the American/Vietnam war. Additionally, analyze the cultural value of fortification architecture in Vietnam and the predecessors' conventional urban construction.

Additionally, by proposing a feasible model for multi-layered digital preservation of military landscape, the thesis points out the urgency of forming a new theoretical basis for restoration to implement to the existing heritage conservation documents.

The outcome can be used as reference materials for research by architectural students, architectural planning consultants, conservators, the National Library of Vietnam, the Center for Historical Research, the Nation Urban Planning Institute, and the Nation Monuments Conversation Center. Additionally, it provides comprehensive tourism information for the Vietnamese.

B.CONTENT

CHAPTER I: MORPHOLOGY OF FORTIFICATION AND MILITARY LANDSCAPE

1. Concepts and arguments

1.1 The development of fortification through history

Fortifications are military structures or buildings used to defend territories during the war and to establish dominance in a region during peacetime. The term comes from the Latin *"fortis"* (strong) and *"facere"* (face) (to make). Fortifications are used to protect people and property, warehouses, to maintain stable control, to improve the efficiency of weaponry and technical means, and to combat hostile armament [1]. A fortification is a collection of architectural structures that may include guard huts, forts, mandarin towers, fortresses, and watchtowers (Figure 1.1). Guard huts are structures constructed in open places with an excellent view to observe, guard, and fight. The garrison or mandarin is built solely to retain the army. The garrison and mandarins are typically smaller than the fortress. Fortresses are military fortifications and buildings constructed for defensive purposes during wartime and as military bases [2]. A watchtower is a small tower that protrudes from the fortress's wall, whereas a great tower is the fortress's main tower [3].

Figure 1. Diagram of a Fortification
(Source: https://www.culturalheritageonline.com/location-3059_Castello-di-Bodiam.php)

From very early history to the current era, defensive walls have frequently

been necessary for towns to survive in an ever-changing world of invasion and conquest. The Indus Valley Civilization's villages were among the first minor towns to be defended. Large stone walls were constructed in ancient Greece, particularly in Mycenaean Greece, such as at the ancient site of Mycenae (renowned for the massive stone blocks that comprise its 'cyclopean' walls). A Greek phrourion was a fortified group of houses used as a military garrison (Figure 2), comparable to the Roman castellum (Figure 3) or English stronghold. These structures were used primarily as watchtowers, guarding specific highways, passes, and boundaries. Though they were smaller than an actual fortress, they served as a border guard rather than a true stronghold for monitoring and maintaining the boundary.

Figure 2. Greek phrourion floor plan at Mikrovivos
(Source: Coleman, Korseia in E Lokris. Article and Addendum)

Figure 3. Roman castellum of Fectio
(Source: Carole Raddato, Reconstruction drawing of the Roman Castellum of Fectio)

Since the time of the Roman legions, the art of laying up a military camp or promoting a fortification has been referred to as "castrametation". Fortification is typically classified into two types: permanent and field fortification. Additionally, there is a sub-branch called semi-permanent fortification. Castles are fortifications distinguished from generic forts or fortresses because they are the dwelling of a monarch or noble and command a specific defensive territory.

Roman forts (or castrum) (Figure 4) and hill forts (Figure 5) were the primary ancestors of castles in Europe, which first appeared in the Carolingian Empire in the ninth century. The Early Middle Ages saw the establishment of several towns centered on castles.

Figure 4. Basic ideal plan of a Roman castrum. (1) Principia; (2) Via Praetoria; (3) Via Principalis; (4) Porta Principalis Dextra; (5) Porta Praetoria (main gate); (6) Porta Principalis Sinistra; (7) Porta *Decumana (back gate).* *(Source:https://en.wikipedia.org/wiki/Castr a)*

Figure 5. Maiden Castle in 1935. The Iron Age hillfort was first built in 600 BC. *(Source: https://en.wikipedia.org/wiki/Hillfort)*

Medieval-style defenses were rendered mostly obsolete in the 14th century with the introduction of cannons. Fortifications evolved significantly lower in the period of black powder, with a greater reliance on ditches and earth barriers to absorb and spread the energy of cannon fire. Because walls exposed to direct cannon fire were extremely susceptible, they were dug into ditches and protected by dirt slopes.

The invention of explosive shells in the nineteenth century ushered in a new era in the growth of fortification. Star forts were vulnerable to the effects of high explosive shells, and the elaborate formations of bastions, flanking batteries, and painstakingly designed lines of fire for the defending cannon could be quickly disrupted by explosive shells (Figure 6). During the nineteenth and early twentieth centuries, steel-and-concrete fortifications were prevalent. Since World War I, developments in modern warfare have

rendered large-scale fortifications obsolete in most scenarios.

Figure 6. Bastions of Valletta - Malta which were built in the 16th and 17th centuries
(Source: Michael Sciortino and Peter Agius – Malta Vintage History)

1.2 Definitions of military landscape

In a wide sense, the military refers to the area of specialized activity within society concerned with armed conflict, war, army, and armed forces. In a narrower sense, it is one of the military's fundamental operations, alongside others such as politics, logistics, and technology, that contribute to the military's fighting power. Among the numerous human interventions on the landscape, war and military activity have left one of the most enduring and evocative traces, physically etched into the face of the planet.

Military landscapes can take on a variety of forms and functions: they can be vertical, such as the Towers of Bologna (Figure 7); or horizontal, such as The Great Wall of China (Figure 8); they can be aboveground and geometrically controlled, such as the earthworks of the Renaissance trace 'Italienne' (Figure 9), or sunken and concealed by local topography, such as

the trenches of World War I (Figure 10). They can be high-security locations, such as the Pentagon (Figure 11), or tourist destinations, such as Japan's Himeji Castle (Figure 12); they can be well-maintained, such as the Gettysburg Battlefield (Figure 13), or neglected, such as the outskirts of the Savannah River nuclear reservation site (Figure 14). In a more recognizable form, they are national memorials as places of remembrance and commemoration (Figure 15). They retain a strong emotional, political, and cultural relevance as sites where historical memory is transformed into myth [4].

Figure 7. Over 100 towers were built in Bologna during the Middle Ages for offensive/defensive purposes during the period of the Investiture Controversy. *(Source: https://www.sciencedirect.com/science/article/pii/S1296207418306952*

Figure 8. Great Wall of China (built from 7th century BC to 17thcentury) with 21,196.18 km in total. (Source: https://en.wikipedia.org/wiki/Great_Wall_of_China)

Figure 9. The walls of Nicosia (1567) - typical example of Italian Renaissance Military Architecture
(Source: https://weaponsandwarfare.com/2015/08/13/renaissance-fortifications/)

Figure 10. The trenches of Battle of Somme between the German Empire and the French/British forces. Photos are taken in 1916 (left) and 2016 (right).
(Source: https://www.theworldwar.org/learn/wwi/trenches)

Figure 11. The Pentagon –the world's largest office building and also symbol of U.S Military

(Source: https://www.defense.gov/)

Figure 12. Himeji Castle – finest surviving example of prototypical Japanese castle architecture

(Source: https://www.himejicastle.jp/en/)

Figure 13. Gettysburg Battlefield in Pennsylvania, where a three-day Civil War battle shaped the course of America's history *(Source: Gettysburg National Military Park)*

Figure 14. Savannah River Site (SRS) was built during the 1950s to refine nuclear materials for deployment in nuclear weapons *(Source: https://www.srs.gov/general/srs-home.html)*

Figure 15. Mamayev Kurgan – Stalingrad battle memorials
(Source: https://en.wikipedia.org/wiki/Mamayev_Kurgan)

By decoding and establishing morphological databases about multi-layers of a military landscape, we can fully understand the variation of architecture, culture, history, and urban memory.

2. Military landscape in Western countries

During the Roman period, the Romans utilized the city model of two principal axes of the horizontal, vertical, and centered structure in the design of their towns, so forming the cultural and social construction of Roman civilization. This was the fundamental concept upon which the Renaissance's geometric defenses were built.

The article *"Urban Roman architecture: Cities"* defined the *"urban form"* of a city as *"a collection of identical components arranged in a particular way - parallel and equal-distance apart - separated by roadways."* The entire structure is rectangular in shape and is enclosed by a perimeter

wall with watchtowers, except for two streets: the North-South (kardo Maximus) and the East-West (decumanus). Both are wider and terminate at the outer wall's four doors. The city's forum and market are located at the crossroads of both streets. [1]

The city's forum (basilicate, termae) and market are located at the intersection of two main streets. Housing types in these cities can be classified as houses, Domus, insula, and villa (Figure 16).

Figure 16. Characteristic features of a Roman town *(Source: https://www.tes.com/teaching-resource/design-a-roman-town-6451033; summarize by Author)*

Since 1598, Giorgio Vasari, a Renaissance painter-architect-historian, has used the term "ideal city" in his work. Other researchers then exploited Renaissance authors' conceptions of the perfect city to develop urban theoretical models.

Renaissance ideal city models place a premium on fortifications, aesthetics, and urban technology, with less regard for population, social organization, and urban economics. Proposals, particularly in urban design, have a long-term

impact on the art of urban area composition. Vitruvius's influence on the construction and development of urban Renaissance theory is tremendous, owing to his writings *"Ten Books on Architecture"* (Figure 17 and 18).

Figure 17. Roman 24-point wind rose according to Vitruvius *(Source: https://en.wikipedia.org/ wiki/Classical_compass_winds)*

Figure 18. Wind Rose used in urban design by Vitruvius (*Source: Alexandros Ph. Lagopoulos - The semiotics of the Vitruvian city)*

Several noTable authors from this era are Leon Battista Alberti (1404-1472), Antonio Averlino Filarete (1400-1469), Leonardo da Vinci, Pietro Cattaneo, Vicenzo Scamozzi, Francesco di Giorgio Martini (1439-1501), Giuliano da Sangallo (1443-1516), Bartolomeo Ammanati (1511-1592), , and Girolamo Maggi (1523-1572).

Numerous European countries have applied, created, and developed the model of a Star-shaped Citadel as a fortification system based on Renaissance urban theory. Table 1.1 indicate that there are several star-shaped citadels still exist in European countries:

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[1] http://www.spanisharts.com/arquitectura/i_roma_urbano.html

Table 1 The star-shaped citadels in typical European countries
(Source: Wikpedia "List of bastion forts").

	European Countries	**Quantity of Star-shaped Citadel**
1	Netherlands	97
2	Italy	36
3	France	28
4	United Kingdom	14
5	Spain	13
6	Germany	11
7	Portugal	10

2.1 Fortification characteristic

The researched urban morphology mainly consists of the city's contour and inner division structure. In the Renaissance, three distinct forms of urban boundaries existed:

2.1.1 Circle shape

Some architects and urban researchers choose an ideal model to construct urban models. For example, architect Bramante was a pioneer in the usage of circles.

Antonio da Sangallo took another step in organizing his city by utilizing numerous circles. The city's contour was circular, with an additional circular inner circle, and the square was similarly circular (Figure 19).

Leonardo de Vinci incorporated the circle into his urban planning concept for Milan. Before 1540, circles were frequently used in urban space studies. Then, with the advent of artillery, the circle failed to adapt to defense requirements, eventually declining in use (Figure 20).

Figure 19. Ideal "Sforzinda" by Antonio
Averlino Filarete *(Source: Caterina Palestini -
Imagination and Images: From the Treatise to
the Digital Representation. Sforzinda and the
Bridges in the Inda Valley*)

Figure 20. The city of Milano in circular
shape by Pietro del Massaio in 1745
*(Source: Mauro Colombo- Le mappe di
Milano dal secolo XIV al secolo XX)*

2.1.2 Rectangular shape

The square was not the preferred shape for urban Renaissance academics
when determining the city's contours, partly due to the wall's inability to defend
itself in straight lines and its simplicity (Figure 21). However, squares were
frequently employed in actual buildings, particularly when the convex
fortification system was built outside in square form to protect against artillery
shells, suiting the defensive requirements of the city (Figure 22). In addition, the
square, and its derivatives, were frequently employed in the design of gardens
and parks.

Figure 21.Typical Roman Square-shaped plan city *(Source: Jamie Sewell - Urban Planning, Roman)*

Figure 22. Square city plan with fortress system at four corners *(Source: https://en.wikipedia.org/wiki/)*

2.1 3 Edge polygonal form

Polygons were the focus of Renaissance urban thinkers' studies, particularly in constructing defensive walls in the form of convex fortresses. Typically, there were eight edges, but occasionally there were more (Figures 23 and 24). Defenses were critical throughout the Barocco period, in Europe's 17th and 18th centuries, particularly for fortress-like cities in essential locations such as France and Austria, between North Europe and the Baltic countries.

The most significant contributor to the fortified system of the 17th and 18th centuries was the French Marshal Sebastien Le Prestre de Vauban (1633-1707). He was a military engineer, a great general, and the inventor of the most influential urban defense system at the time.

Figure 23. Palmanova citadel map 1593 with edge polygonal form *(Source: Francky Knapp - A Bucket List of Star Cities Scattered Across our Globe)*

Figure 24. Star-shaped citadel plan of Neuf Brisach *(Source: https://www.zoomsurlille.fr/wp-content/uploads/2010/10/plan_citadelle. png)*

Vauban's defenses follow various principles based on the site's unique natural topography. Vauban's defenses are centered on the outer wall, surrounded by a complicated moat and fortress. The inner city design is frequently a polygon with a small number of edges, typically between five and six (Figures 1.25 and 1.26). His military experience aided Vauban in continuously improving the skill of building and constructing urban defenses, resulting in the Vauban system being widely adopted throughout Europe and the rest of the world in the following years.

Figure 25. Charleroi Citadel (Belgium) 1709 designed by S.P.Vauban *(Source: https://www.pinterest.com/pin/535013630772032 72)*

Figure 26. Citadel Lille (France) designed by S.P.Vauban *(Source: https://www.zoomsurlille.fr/wp-content/uploads/2010/10/plan_citadelle.png)*

The general shape of the Renaissance urban model incorporated aspects such as geometry, symmetry, emphasizing perspective, unification, and balancing. The characteristics of fortifications, fortresses, and defensive systems were spread and built-in European colonies. For instance, it was represented in the Nguyen Dynasty's system of thirty-three citadels and numerous lesser strongholds built from North to South in Vietnam.

2.2 Citadel structure

2.2.1 Radial street type

The urban structure was established based on a radial network. The pathways were arranged evenly, beginning with the central square and ending at the gates or corners. The number of pathways was determined by the number of gates and the angles or lengths of the outer walls' edges. For instance, like in the urban model of Filarete, Sangalo, and Martini, the number of routes is eight or ten.

The Renaissance urban planners chose the radial path because it allowed for creating a majestic center perspective that was also suited for military movement and easy to govern in the case of war (Figures 27 and 28).

Figure 27. Radial city plan of Palmadova - Italy *(Source: Museo Civico Palmanova, n.d.)*

Figure 28. Plan of "Sforzinda" with radial avenues *(Source: Alverino, 1464)*

2.2.2 Chessboard type

Pietro Cattaneo, Scamozzi, and especially Giorgio Vasari were all interested in the chessboard layout. Architects included roadway networks, squares, and various shapes and sizes to add complexity to the layout. Compared to the radial roadway, the checkerboard layout appears less frequently in Renaissance studies of urban form (Figures 29 and 30).

Figure 29. Chessboard urban plan of Neuf-Brisach, Haut-Rhin, Alsace, France. *(Source: https://www.castlesandmanorhouses.com/)*

Figure 30. Chessboard city plan by Pietro Cattaneo *(Source: https://community.middlebury.edu/~slides /HA220/views/aoc136_view.html)*

The checkerboard urban structure concept was a popular one used by Spaniards to construct their colonial cities in the Americas during the 16th century. Although this model was not widely employed in Spain then, it was because of its rationality that the Spaniards chose to use it in their colonies. Then, in the 17th and 18th centuries, the French and British used this paradigm in their colonial urban development.

2.2.3 Spiral type

While urban spirals and other complicated forms were not commonplace, they did speak to Renaissance architects' abilities to design urban spaces. According to Leonardo da Vinci, Martini believed that humans were incapable of creating simple and attractive morphology in the natural sense, pushing for the imitation of urban form twisted like a snail shell. As a result, the spiral model has numerous advantages in defense. Also, the layout's complexity preserves nature's beauty and increases citizens' discoveries (Figures 31 and 32).

Figure 31. The city plan follows the spiral
concept by Francesco di Giorgio Martini
(Source: L.A.Cummings,1986)

Figure 32. A. Zoning determined by the
intersection of spiral roads *(Source:
L.A.Cummings,1986)*

3. Military landscape in Eastern countries

While ancient Asian combat was frequently characterized by massive armies engaged in pitched battles, siege warfare and city-sacking were also common. Massive earth walls with towers and encircling ditches or moats became the standard defensive technique for most cities, dating back to the Neolithic period. Fortifications were also important to secure certain vulnerable parts of vast state borders, particularly during the 5th century BCE's Warring States Period. This tactic culminated in the Qin and Han dynasties' Great Wall of China. Nonetheless, Eastern warfare was far from passive. Most commanders were well aware of the limitations of a defensive policy based on a long and bitter history of fallen cities. Like their counterparts in other ancient cultures, they preferred the mobility provided by chariots and cavalry or the advantages of pre-emptive strikes over quick withdrawal following killing and looting [5].

As a result, the fortifications in Eastern countries were mainly large-scale, covering the entire city with a stretched area and square shape to be suitable for the whole population. The activities of life and the military are not separate as in the castle form of the West. Also, the feng shui theories in urban planning are

thoroughly applied to create a harmonious city in terms of the three worlds of heaven, earth, and man combined into the planning structure [6].

3.1.1 Urban boundary and planning

Due to their distinct origins and cultures, the general shapes of Eastern cities differed slightly from those of Western ones. While European monuments emphasize visual beauty via their original material and authentic record, their spiritual message and naturalistic sensitivities define conservation principles in East Asian and East-South Asian societies. The spiritual message concealed within the urban construction was critical to the city concept. They were not only geometric shapes and symmetry but also a spiritual message of harmony with nature, a water system, and a lack of fortifications.

Michael E. Smith (2007) made some insightful observations about the form and meaning of some ancient cities in his article *"Form and Meaning in the Earliest Cities,"* and Marten Kuilman (2013) notes in his article *"Quadralectic Architecture"* that *"The first, high-level meaning refers to supernatural symbolism and can be positioned in a quadralectic interpretation – in the First (I) and Second Quadrant (II)."* Cities in antiquity were viewed as images or *"smograms."* Mircea Elide (1959) identified four distinct types of cosmological importance in his book "Eternal Return Myth":

1. A comparison between the skies and earthly life;

2. The axis Mundi serves as a link between the earth and the universe;

3. The cosmos is divided into four cardinal directions and four quadrants.

4. The requirement for divination and augury serves to identify the earth's hallowed locations [7].

The Eastern thought of ancient people claimed that man and the universe were inextricably linked. Each key element of the city is a metaphor for one of the universe's stars. According to this view, the heavens were circular, and the earth was square. The square embodied completion and sufficiency as an ideal

shape for prosperous living. Thus, the square shape was always used in the design of city forms.

Victor Llus Pérez Garcia (2016) stated in his article titled "South-East Asian Fortified Stone Walls: Angkor Thom (Cambodia), Ho Citadel (Vietnam), and Ratu Boko (Indonesia)" that *"According to the ancient Chinese texts referring to architecture and urbanism, the ideal city consisted of a square, a theory which may have derived from the belief that the heavens were round, and the earth was square. And just as the earth has four cardinal points, also the city should have gates in those directions, connected by main roads which would serve as the central axis for arranging the inner space according to a grid pattern, a symbol of order, etc. Thus, Feng Shui recommended locating cities on level land with a river in the front and a mountain behind. The imperial palace should be placed in a pre-eminent position in the capitals, which varied from the center to the north depending on the historical period."* [8] (Figures 33 and 34)

The papers demonstrated that cities frequently had a quadrangular plan, thick walls, and wide moats within citadels, as evidenced by Angkor Thom (Cambodia), Ratu Boko (Indonesia), and Ho Citadel (Vietnam), and Beijing (China), among others. In addition, there were monumental gates at all major intersections, frequently covered with arches and topped with wooden structures.

Figure 33. Angkor Thom and Angkor
Wat plan, Cambodi *(Source:*
https://www.aboutasiatravel.com/
images/maps/angkor-thom.gif)

Figure 34. Ho citadel plan, Thanh Hoa -
Vietnam *(Source:*
https://edition.cnn.com/travel/article/ho-citadel-
vietnam/index.html)

Charles M. Nelson (1988) observed in his article "Urban Planning in Pre-Industrial China" that Chinese cities have a "square form." The synthesis of these four principles resulted in the Han reinterpretation of the Zhou li, an ancient document attributed to a politician during the early Zhou period (ca. 900 BC). This synthetic Han view established an elaborate structural and organizational ideal that influenced the development of all subsequent traditional cities in China. *"The ideal capital city is a perfect square, every nine li on a side, bisected by a central meridional axis so that it forms the ideographic character for the earth and China, and models the earth's structure which the Han thought to be square."* [2] (Figures 35 and 36).

The oriental ideal city was frequently rectangular in design with gates and was laid up according to a standard urban planning system dominated by a central axis running North to South.

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[2] Charles M.Nelson, Urban Planning in Pre-Industrial China, US-China Review, Vol. XII, No.2, 1988

Figure 35. The Chinese cartographic view of the ideal square city. *(Source:https://www.chaz.org/ Arch/China/City)*

Figure 36. The nine-in-one square is the basis citygrid plan of Chang'an *(Source: https://www.chaz.org/Arch/China/City)*

City layout structure

The structure of an ancient eastern city was often arranged according to the order of the universe, with cosmic elements and city symbols; it also incorporated the Feng Shui principle, orientation auxiliary axis, and center function into urban architecture.

In his work, Paul Wheatley (1971) referred to 'city structure': *"It deals with the genesis of the city and the diffusion of city life during the Shang and Chou dynasties in China. The function of ceremonial centers is highlighted. The cultures of Meso-America, Central Andes, Africa, Mediterranean, Asia, and eastern North America are brought together in a cross-cultural approach to search for a chronology of urban genesis. Finally, the cosmo-magical elements and symbolism of city planning (geomancy, orientation, axiality, and the center's function) are discussed."* [7] (Figures 37 and 38). Following that theory, Marten Kuilman (2013) also pointed out that the traditional concept of Chinese urban planning reflects a cosmological order based on Confucian ethics and Feng Shui (geomancy). The former seeks a rational order emphasizing relationships, while

the latter is concerned with natural harmony. The "science" of Feng Shui may refer to wind and water [9].

Figure 37. The ideal planning structure theory is also applied for secondary living units *(Source: Tang and Mingtang Courtyards)*

Figure 38. Urban planning reflects the order based on Confucian ethics, with the Royal Place as the position of Heaven *(Source: The origins of Beijing's Forbidden City)*

Figures 39 and 40 illustrate the arrangement and significance of each element in the city model's central axis according to the Feng Shui principle. Each country has a slightly distinct meaning depending on its geographical location and culture, but they all use the same essential axis to represent the meaning of elements.

Figure 39. The city with satellite towns and villages, water, and mountains *(Source: China historical GIS)*

Figure 40. Feng Shui principal diagram for city planning *(Source: Analysis of Feng Shui Theory and urban planning in ancient China)*

In the article published in 2016, *"South-East Asian Fortified Stone Walls: Angkor Thom (Cambodia), Ho Citadel (Vietnam), and Ratu Boko (Indonesia),"* Victor Llus Pérez Garcia stated that *"According to Indian technical treatises on architecture and urbanism (Vastu-shastras) compiled in the Antiquity and influential until the arrival of Muslims, a military camp, fort, village or town, either circular or square in plan, should be encircled by citadels and moats and were supposed to have two major axial roads aligned with the four cardinal points. A capital city not only served as the political center of the state and the monarchy's seat, but it was also a representation of the whole Indian universe, like a microcosm. The main temple was a replica on the Earth of the mythological Mount Meru, and the whole city was erected around it. Hence, the main temple was installed at the central crossing of the two axial roads, the king's palace to its north, etc. Angkor Thom is a perfect example of this conventional foundational plan of a Hindu capital city."(Figure 41, 42)* [8].

Figure 41. Indian Vastu-Shastras theory of planning (Source: www.vaastuinternational.com/)

Figure 42. Angkor is a Hindu capital city representation of the whole Indian universe (*Source: Freeman, Michael, Jacques - Ancient Angkor, 2001*)

The Chinese and Japanese cities also incorporated square and rectangle layouts into various city plans. Marten Kuilman (2013) stated about the imperial palace position that "*The Forbidden City in Peking (Beijing) was built similarly to Xi'an, but the two cities also have fundamental differences (Steinhardt, 1986; Kostof, 1995). Xi'an (Chang'an) during the Tang dynasty (7th – 9th centuries) had the imperial palace at the north end of the central axis. Beijing and its capital scheme were of a much later date. It seemed that the Mongol ruler Khubilai Khan revived the old scheme in 1267, when he built his Mongolian capital Dadu in the present location of Beijing, just to confer his legitimacy on his non-Chinese regime. The later building of Beijing retained the resurrected type, and the conservative Ming dynasty held on to the classical cosmology used for town planning. The palace is in Beijing in the center of the city.*" [7] Figure 43 shows that in Chinese cities, the imperial palace always had to be on the main road with symmetrical boundaries.

Figure 43. Position of inner-city in Chang'an (left) and Beijing (right) on the central axis
(Source: Tamara Kelly, 2017)

The outlying city of Chang-an is depicted in Figure 43. The principal axes split the outside city into four districts. Twelve city gates defined a gridwork of important street structures. The administrative city, palaces, temples, ancestral halls, markets, residences, and parks were all located in specific areas in the town in accordance with their cultural and political functions following the cosmos structure.

The data analysis revealed the ideal city form, including the meaning of the city's features and symbolism, as well as the orientation axis and function of the center in urban planning. The ideal capital city is a perfect square with a central axis that shapes the earth's ideographic character and models the structure to be square. The palace city lies at the center, followed by an administrative complex, and finally by the outer city, mirroring the three levels of the world and symbolizing oriental society's moral divide into emperor, scholar-administrators, and commoners. (Figure 44)

Figure 44. Chang'an squares outlying follow cosmos structure
(Source: https://www.chaz.org/Arch/China/City/changan_annotated_map.png)

Examples of multi-layers military landscape

In the millennial flow of human civilization, many large cities formed, developed, and maintained, which contain changes and fluctuations in history. All clans are subject to the multidimensional effects of nature and experience political changes accompanied by wars. Communities were forced to form methods of protection against the impact of nature, foreign invasion, and civil war. Besides, more or less, the new elements of a city born with new ruling dynasties also contain old values from previous dynasties. Over time, they are deposited to form interwoven cultural sediments with changes that mark historical events, science and technology, and typical design thinking of each period. Rome (Italy), Paris (France), Amsterdam (Holland), Ancona (Italy), Pergamon (Turkey), Jerusalem (Israel), and Beijing (China) is among many good

examples demonstrating the multi-layers of military landscape factor of the urban timeline.

Rome-Italy

Rome (Italian and Latin: Roma) is Italy's capital city, with a 28-century history. The city's early inhabitants were a mingling of Latins, Etruscans, and Sabines. The city eventually became the capital of the Roman Kingdom, the Roman Republic, and the Roman Empire and is widely considered the world's first Imperial city and metropolis. The Eternal City (Latin: Urbs Aeterna; Italian: La Città Eterna) was coined in the first century BC by the Roman poet Tibullus and was afterward used by Ovid, Virgil, and Livy [10] [11].

Although Rome was founded early and began to be structured into four administrative areas in the sixth century BCE (Figure 45), it was not until the early fourth century BC that a defensive wall encircling the city was completed. The wall is named after Servius Tullius, the sixth Roman king (Figure 46).

The Servian Wall was constructed of volcanic tuff and reached a height of up to 10 meters (33 feet) in places, was 3.6 meters (12 feet) wide at its base, and measured 11 kilometers (6.8 miles) in length [12]. It is believed to have had sixteen main gates, only one or two of which have survived, and enclosed a total area of 246 hectares (610 acres). The Servian Wall was maintained throughout the Late Republic and into the Roman Empire. By this time, Rome had already begun to overrun the Servian Wall's initial confines.

Figure 45. Four administrative areas of Rome in 6th BCE *(Source: Author)*

Figure 46. Servian Walls were constructed in the early 4th BCE (blue line) *(Source: Author)*

By the third century AD, Rome's limits had expanded well beyond the Servian Wall's boundaries. Due to the city's lack of hostile threats over the succeeding centuries of expansion and consolidation, Rome remained unfortified. Rome's residents took great pride in the city requiring no walls due to the stability brought on by the Pax Romana and the protection provided by the Roman army. However, the necessity for upgraded defenses became critical during the Third Century Crisis, when barbarian tribes invaded the Germanic frontier, and the Roman military quarreled over how to resist them. Aurelian built the walls as a precautionary measure in response to the barbarian invasion of 270; the historian Aurelius Victor notes expressly that the project's objective was to reduce the city's vulnerability [13].

Figure 47. Aurelian Walls were built in 270 AD as an expansion of previous Servian Walls *(Source: Author)*

Figure 48. Janiculum Walls were erected in 1643 for better protection of the area on Tiber's right bank *(Source: Author)*

The Aurelian walls surrounded all seven hills of Rome, as well as the Campus Martius and the Trastevere neighborhood on the right side of the Tiber. Within the city bounds, the riverbanks appear to have been left unfortified, notwithstanding their fortification near Campus Martius. The enclosed area as full measures 1,400 hectares (3,500 acres). The wall crossed through densely populated areas: in reality, the city encompassed 2,400 hectares or 6,000 acres at the time [12]. In the first century AD, Pliny the Elder believed that the densely populated territories, 'extrema tectorum' (the bounds of roofed places), extended 2.8 kilometers (1.7 mi) beyond the Forum's Golden Milestone (Natural History 3.67) [14]. The walls were the largest construction project in Rome in decades, and their erection was a tangible declaration of Rome's enduring strength [15] (Figure 47).

There are also other fortification systems throughout the history of Rome. One of which is the Janiculum Walls (Italian: Mura gianicolensi), are a series of defensive fortifications built-in 1643 by Pope Urban VIII to complete the Leonine wall (defending the Vatican Hill) and to provide additional security for the part of Rome rising on the right bank of the Tiber. With this, the borders of the modern city center of Rome were mostly completed (Figure 48).

Figure 49 Rome city expansion through history *(Source: Wikipedia)*

Rome experienced urbanism and a lot of political upheaval and military campaigns during its existence. Therefore, the city often became a battlefield and formed a fortification itself. Not only a "museum" of numerous ancient, medieval, and Renaissance styles that coexisted, Rome is also a multi-layered military landscape city (Figure 49).

4.2 Paris – France

Paris is France's capital and most populated city. The Parisii, a sub-tribe of the Celtic Senones, initially settled in the Paris area around the middle of the third century BC [16] , [17]. On the île de la Cité, one of the area's primary north-south trade routes crossed the Seine; this intersection of land and sea trade channels ultimately developed into an important trading center [18]. These expanding business operations also increased the possibility of conflict and necessitated the construction of protection structures.

The Walls of Paris (French: enceintes de Paris or Murs de Paris) are the city walls that surrounded Paris, France, from ancient times to the twentieth century, primarily for defensive and administrative purposes. They were built mainly to defend the city but also for administrative purposes. Several additional city walls were constructed over the centuries, either to supplement existing walls or to replace those that had been dismantled, until 1846, when the Thiers wall was completed [19] (Figure 50). Paris's city walls include the following:

- The Gaulish enclosure.
- The Gallo-Roman fortification.
- Two medieval fortifications, one of which is the Wall of Philippe Auguste Charles V's Wall, which runs along the right bank of the Seine.
- The Louis XIII Wall stretches over the right bank's western portion.
- The Farmers-Wall, General for tax purposes.
- The Thiers's wall.

Figure 50. Paris citadel from 4th century to present *(Source: Author)*

As Paris became one of Europe's largest cities, new walls were constructed to contain the existing city's new buildings, gardens, and vegeTable fields. Numerous medieval walls were eventually demolished (as in 1670, when Louis

XIV ordered the demolishment of the Louis XIII Wall), and the roads that the walls once occupied were frequently repurposed as avenues or boulevards. Only a few pieces of the Farmers-General Wall (Claude Nicolas Ledoux's pavilions) and Philippe Auguste's Wall have survived to the current day. Nevertheless, the walls' influence on modern Paris is still visible on several of the city's major thoroughfares and boulevards, including:

- The Grands boulevards (main thoroughfares) were constructed in place of the Charles V and Louis XIII Walls.

- Adjacent streets Rue de Cléry and Rue d'Aboukir (2nd Arrondissement), which trace the Charles V Wall's path.

- The outer boulevards were constructed in place of the Farmers-Wall General.

- The Boulevards of the Marshals, a ring of boulevards named after French Marshals created to replace the Thiers wall.

- The Boulevard Périphérique (ring road or beltway) was constructed beyond the circle of the Marshals Boulevards.

Figure 51. Paris age of buildings map (Source: https://googlemapsmania.blogspot.com/2016/02/the-paris-building-age-map.html?m=0)

As a result, Paris's identity is now shaped by the scattered independent cities and their fusion of design opinions. Additionally, the harmony between the

landscapes and heritages contributes to the uniqueness of the urban complex (Figure 51).

4.3 Amsterdam - Holland

The Netherlands has harsh natural conditions and a low terrain, which means it is frequently subjected to tides and storms. Amsterdam is the Netherlands' capital and most populous city, with a population of 905,234 within the city limits, 1,558,755 within the urban area, and 2,480,394 within the metropolitan area [20]. Amsterdam is colloquially referred to as the "Venice of the North" due to the city's extensive canal system, a UNESCO World Heritage Site. Amsterdam began as a little fishing town on the marshes around 1300. Since 1600, it has developed into a significant commercial and economic hub for the Nordic region, with a population of over 50,000. The city, which covered an area of approximately 750 hectares, was built around a canal system comprised of three major converging canals: the Herengracht Canal, the Keizersgracht Canal, and the Prinsengracht Canal. The combination of the road and canal system resulted in a narrow and long land area. Apart from homes, other areas of land were utilized to construct churches, marketplaces, and parks.

Figure 52. Amsterdam is a medieval city with its defense walls, gates, and towers. *(Source: Cornelis Anthoniszoon, 1538)*

With an important strategic position in economic trade and maritime control, the city was encircled by a half-circle. It was defended by an 8-kilometer-long fortress with 26 bastions and seven significant gateways. Start

with Amsterdam's walls (Dutch: Vestingwerken van Amsterdam) which were constructed during the Middle Ages to protect the city from attack (Figure 52). In the 17th century, the medieval walls were replaced by a series of bastions (Figure 53). The walls were demolished in the nineteenth century and replaced by the Defence Line of Amsterdam (Stelling van Amsterdam), a fortification line that encircled the city at a safe distance [21] .

Figure 53. The Amsterdam in 17th-century with seven gates and 26 bastions.
(Source: Frederick de Wit, 1688)

The former city gates Waag and Munttoren, as well as the defensive tower Schreierstoren and the watchtower Montelbaanstoren, are all remnants of the medieval and seventeenth-century defenses; combined with the canal and water serve as the city's unique landscapes. The characteristics of cities are inextricably

related to the water system and naval military landscape, which serves as an important lesson for urban development and extension. This is a distinctive aspect of the urban multilayered military landscape (Figure 54).

Figure 54. Amsterdam city shape-changing through history (Source: Antonello Alici, Water Heritage lecture – Cultural Landscape 2021 course, Politecnica Delle Marche University)

Ancona - Italy

Ancona, the Marches Region's capital, is located on Monte Conero. The strategic importance accorded to Ancona throughout history is mainly due to its natural location on the Adriatic coast. Indeed, the city develops at the foot of a

buttress that descends from the Apennines to the sea between the Esino and Musone rivers, with a series of hilly echelons in between. As they approach the coast, these are easily accessible and practicable on the landward side but descend nearly vertically to the sea. The city was founded by the Greeks and witnessed spectacular expansion when Emperor Hadrian enlarged the modest port to accommodate the strategic importance of the Adriatic traffic [22].

Due to Ancona's strategic location, the military has left its imprint. Indeed, the city is dotted with forts, tactical storage facilities, massive walls, and gates that witness pivotal moments in the city's history. The extension of Ancona urban planning preserved the historic center and added some sections along the shore and then to the south. (Figure 55).

Figure 55. Borders and castles of the Republic of Ancona in the 15th century.
(Source: carta elaborata da me; la base è tratta da Openstreetmap)

Along with the Ciriaco, the Marches National Archaeological Museum, the 11th-century Church of Santa Maria Delle Piazza (of Romanesque origin), Trajan's Arch (built-in 115 AD), Mole Vanvitelliana (an 18th-century military

structure), the Roman Amphitheater (1st century AD); "The sixteen forts of Ancona" was part of Ancona's most beautiful landscapes (Figure 56):

- Altavilla
- Campo trincerato
- Cardeto
- Cassero – San Paolo
- Cittadella
- Lanterna
- Lazzaretto
- Lucarino

- Lunetta Santo Stefano
- Marano
- Montagnolo Torre e Chiesa
- Monte d'Ago
- Pezzotti
- Scrima
- Garibaldi (already Umberto)

Figure 56. Ancona fortifications reconstruction plan in 1945-1956 *(Source: Antonello Alici, History of contemporary Architecture lecture,*

Ancona is still one of the main ports on the Adriatic Sea, especially for passenger traffic, and is the region's leading economic and demographic center [23]. The works of treasures, watchtowers, military lighthouses, citadels, and

fortresses still exist, interlaced with new converted works for the new era. Those multi-layered military landscapes are important urban memories that form the cultural landscape of the Ancona region.

4.5 Pergamon - Turkey

Pergamon, also known as Pergamos (o) in modern Greek, was a prosperous and powerful ancient Greek city in Mysia. It is located 26 kilometers (16 miles) northwest of the contemporary Aegean Sea city of Bergama, Turkey, on a promontory on the north side of the river Caicus (modern-day Bakrçay) [24] . In the third century BC, Pergamon was created as the capital of the Attalid dynasty. It developed into a prominent cultural, scientific, and political center due to its location in the Aegean Region, the heart of the Antique World, and at the crossroads of Europe and the Middle East. Establishing the capital on Kale Hill laid the groundwork for the city. The urban layout incorporated steeply sloping topography and the Bakrçay Plain. The extraordinary monument composition comprises the unusually steep theatre, the long stoa, a three-tiered Gymnasium, the Great Altar of Pergamon, the tumuli, pressurized water conduits, the city walls, and the Kybele Sanctuary, which was precisely aligned with Kale Hill (Figure 57). Pergamon was the guardian of cities throughout the Hellenistic Period as the Attalid capital. It possessed political and artistic clout and developed a close interaction with its contemporaneous civilizations. The dynasty established one of Pergamon's most important libraries, and the Attalid Dynasty established the famous sculpture school due to rivalry between the three Hellenistic dynasties (Figure 58).[25]

Figure 57. Pergamon landscape (Source: Antonello Alici, History of contemporaty Architecture lecture, Politecnica delle Marche, 2022)

Figure 58. The traces of Greek in Pergamon *(Source: https://whc.unesco.org/en/list/1457/)*

Pergamon became a metropolis and the seat of the Roman Province of Asia during the Roman imperial period after it was passed to the Romans in 133 BC. The Romans preserved the Hellenistic Period's structures while adding new functions as the empire's cultural and imperial cult center. As a result, numerous significant systems were built or expanded during the Roman Period, including

the Asclepion Sanctuary, a well-known healing center with a still-flowing sacred spring; the Roman Theatre; one of the largest Roman amphitheaters; a massive aqueduct; the Trajan Temple; and the Serapeum (Figure 1.59). Pergamon was transformed into a middle-sized town during the Byzantine Period as a result of the relocation of trade routes and political centers from the Aegean Region to northwest Anatolia, particularly to Istanbul (Constantinople) and retained its cultural-religious significance as the home of one of Asia's Seven Churches. Pergamon has preserved and presented this change in its entirety.

Figure 59. Aqueducts, walls, and temples as the Roman traces in Pergamon
(Source: Reg and Nicky, Ancient Pergamon, 2015)

Pergamon had another cultural adjustment following the entrance of the Ottomans, which is particularly noticeable on the Bakrçay Plain. The Ottomans

constructed all required urban structures in the city, including mosques, baths, bridges, khans, bedestens (covered bazaars), arastas (Ottoman markets), and water systems were built on top of the Roman and Byzantine settlement layers. The superimposition of these various ages and cultures in Pergamon manifests itself in the city's urban form and architecture as continuities, forms, transformations, and losses resulting from the material existence and use of space by various eras and cultures. The Church of St. John, previously part of the Serapeum, a Roman sanctuary devoted to an Egyptian deity, exemplifies the re-use of structures by subsequent cultures. It was then converted into an Ottoman Mosque and incorporated into a Jewish Synagogue [26].

From the third century BC, the city was surrounded by a ring of grave mounds of varied sizes, establishing Pergamon's claim to the Bakrçay plain. Along with grave mounds, there were sanctuaries, such as the Kybele Sanctuary in Kapkaya, located on noTable hills and mountain peaks in the city's vicinity. In conclusion, Pergamon is a testament to the civilizations' singular and comprehensive aesthetic achievement. It contains Hellenistic, Roman, Byzantine, and Ottoman architecture, which reflect Paganism, Christianity, Judaism, and Islam while keeping their cultural characteristics within the multi-layers historical and military landscape.

4.6 Jerusalem - Israel

Jerusalem is a Western Asian city. It is one of the world's oldest cities, located on a plateau in the Judaean Mountains between the Mediterranean and the Dead Sea. It is considered holy by the three major Abrahamic religions: Judaism, Christianity, and Islam. However, the interweaving of beliefs has made it a site of disputes over thousands of years by major religions. In its long history, Jerusalem has been destroyed at least twice, besieged 23 times, captured and recaptured 44 times, and attacked 52 times [27].

Each time there is a change in the ruling religion, there will be comprehensive changes in architecture, culture, society, and even military science at the time. All of this creates a complex, interweaved, multi-layered cultural and military landscape. Besides that, the center's geographical location on the east and west crossroads makes Jerusalem's cultural and historical mix even more diverse.

With a critical position and influence in almost all aspects, from military, religious, economic, political, and cultural, Jerusalem is a territory that no warlords want to give up. While being held, this led to the fighting here that took place on a fierce scale and lasted to this day. The citadels are constantly being built, added, expanded, or replaced through many skirmishes, forming a special form by overlapping layers of military landscape with dense density (Figure 60).

Figure 60. A complexity of cultures and religions settled in Jerusalem in 1st AD

(Source: https://www.conformingtojesus.com/charts-maps/en/jerusalem_in_jesus_time_map.htm)

4.7 Beijing - China

According to Linan LIU (2011), in his article *"Old Beijing: Capital of Five Dynasties and Her Five Characteristics"* [3], the history of urbanization in Beijing dates back to the 5th century BC, when the small Marquis of Yan unified

the territory of the Marquis of Ji, establishing Ji City as the Warring States Period's new capital (475-221 BC).

Figure 61. The overlapping military landscape layout of Beijing during the Liao, Jin, Yuan, and Ming dynasties *(Source: KristerBlomberg, 2014)*

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[3] Linan LIU, *Old Beijing: Capital of Five Dynasties and Her Five Characteristics,* in "*Knowledge and Architectural Design in Beijing,*" Fausto Pugnaloni, Cecilia Carlorosi, Giovanni Issini, Sino-Italian Workshop on knowledge and architectural design, Giancarlo Ripesi Publisher, Ancona, Italy, 2011

Beijing served as the capital of five dynasties from the 10th century to the early twentieth century. Then, the Khitans of the Liao Dynasty (916-1125) seized Ji. They established it as their second capital, Nanjing City, a restoration project of new palaces that resulted in the capital being an 18-kilometer-square wall city.

The Jurchen completely conquered the Liao in the early 12th century, establishing the Jin Dynasty (1115-1234). The Jurchen relocated the Jin capital to Nanjing, Liao, in 1153 and renamed it Zhongdu. The large-scale restoration of the new city extended the wall to the east, west, and south. The newly expanded metropolis was determined to have a radius of 5 kilometers and a population of around one million people.

In 1271, Kublai Khan established the Yuan Dynasty and spent the next 30 years rebuilding the new city, which he dubbed Dadu - the political capital of his vast empire. The Dadu was a rectangular city wall covering an area of more than 50 kilometers square and more than 30 kilometers in diameter, with eleven gates. It had a central axis that ran north to south and several big main streets.

The Ming troops conquered the Dadu in 1368 and renamed it Beijing City. Emperor Yongle officially renamed Beijing City in 1421 after relocating his capital from Nanjing to Beijing. The extensive renovation was carried out on a massive scale. Beijing's urbanism was established mainly during the Yuan Dynasty. Still, urban expansion during the Ming and Qing eras made it famous for its tens of thousands of halls and twelve gates arranged symmetrically along a north-south axis. Beijing's city wall had a circumference of 32 kilometers and a surface area of 38 kilometers.

The old city had been destroyed three times (1950's, 1980-2000 phase, and post-2001) to widen streets, improve urban transportation, revitalize historic sites, and demolish traditional courtyards for estate interest. Fortunately, classic houses and palaces have been preserved as milestones in preserving historical identity (Figure 61).

Figure 62. Beijing's master plan in 1992 indicated that The Old City would be the
complex's core
(Source: https://doi.org/10.1016/j.cities.2011.07.007

Beijing City modified plenty of locations because of the various strategy. It
was not as if Western cities stressed visual beauty through their original materials
and authentic documents, but conservation principles in Eastern and Asian towns
were dictated by their spiritual message and naturalistic sensitivities.
Nevertheless, despite its massive development, Old Beijing remained the
complex's core and contained all value of all the previous multilayered cultural
landscapes that overlapped throughout history (Figure 62).

5. Conclusion Chapter I

Urbanization is an unavoidable consequence of the development rules.
However, each city's cultural containing in its multi-layer is unique. Consider

some cities throughout the world; the military landscape of the city shaped its identity. Rome, Paris, Amsterdam, and Beijing are all complexes of distinctive monuments, while Ancona, Pergamon, and Jerusalem have unique overlapping characteristics. The experience comes from analyzing some of the world's most attractive cities to comprehend the characteristics that have made these cities great. They were classified into two categories to analyze the city's character: natural eco-system and urban heritage. The study results indicate that, despite their disparate resources, the towns of Eastern and Western countries share similar characteristics, not only in terms of their defensive functions but also in terms of their significance.

Thus, it is critical to identify the primary factors that contributed to preserving these cities' identities during history. Continuing the research, the type of Vietnam's fortifications will be clarified in chapter two.

CHAPTER II: FORTIFICATIONS SYSTEM IN VIETNAM
1.Military landscape and warfare history of Vietnam

Vietnam's history dates all the way back to around 20,000 years ago when the first modern people arrived and were established in this area, known as the Hoabinhians, who are descended from modern-day Negritos[5]. Archaeological discoveries made in 1965, which are still being studied, reveal the remains of two hominins[7] closely linked to Sinanthropus[9] going all the way back to the Middle Pleistocene, about half a million years ago [28]. Prehistoric Vietnam was home to some of the world's earliest civilizations and societies, establishing them as one of the world's first agricultural societies. The Red River valley created a natural physical and economic entity, with mountains and jungles to the north and west, the sea to the east, and the Red River Delta to the south [29]. The requirement for a single authority to prevent Red River floods, cooperate in the construction of hydraulic systems, trade, and combat invasions resulted in the establishment of the first fabled Vietnamese states around 2879 BC. While later studies by archaeologists indicated that the Vietnamese Đông Sơn culture originated in Northern Vietnam, Guangxi, and Laos circa 700 BC [30].

Vietnam's long, narrow coastlines, rough hilly terrains, and two major deltas quickly became home to various ancient cultures and civilizations. By 500 BC, the Dongsonian civilization and its indigenous chiefdoms of Van Lang and Au Lac had established themselves in the north. Which were washed away by the Chinese Han dynasty's northward expansion - the Han invasion of Nanyue in 111 BC brought sections of Vietnam under Chinese authority. Traditional Chinese was adopted as the official language, as was Vietnamese later developed independent Nôm script.

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[5] Several diverse ethnic groups who inhabit isolated parts of Southeast Asia and the Andaman Islands.

[6] The Hominini form a taxonomic tribe of the subfamily Homininae ("hominines"). Hominini includes the extant genera Homo (humans) and Pan (chimpanzees and bonobos) and in standard usage excludes the genus Gorilla (gorillas).

[7] An archaic genus in the scientific classification system to which the early hominid fossils of Peking man, Lantian Man, Nanjing Man, and Yuanmou Man were once assigned.

In contrast, Sa Huynh culture of Austronesian Chasmic and Oc Eo culture of the Mekong Delta River prospered in the Central and Southern regions [31]. In this early stage, the military landscape did not have a fixed form. Instead, it is closely related to and dependent on nature, such as mountains, rivers, and terrain obstacles, to create a dominant defensive advantage [32].

The Trưng Sisters[8] staged the first indigenous insurrection against the Chinese dominion around 40 BC. Although the uprising was put down, as the Han dynasty began to wane in the late second century and China (中国) descended into chaos, the indigenous peoples of Vietnam rose again, and some became free. In 192 AD, the Cham of Central Vietnam revolted against the Chinese and established the independent kingdom of Champa, while the Northern authority of the Red River Delta weakened. In the period, with the advent of Buddhism and Hinduism in the second century AD, Vietnam was the first country in Southeast Asia to have a mix of Indian and Sino cultural influences, resulting in the development of the first Indianized kingdoms Champa and Funan [33]. Additionally, during these 1,000 years, there were numerous uprisings against Sino dominance, and at times, Vietnam was ruled independently by the Trưng Sisters, Early Lý, Khúc, and Dương Đình Nghệ — although their victories and reigns were not so long [34]. The large-scale introduction of a series of civilizations, plus the fierce competition for territory between the warlords that have formed a very diverse in both size and form of military landscape network in Vietnam during this period.

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[8] Vietnamese female military leaders who ruled for three years after rebelling in AD 40 against the first Chinese domination of Vietnam

Figure 63. Vietnam expansion timeline map *(Source: mapsontheweb.zoom-maps.com)*

When Ngô Quyền (King of Vietnam, 938–944) restored the country's sovereign power with his victory at the Battle of Bach Dang River, the next millennium was advanced by the accomplishments of successive local dynasties: Ngô, Đinh, Early Lê, Lý, Trần, Hồ, Later Trần, Later Lê, Mạc, Trịnh, Nguyễn, Tây Sơn, and again Nguyễn. The Vietnamese Nôm script began to evolve and grow more sophisticated as literature was produced and written in Nôm. Vietnam was destroyed and divided by civil conflicts at various stages throughout the imperial dynasties, with interventions by the Song, Yuan, Cham, Ming, Siamese, Qing, French, and Imperial Japan [35]. During this time, Dai Viet also gradually prevailed, attacking and assimilating the Champa nation politically and culturally [36] (Figure 63). The military landscape of Dai Viet during this time almost all followed the theory of Chinese citadel construction since the Nguyen

Dynasty began to study in the form of Vauban-style citadels advised by French advisors [37], while the Champa citadels and fortifications, after being captured, were destroyed or completely renovated [38].

For a while, the Ming Empire invaded the Red River valley before the Vietnamese people recovered power, and for nearly a century, the French Empire reduced Vietnam to a French colony, followed by a brief but savage occupation by the Japanese Empire [39]. Throughout the French period, widespread violence, inequity, and cultural relics of Hán-Nôm were removed, with the French seeking to cleanse the Vietnamese of their 1880s Confucian inheritance. During this period, French was the official language. Since the twentieth century, the Vietnamese Latin script, regarded as a Latin translation of Hán-Nôm, has supplanted the Hán-Nôm logographic scripts as the primary medium of written and spoken language. On the other hand, Japan's invasion in 1940 ignited deep animosity that fueled opposition to post-World War II military-political efforts by France as the returning power, and the United States considered themselves champions for liberty and democracy against communism's red waves [40] [41].

The US or the Western Bloc supported South Vietnam during the Vietnamese Proxy War, while the Soviet Union or the Communist Bloc supported North Vietnam. Following World Battle II, political turmoil, a period of heavy struggle and war, followed by a Communist uprising and triumph, effectively ended the monarchy, and the country was proclaimed a communist Socialist Republic [42]. The feudal-style fortification of this period was no longer relevant in modern warfare. Instead, the type of trench (used in the French Indochine War) and the type of tunnel (used in the guerrilla war against the US) are considered the dominant military landscape form of Vietnam during this period [43].

After years of harsh sanctions and political and economic isolation as a result of horrific conflicts with China and Cambodia, the Đổi Mới (renovation/innovation) reforms were implemented [44]. Since then, the

economic and political circumstances in Vietnam have been influenced by the forces of market liberalization and globalization.

(Figure 64; 65).

Figure 64. The founding wars timeline of Vietnam Dynasties and Regime
(Source: Wikipedia, summarized by author)

Figure 65 Vietnam Dynasties historical timeline *(Source: Wikipedia)*

2. Formation and distribution of Vietnamese fortifications
2.1 Hồng Bàng & Lạc Việt kingdom (500 – 111BC)

According to the 14th-century book Lĩnh Nam chích quái, the tribal ruler Lộc Tục (c. 2919 – 2794 BC) proclaimed himself Kinh Dương Vương and established the state of Xích Quỷ in 2879 BC, so initiating the Hồng Bàng dynasty period. Sùng Lãm (c. 2825 BC –?) succeeded Kinh Dương Vương. The next royal dynasty produced 18 monarchs dubbed the Hùng Kings, who renamed the nation, Văn Lang. The administrative structure is composed of offices such as Lạc tướng (military generals), Lạc hầu (lords), and Bố chính (mandarins officer) [45]. Numerous metal weapons and implements discovered at numerous Phung Nguyen culture sites in northern Indochina are dated from the start of Southeast Asia's Copper Age. Additionally, the Bronze Age began around 500 B.C. at Đông Sơn [46]. The indigenous Lạc Việt people had created a highly sophisticated bronze production, processing, and tool fabrication industry, as well as the manufacture of armor, weaponry, and bronze drums (Figure 66).

Fig. 35ter. Ngoc Lu drum schemas – Tympanum and mantle outstanding decoration.

Figure 66. 2nd century AD Ngoc Lu bronze drum schemas – Tympanum and mantle outstanding decoration. *(Source: Vietnam Historical Museum)*

The weapons and military gears of the Hung King's period were quite diverse. In the period corresponding to the Phung Nguyen, Dong Dau, and Go Mun cultures, the weapons were still very rudimentary, mainly made of bamboo, wood, and bone. At the stage of Dong Son culture, the field of weapons production and use took place a real boom. Brass weapons developed dramatically, replacing stone and bone weapons almost entirely [47]. The superiority of new materials - brass - was quickly adopted by the people of Dong Dau and Go Mun in the field of weapon making. By casting, workers can make mass-producing brass items [48]. Brass weapons such as bronze swords, bronze crossbows, and bronze arrows are exquisitely crafted both in terms of art and effectiveness in combat. Early Viet is famous for swordsmanship and for producing fine swords. The Book of Chiến Quốc Sách (戰國策) mentions the high quality of the southern sword and its ability to cut through buffaloes, horses, bowls, and pots. Yue Jueshu (Record of Precious Swords) mentions several famous swords: Zhan Lu (湛卢), Haocao (勇敢的), Ju Que (巨阙), Lutan (鲁坦), Chunjun (纯钧), Sheng Xie (胜邪), Yu Chang (鱼肠), Longyuan (龙渊), Tai A (泰阿) and Gongbo (工布) [49][50]. Especially preserved to this day is the Goujian Sword (越王句踐劍) being displayed at the Hubei Provincial Museum. Even though it is a 2500-year-old artifact, it still retains its invincible sharpness [51] (Figure 67). It can be seen that the development of military science in Vietnam during this period developed at a high level.

Figure 67. 3-1st century BC lamellar armor (Vietnam National Historical Museum) and weapons from Dong Son culture (Source: Vietnam National Historical Museum and Hubei Provincial Museum)

One of the clearest pieces of evidence of the military science of the early Vietnamese state is the war of the 6th Hung King with the Shang dynasty and the Qin-Vietnamese war in 218-208 BC. After destroying the 6 Shandong countries, unifying China, and ascending the throne, Qin Shi Huang ordered the general Đồ Thư (屠睢) to lead 50,000 troops to invade the southern lands. The Vietnamese war against Qin went on for ten years. In the end, the Qin army was badly defeated, with their general Đồ Thư killed in battle [52] [53]. Thus, it can be seen that the combat ability of the Vietnamese army at that time was not inferior to China's Qin dynasty. Carvings found on bronze drums, along with archaeological artifacts found during this time, give clear proof for that statement (Figure 68). The ancient Vietnamese army was organized with a full range of troops, from marines, infantry, and archers to armored cavalry (Figure 69), similar to the Qin army through descriptions from teracota warriors (Figure 70).

Figure 68. Restoring image of a swordsman, cavalry, and halberdier in Dong Son army 200 BC based on archaeological archives (Source: https://luocsutocviet.com/2018/01/07/053-khao-cuu-ve-trang-phuc-thoi-ky-hung-vuong)

Figure 69. 2nd century BC warrior statues of the Dian Yue tribe (a tribe of Viet's ethnicity)
(Source: https://luocsutocviet.com/2018/01/07/053-khao-cuu-ve-trang-phuc-thoi-ky-hung-vuong)

Figure 70. Military units of Qin dynasty, as seen on terracotta warriors
(Source: https://www.chinahighlights.com/xian/terracotta-army/)

Social organization in the early period consisted of alliances of Vietnamese tribes (Baiyue) scattered in the land south of the Truong Giang River. These alliances are relatively loose and temporary due to frequent fluctuations in Chinese history [54]. The first capital was Phong Chau (峰州), dated 4000 years ago, located between today's Viet Tri city to Lam Thao district, Phu Tho province, Vietnam [55]. The archaeological data do not show the centralized

military stronghold organization of the Van Lang government. The military landscape of this period was a tribal community of villages along rivers and lakes, relying on the natural advantages of forests and rivers to protect themselves (Figure 71; 72). When the kingdom was in danger situation, the Viet army would retreat to the forest to wage guerrilla warfare instead of being entrenched in pre-built fortification [56].

Figure 71. Model of residental unit in Van Lang state period based on bronze drum's pattern
(Source: AnhHung4000 historical project)

Figure 72. Model of a residential unit of Dian Yue (Điền Việt) based on artifacts
(Source: http://gd.people.com.cn/n2/2021/0125/c123932-34546196.html)

The mindset about planning military fortification and taking advantage of the natural terrain in the period of the Van Lang state (2524 - 258BC) was inherited and upgraded in the Au Lac period (257 - 179 BC) [57]. The clearest evidence is the Co Loa citadel, considered *"the oldest, the largest scale at that time, the structure is also the most unique in the history of citadel construction of the ancient Vietnamese"* [58]. The citadel is shaped like a snail [59], reflecting the citadel's multi-layered structure with concentric citadels and moats [60] (Figure 73). The solid defensive structure combined with the development of the Nỏ Liên Châu (multi-arrows crossbow) [44] made the Co Loa citadel almost impenetrable fortification to the northern foreign invaders.

Figure 73. 3D model of Co Loa inner citadel builded by King of Âu Lạc from 257 BCE
(Source: Kim, Nam & Van Toi, Lai & Hiệp, Trịnh - 2010)

2.2 Chinese rule (111 BC – 938 AD)

2.2.1 Vietnam's military landscape under Chinese rule

In 111 BC, the Han dynasty invaded Nanyue and established new territories, dividing Vietnam into three provinces: Giao Chỉ (pinyin: Jiaozhi), which is now the Red River delta; Cửu Chân, which extends from modern-day Thanh Hóa to Hà Tĩnh; and Nhật Nam (pinyin: Rinan), which extends from modern-day Quảng Bình to Huế. During this historical period, Buddhism was introduced to Vietnam from India via the Maritime Silk Road, while Taoism and Confucianism were introduced via Chinese law [61] (Figure 74). The Chinese kingdoms that setup colonial government in Vietnam during this period are:

- First time colonial (179 BC or 111 BC): the Zhao dynasty, the Han dynasty founded the country around 206 BC, until 111 BC occupied Linh Nam (then the country of Nam Viet under the Zhao dynasty).

- Second time colonial (43 - 541): Eastern Han, Eastern Wu, Cao Wei, Jin, Qi, and Liang dynasties.

- Third time colonial (602 - 938): the Sui and Tang dynasties ruled for three hundreds years. During the Autonomous Period from 905-938, Vietnam fell into the hands of the Southern Han.

There were only a few short periods of independence such as the Hai Ba Trung period (40-43), the Pre-Ly Dynasty period with the Van Xuan country (541-602).

Figure 74. Vietnam's map during the first three times of Northern domination
(Source: https://hinhanhvietnam.com/ban-do-viet-nam-theo-tung-thoi-ky-lich-su/)

During the Northern domination period, Chinese dynasties constantly assimilated Vietnamese people to turn Vietnam into a district of China. Under this rule, the Vietnamese had to pay taxes to the northern court. In addition to the tax amount of the state, some local rulers also extort more from the people for their private purpose. Chinese civilization also entered Vietnam during this period massively. Sĩ Nhiếp, the prefect of the Han Dynasty (187-226), was a person who systematically spread Confucianism into Vietnam and is considered the pioneer of Confucianism of feudal mandarins in Vietnam. Many Chinese

have immigrated to Vietnam, they stay, gradually marry Vietnamese and integrate into Vietnamese society, and their descendants become Vietnamese [62]. Because of this social assimilation, the methods of military organization, war doctrine, and military landscape of Vietnam during this time also followed the planning and design ideas of the Chinese government.

For nearly one thounsand year, Vietnam was controlled by a centralised bureaucratic government of China with a highly nationalized military apparatus. Due to the centralised government's ability to mobilize additional resources and develop a coherent defense strategy on a grand scale, the fortification strategy concentrated on the establishment of an interconnected network of fortified settlements, military fortresses, outposts, chokepoints, postal/relay stations, and watchtowers. As a result, the Vietnamese did not generally construct fortified private residences in the manner of European medieval castles, and the central state would have aggressively discouraged such behavior [6].

Due to the focus placed on settlement protection, the reinforced wall became the focal point of Vietnamese fortification. A wall served as the final line of defense against attackers and very frequently served as the initial line as well. Every capitol in Vietnam, as well as a sizable number of towns and cities, was walled. Most of Vietnam's walled towns were settlements encircled by a wall and a moat, with the main city gate almost invariably facing south. However, in this transition period, the city planning layout and important landmarks are still based on the natural topography, which is why the citadel follows the simple quadrangular geometry shape [5].

The new head-town is Giao Chi district, located at Luy Lau. For defense purposes, Luy Lau citadel was built in 111 BC during the Han Dynasty with 2 closed loops (the outer wall is rectangular with a circumference of 1848 m; the inner wall is square with a circumference of 454 m named Lung Khe) in Thanh Khuong commune, Thuan Thanh district, Bac Ninh (Figure 75). What remains today are mainly traces of this period. This is the largest and most fortified

fortification in the district. Luy Lau urban area continues to develop not only as a political, administrative and economic center, but also as the largest cultural center (Figure 76) [63].

Figure 75. Luy Lau Citadel location and it's inner fort "Lung Khe"
(Source: Nishino Noriko, 2017)

Figure 76. The remaining architectural heritage in Luy Lau shows it's role of military, political and religious center *(Source: https://doi.org/10.1163/22879811-12340004)*

Starting from the defeat of the Hai Ba Trung uprising, Ma Vien re-divided the administrative boundaries of Viet's districts, completely replacing the native leaders, and appointed commanders on behalf of the direct colonial governor of each district. In each district, a system of fortification was built as the

headquarters of the governor. Phong Khe citadel district (Kiển Thành) was built right on the citadel of An Duong Vuong, which is also the inner citadel of Co Loa citadel today. What can easily be noticed is that the structure of this citadel is similar to China's fortification characteristics, with a circumference of 1,650m, with many symmetrical, range towers, which is different from the contour layout structure of the middle and the outer citadels from Au Lac period. Inside the inner citadel, many relics of Han culture have been unearthed, such as brick wells, money, ceramics decorated with square patterns, cage fillings, ropes, fish bones, etc., typical patterns of the Eastern Han Dynasty. In Co Loa and the surrounding area, archeology has unearthed a large number of Han brick tombs. The appearance of brick tombs in this citadel proves that since the Eastern Han Dynasty, the Han mandarins lived and directly ruled the land taken from the defeated Viet King [64] (Figure 77).

Figure 77. The difference in the design of the outer citadel built by the Vietnamese king according to the natural terrain and the inner citadel built by the Chinese colonial government in a square shape *(Source: Nam C. Kim, Lai Van Toi, Trinh Hoang Hiep, 2020)*

In 602, the Van Xuan state was defeated by Luu Phuong of the Sui dynasty. In 607, the Sui dynasty divided and resettled the districts and transferred the headquarters of the Giao Chi district to Tong Binh. From that period, the central land of Hanoi nowaday officially became the capital of the Northern

colonial government. More than a decade later, the Tang dynasty replaced the Sui dynasty, establishing Giao Chau as the colonial government and then changing it to the An Nam government. The headquarters of the colonial government of Annam was located at Tong Binh. The Tang Dynasty continuously add-in Tong Binh many layers of fortifications to increase the protection for the ruling government:

- The first inner citadel was built by Khâu Hòa under the name 'Tử Thành'.

- In 767, Trương Bá Nghi built the 'La Thành' as the first large-scale solid outer wall built in the center of Hanoi's inner city.

- In the years 791 and 801, Triệu Xương and Bùi Thái all carried out repairs and strengthen La Thành.

- In 808, Trương Châu changed the name to 'Đại La' and called it 'Annam La Thành'.

- In 824, Lý Nguyên Hỷ built a new citadel on the bank of To Lich River, also called 'La Thành'.

- In 843, 858, Vũ Hồn and Vương Thức repaired and rebuilt the citadel.

- In 866, Cao Biền organized the rebuilding of La Thành with "a circumference of 7925 m, a height of 14 m, foot width of 14 m, building a female wall 5,5 m high, building 55 towers, 5 gate towers, six tunnels, three waterways, build 34 roads, outside embankment 8560m long, 9 m high, 12m wide, erected more than 5,000 houses." Thus, there were many different citadels of An Nam protectorate built by the Tang Dynasty, called La Thành or Đại La citadel. New vestiges discovered at 18 Hoàng Diệu and the construction site of Ba Đình Hall from 2002 up to now allow specific and accurate views of the central area of Đại La Fort. These are architectural pillars, bundles of floors, and many bricks embossed with three words "Giang Tay Quan," architectural vestiges, houses, wells, sewers, and some Vietnamese and Chinese ceramics. Country and West

Asia, dating from the 7th to the 9th centuries, are located in the last layer of the monument [65].

Figure 78. Timeline and map of the expansion of the Han dynasty in the 2nd century BC
(Source: https://commons.wikimedia.org/wiki/File:Han_Expansion.png)

For more than three centuries under the Tang dynasty, the Chinese colonial government had to continuously build and strengthen the fortress because they always had to deal with increasingly large-scale uprisings (Figure 78). These revolts were also associated with the fortifications for the long-term strategy. It may be mentioned as:

- Mai Thuc Loan revolted in Hoan Chau with Van An citadel along the Đường Lâm river.

- Phung Hung, with the base at Đường Lâm citadel, rebelled to occupy Tong Binh citadel and expand its base to Trieu Khu citadel; Phung Khoang; Nhan Chinh (Thanh Xuan district); Quang Ba (Tay Ho district); Kim Ma, Hao Nam (Dong Da district).

- Khuc Thua Du, with Hong Chau citadel base, rebelled to occupy La Thanh and was later succeeded by descendants of Khuc Hao, Khuc Thua My, and under general Duong Dinh Nghe.

- Ngo Quyen from Asia (Thanh Hoa) rebelled to drive away the Chinese with historical victories, then proclaimed himself king and established the capital in Co Loa.

It can be concluded that the Northern domination period took place for nearly a millennium, which made the military doctrine and architectural form of the fortifications of China profoundly and long-lasting influence on Vietnamese thinking later. Although ruled by a centralized government, Vietnam during this period was a period of constant war because the Vietnamese were not willing to be assimilated by China. Therefore, the Military landscape during this period was a series of strongholds that were continuously adjusted or built according to the evolution of the skirmishes [65] (Figure 79).

Figure 79. Distribution map of the Chinese colonial government fortification system
(Source: https://doi.org/10.1163/22879811-12340003)

2.2.2 Lin-Yi Kingdom military landscape

Simultaneously, the Cham nations staged a successful insurrection in present-day Central Vietnam in 192. Lin-Yi (Lin village; Vietnamese: Lâm Ấp) was the name given to it by Chinese dynasties. It later developed into a

formidable kingdom known as Champa, which stretched from Quảng Bình to Phan Thiết (Bình Thuận). The Cham produced Southeast Asia's first indigenous writing system, establishing a precedent for the region's Buddhist, Hindu, military, and cultural expertise (Figure 80).

Figure 80. Mandala political thought and its spread in Southeast Asia & Vietnam
(Source: https://en.wikipedia.org/wiki/Mandala_(political_model))

The Cham Lâm Ấp monarchy, with its capital in Simhapura (Figures 81 and 82), prospered by capitalizing on old maritime trade routes connecting the Middle East and China. The affluent of Lâm Ấp aroused the Chinese Empire's notice. In 605, Emperor Yang Guang of the Sui Empire directed commander Liu Fang to invade Lâm Ấp. Liu Fang had recently reconquered and pacified northern Vietnam. Invaders rapidly overran the country, pillaging and looting

Cham sanctuaries. Despite this, Sambhuvarman of Lâm Ấp (r. 572–629) rapidly asserted his independence and established the Second Cham monarchy in 629.

Figure 81. Map of Simhapura Citadel built in the 4th century
(Source: Claeys, "Fouilles de Tra-Kieu,")

Figure 82. Capital Simhapura by Professor J.Yves Claeys (EFEO) was drawn in 1930 (left photo) and by Cleric Antoni Truong Thang in 1987 (right photo) *(Source: https://antontruongthang .wordpress.com/tra-kieu-mot-thoi-de-nho/tra-kieu-tu-mot-buc-khong-anh-1930/)*

Champa reached its golden ages. Between the seventh and tenth centuries, the Cham controlled the spice and silk trade between China, India, the Indonesian islands, and Baghdad's Abbasid kingdom. They augmented their wealth from the trade channels by participating in piracy and raiding, in addition to exporting ivory and aloe (Figure 83).

Figure 83. Champa capital (Indrapura) is located in an extremely important strategic position in maritime trade between major civilizations.*(Source: Gunawan Kartapranata, 2008)*

In 875, Indravarman II (r.854–893), a new Mahayana Buddhist emperor, established a new dynasty with Buddhism as the national religion. [50] Indravarman II established a new capital city at Indrapura (modern-day Quảng Nam) and a sizable Buddhist temple in Dong Duong. The Indravarman II dynasty ruled until the late tenth century when the ruling king Jaya Paramesvaravarman I (r.972–982) was killed in battle during a Vietnamese invasion in 982. [51] In anticipation of the unsettled scenario, a Vietnamese general name Lưu Kế Tông captured Indrapura in 983 and crowned himself King of Champa in 986, destabilizing the Cham empire. In 989, a new Hindu monarchy was created in Vijaya (modern-day Binh Dinh) from the south, and the Cham capital was shifted to Vijaya in 1000 [66] (Figure 84).

Figure 84. Hóa Châu (Vijaya Citadel) – Capital of Champa Kingdom since 1000 AD
(Source: https://brill.com/view/journals/arwh/5/2/article-p70_70.xml)

Under the strong influence of religious thinking and the Mandala political model, each city of Cham people is not only a place to live but also the center of religious activities. The landmarks are Cham towers that serve as temples or works for worship, forming tower-complex combinations following "Vastu Shastra" [4]. The citadel was built to connect the gods' corridor and protect beliefs and divine spirits. Positions with good strategic observation, such as high mountains looking down the big river mouths, are the place to put the most important gods' temples and a watchtower to control the maritime trading and lighthouse for Champa's pirate ships. Military landscape layout at this time has a simple quadrilateral form layout; organized in 3 layers, highest in the center, then Lower layer and Lowest outer, corresponding to Heaven-Earth-Hell of

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[4] Principles of design, layout, measurements, ground preparation, space arrangement, and spatial geometry on the traditional Indian system of architecture.

Mandala mindset. Around the city is the surrounding moat connected to natural rivers for defending and water supply for residents inside the citadel.

Figure 85. Mandala architectural and Vastushatra layout style applied by Cham people
(Source: https://vedictribe.com/uncategorized/vaastu-shastra-and-the-structure-of-human-body/)

Due to the characteristics of geography with the fertile Mekong River basin and the establishment of maritime trading, the Funan, Khmer, Chenla, and Champa kingdoms have a strong connection forming the Indian religious ideology and art style. Cities and citadels are more of brick and stone architecture instead of wood architecture as Dai Viet. This leads to the lack of complex assembling types like the Dou-Gong. Instead, it is a style of placing bricks heavy at the bottom and lighter at the top. Although the links are simple, it is rich in shaping and has a sophisticated art sculpture. This form of architecture and material is suiTable for the eternity mindset world of Indian Mandala culture [67]. Although this fortification type's tactical efficiency has shown inefficiency

in siege battle, it is undeniable that the combination of religion with politics and military formed a very divine appearance for Military Landscape Champa.

2.3 Monarchical era (938 – 1832)

2.3.1 Vietnam's military landscape during a monarchical era

Figure 86. The change of the capital through the Ngo - Dinh - Ly dynasties
(Source: https://hinhanhvietnam.com/ban-do-viet-nam-theo-tung-thoi-ky-lich-su/)

After defeating the Southern Han fleet at the Battle of Bạch Đằng (938), Ngô Quyền (r. 939–944) declared himself king. This event is the beginning of of independence and self-reliance for Vietnam after nearly a thousand years of being a Chinese colony. The Ngo - Dinh - Early Le dynasties were the feudal states that were initially developing. Like all other feudal social organizations, the peace of Vietnam during this period was often challenged by civil wars and revolts, but the Chinese dynasties were the greatest pressure. During the next four centuries, under the Ly - Tran - Ho dynasties, the Dai Viet people conducted five resistance wars against foreign invaders with glorious victories even though they were always in a disadvantageous position: resistance against the Tang dynasty during the Ly Dynasty, three times against the Yuan - Mongols of the Tran Dynasty and the resistance against the Ming Dynasty of the Ho Dynasty. The alternation of independence and war influenced the dominant ideology of

Vietnam's military landscape during this period. To increase the defense ability from the pressure of powerful invasions from China, the Vietnamese feudal dynasties in turn, moved the capital from Co Loa to Hoa Lu, then from Hoa Lu to Thang Long. In parallel with strengthening the defenses to resist the northern expansion, the Vietnamese dynasties expanded their territory to the south with long-term and purposeful military campaigns, leading to fierce battles with Champa. [30]

After the Ming invasion defeated Ho Quy Ly (leader of the Ho Dynasty), Vietnam experienced a dark and tragic period due to China's policy of assimilation. The Ming Dynasty destroyed many documents, artworks, cultural artifacts, and architectural works. Skilled workers and scientists were also brought back to China to serve the colonial government. This is what makes most historical data for this period so rare.This policy was strictly enforced by the Yongle emperor. His command to the army in Vietnam in July 1406 is as follows [68]:

兵入。除釋道經板經文不燬。外一切書板文字以至俚俗童蒙所習。如上大人丘乙巳之類。片紙隻字悉皆燬之。其境內中國所立碑刻則存之。但是安南所立者悉壞之。一字不存。

"Once our army enter Annam (Vietnam currenly), except Buddhist and Taoist text; all books and notes, including folklore and children book, should be burnt. The stelas erected by China should be protected carefully, while those erected by Annamese (Vietnamese currently), should be completely annihilated, do not spare even one character."

Figure 87. Vietnam map (left picture) and depicting the policy of destroying cultural objects (right picture) under Ming Dynasty colonial *(Source: https://trithucvn.org/van-hoa/thu-tich-ly-tran-va-lenh-cuop-pha-cua-nha-minh.html)*

As a result, almost all written sources in Vietnam accumulated over 400 years were wiped out. Books about Ly and Tran dynasty customs, literature, and governmental organization are forever lost. At the beginning of the Le dynasty, while the court wanted to model their organization on that of the Ly and Tran dynasties, it was impossible due to lack of record, and in the end, it had to emulate the Ming dynasty organization. Even nowadays, Vietnamese historians face great difficulties accurately reconstructing the ancient cultural landscape of the Ly and Tran dynasties. Later dynasties also often had large-scale conflicts, such as Trinh Nguyen's civil war, the Tay Son Dynasty's war with the Qing Dynasty, and the Nguyen Dynasty, all created a historical period with many changes and overlaps. The introduction of Western applied science and technology in the late 17th century made the military landscape more diverse.

Figure 88. Decentralized period of civil war between Vietnamese feudal forces until the unified era *(Source https://hinhanhvietnam.com/ban-do-viet-nam-theo-tung-thoi-ky-lich-su/)*

a. Architecture and decoration

The 1000-year period of Chinese domination has put Vietnam in the orbit of Chinese civilization's influence. Just like Japan and Korea, the culture, literature, science, and technology of Vietnam in the Ly, Tran, and Nguyen dynasties had great similarities with the morphology of the Tang, Song, Yuan, and Ming dynasties from China. Although the similarity with Chinese shaping thinking is obvious, the construction form of Vietnam at that time still created distinct features in the design. The art of sculpting and shaping on wood, and stone, especially the dragon image representing each Vietnamese dynasty. These shapes are transitioned and used in architectural design. Outstanding architectural achievements of Vietnam can be seen through religious works such as Dien Huu Pagoda (One Pillar Pagoda), Phat Tich Pagoda, Dau Pagoda, Quynh Lam Pagoda, Yen Tu Pagoda, and most especially is to build palaces and fortifications for politics and defense. Just like in Japan and Korea, it is easy to find similar features in architecture and decorative in Vietnam influenced by Chinese civilization, but there are still distinct features of each culture[69]

Table 2. Architecture and decorative comparison between China – Vietnam – Japan – Korea(Source: Summarize by author)

Architecture and decorative comparison			
China – Vietnam - Korea – Japan			
Imperial Architecture			
Religious architecture			
Administrative architecture			
Bridge			

Holy gate

Hallway

Garden

Interlocked Wooden Brackets (斗拱 - đấu củng - 공포 - 組物)

Stone lantern

b. Military tactical and technology

Military science reached its pinnacle with the appearance of two famous works by Trần Hưng Đạo – Marshal of the Trần Dynasties: 'Binh Thư Yếu Lược' (The Art of Wars) and the 'Vạn Kiếp Tông Bí Truyền Thư' (Bibliography of Military Strategies). These works are the conclusion of many battles through different military campaigns. The information in the military book shows that the organizational model of the Vietnamese army in this period had excellent synergies and tactics optimized for each strategic context. Besides, the particular and decisive feature that helped Vietnam gain the absolute advantage in future conflicts with Champa was the appearance of siege engines, firearms, and artillery. While the war doctrine of the Champa and Ayutthaya armies refused to accept improvements in explosive weapons, Vietnam quickly accepted and improved its application through each campaign. Some Vietnamese weapons are even more superior to China's, such as "Thần Cơ Sang Pháo" (stone ball artillery) and "Thần Cơ Thương Pháo" (fire lance) developed by Hồ Nguyên Trừng (1374-1446) - a Vietnamese scholar, official, and engineer of Hồ Dynasty [70] [71].

Table 3. Military technology in the Vietnam Mornachical period (938 – 1832). *(Source: Đào Duy Từ, 1631, "Hổ Trướng Khu Cơ"; Ngô Sĩ Liên, "Complete Annals of Dai Viet", 1697; Henri Oger, "Techtechnique of the Annamese people," 1908; Phan Thành Nam, "Illustration of Ấm Chè Artist", 2018; Wikipedia; summarize by author)*

Structure
A tactical structure and basic equipment of the Later Le army in 1732, based on the painting *"The city of Cha-Cho, the Metropolis of TONQUEEN"* by John Churchill 1732.
Battle formation

"Trường Xà Liên Châu" (Long Snakes) formation, used in marching in open terrain or breaking sieges.	

"Tiểu Chu Thiên – Trực Trận" (Meridians - Direct) formation, used in direct attack.	"Hạc Trận" (Crane wings) formation, used in the shocking and raiding attack.

"Hổ Hình Trận" (Tiger form) formation, used for troops from high terrain to attack downward.	"Nhạn Trận" (Swallows form) formation relies on armored cavalry, taking speed and power to penetrate the enemy's defenses.

"Bán Nguyệt trận" (Crescent Moon) formation, leaning behind the mountains or river with no way out to force the soldiers to advance. Hannibal used this kind of tactic in Cannae battle – 216 BCE

"Xa Luân Trận" (Alternate Chakras) formation was used to defend the narrow and long land. This tactic was very effective for a weak army against a strong enemy.

"Tiểu Chu Thiên – Khúc Trận" (Meridians - Segments) formation is based mainly on the midfield. Elephant and heavy infantry (red) lead the advance to break into the enemy line. Melee infantry and gunners on the two wings flexibly move to change places depending on the strengths and weaknesses of each opponent's wings.

"Bát Môn Kim Tỏa Trận" (Trigrams) formation was designed to lure the enemy. The platoon's position was constantly fluctuating. Only four diagonally held the arranged line.

Weapon & equipment		
Weapon and armor of Thánh Dực Quân (Royal Guard Infantry) of Tran Dynasty in the 13th century (reconstructed from archeological archives)	Weapon and armor of Thiết Đột (Heavy Cavalry) of Le Dynasty in the 16th century (reconstructed from archeological archives)	Weapon and armor of Cấm Quân (Royal Infantry) of Le Dynasty in the 16th century (reconstructed from archeological archives)
Grenadier of Le Dynasty in 16th century, using "Hỏa Cầu" (fragmentation bomb)	Matchlock soldier of Le Dynasty in 16th century, using "Phật Lăng Cơ" (Breech-loading swivel gun)	Rifleman of Tay Son dynasty in the 18th century, using "Tây Sơn điểu súng" (Musket)

Firearms
- Left: Developed by Hồ Nguyên Trừng (Ho dynasty's prince), "Thần Cơ Thương Pháo" (Fire Lance) is one of the popular firearms of the late Tran and early Ho dynasties (14th century). - Right: illustration of Fireplace in Europe 1470.
- Left: "Hỏa Đồng Súng" (Flamethrower) of Tay Son army (18th century). - Right: Engraving of Hỏa Đồng Súng in the Nine Peaks of the Nguyen Dynasty (1837).

Siege engine

A sky cart

A scaling ladder

A rake cart

A double hook cart

Cloud ladder

Mobile moat crossing bridge

- "Vân thê" (雲梯 / Siege Escalade) is used to climb the wall during a siege. The first recorded of using this engine in Vietnamese history was in the Nanning attack (1075) by Ly Thuong Kiet (a Vietnamese general and admiral).

Plated gallery

Wagon and cart for filling in moats

Assault cover

Head cart

- Công Hào Đồng (攻濠洞/Assault cover) was used for troops' protection or moat crossing during a siege. Recorded of using in Vietnamese history were the Nanning attack (1075) and the siege of Vijaya (1471)

Iron plated ram

- Ô Quy Ba (烏龜笆/Siege ram) is an engine for shielding soldiers when approaching the wall, can be mounted on wheels, and comes with a perforated bar. Ming history says these tools were made by Thai Phuc/蔡福 - a Ming general who surrendered to the Lam Son rebels in 1427

- Lã Công Xa (Siege tower) was used by infantry to approach the citadel. The tower was pushed forward by men on the lowest storey or pulled by horses and oxen. Siege towers in Vietnamese history were recorded at the siege of Xuong Giang citadel by the Lam Son army in 1427.

Tương Dương Pháo (counterweight trebuchet) was used to shoot stones from a long distance. Trebuchet is recorded in Vietnamese history through the war against the Yuan Dynasty invasion in 1285, and in the "Complete Annals of Dai Viet" in 1427, the chapter about the siege weapons of the Lam Son army.

c. Fortification

The dramatic expansion of the war scale, strategic organization, and especially the popularity of firearms and siege weapons have changed the thinking on the design of Vietnam fortification. The most noticeable is in terms of layout. Initially, the citadel of the capital was built along the natural topography of the terrain (Co Loa, Hoa Lu). The advantage of this layout is that it takes advantage of the terrain to create obstacles in the movement of the attackers. However, the most significant disadvantage is that it is challenging to create a mass shooting concentration (bows, weapons, cannons) and the destructive power caused to the enemy formation is ineffective because the siege troops will also take advantage of the terrain to disperse. Gradually, the citadels changed into the traditional square shape, stretching over large surfaces on leveled terrain to achieve optimal gunnery efficiency (Figure 89). The Ho Citadel was built as a military center to confront the Ming, choosing a square layout and flattening the surrounding terrain to maximize the advantage of defensive artillery. Construction materials were also upgraded from rammed earth (Co Loa) to brick materials (Hoa Lu, Thang Long) and then monolithic stone (Ho citadel) to suit the situation and strategic purposes [8] (Figure 90).

Cổ Loa citadel (257 BCE) (Source:
https://kienviet.net/wp-content/uploads
/2012/07/2012_202_T08_anh6.jpg)

Hoa Lư citadel (10ᵗʰ century) (Source:
https://upload.wikimedia.org/wikipedia/commons/f/f8
Codohoalu1-Model.jpg

Thang Long citadel during Ly and Tran
dynasty from 11 to 14ᵗʰ century *(Source:
Hồng Đức Địa Dư – Plan de Thang-long)*

Ho citadel map in 1397 (Source:
https://whc.unesco.org/en/documents/115784)

Figure 89. The transformation from a geology layout to a square-shaped layout
(Source: Noted on photos)

Cổ Loa citadel (257 BCE) *(Source: doi.org/10.1017/S0003598X00067041)*

Hoa Lư citadel (10th century) *(Source: https://laodong.vn/ /kham-pha-co-do-hoa-lu-901236.ldo)*

Thang Long citadel (14th century) *(Source: VOV)*

Hocitadel (built in 1397) *(Source: http://redsvn.net/chum-anh-thanh-nha-ho-toa-thanh-co-ky-vi-nhat-viet-nam/)*

Figure 90. Transformation of material from earthen citadels (Co Loa citadel), earth-bricks mixed (Hoa Lu citadel), brick (Thang Long citadel), and stone blocks (Ho citadel) *(Source: Noted on photos)*

The art of war is intricate and complex, frequently requiring painstaking planning in logistics, morale, tactics, intelligence, and diplomacy. Throughout the pre-modern world, the majority of siege tactics centered around circumvallation, artillery bombardment, tunneling and sapping, escalade, siege tower, battering ram, and thermal attack, and Vietnam was no exception. As a result, Vietnamese remedies against the majority of siege strategies were nearly equivalent to those developed abroad. Through the long process of colonization, plus the encroachment and the strong influence of Chinese military science, the fortification of Vietnam also bears typical forms of the Chinese citadel. These

features continued to be inherited even when Western-style citadels were introduced in the 17th century.

Table 4. Parts of the Vietnamese fortifications (938 – 1832). *(Source: Đào Duy Từ, 1631, "Hổ Trướng Khu Cơ"; Ngô Sĩ Liên,"Complete Annals of Dai Viet", 1697; Phan Thuận An, "Hue Imperial citadel", 2006; https://doi.org/10.25073/0866-773X/391; Wikipedia; summarize by author)*

Parts of the Vietnamese Fortification	
Thành (The Wall)	
- Tường Thành (Fortified Wall): The wall was the most critical component of fortification. Vietnamese built their walls and foundations out of rammed earth, sometimes mixed with sand, gravels, rubbles, and ceramic debris, and reinforced with wooden piles, granite blocks, or brick pavement. From Lý Dynasty onwards, most walls were lined with red bricks and bound with limestone-glutinous rice paste mortar mixture. The resulting walls were tall and thick, nearly impervious to all but the heaviest siege cannons.	 SonTay citadel wall (1822) *(Source:VOV)* The damaged caused by French heavy cannon showed the red bricks structure of Thang Long citadel (*Source:http://icdn.dantri.com.vn/zoom/1200_630/2018/cua-bac-17-1515840982907.jpg*)

- Hộ Thành Hào (Moat): a deep, broad ditch, either dry or filled with water, constructed around a castle, fortification, structure, or town to provide a preliminary line of defense. Moats developed into elaborate water defenses in some locations, including natural or constructed lakes, dams, and sluices. Despite their comparable role, they are commonly referred to as ditches in earlier fortifications, such as hillforts. Moats or water defenses may have been purely ornamental in later periods. Additionally, they could serve as a sewer.	Defensive moat of Hue Citadel (*Source: https://www.moitruongvadothi.vn/tam-dung-viec-tu-bo-ke-ho-thanh-hao-o-kinh-thanh-hue-a45756.html*)
- Tam Trùng Thành Quách (Triple Concentric Citadels): Consists of 3 lines of defense, including: + La Thành (Outer citadel): The outermost citadel encloses the entire city and town area. + Hoàng Thành (Imperial citadel): is the citadel in the middle, protecting the nobles, mandarins, and the most important palaces of the court, the shrines of the royal ancestors. + Cấm Thành (Forbbiden city): The innermost citadel is the king's and royal family's residence and working place.	Outer citadel (green), Imperial citadel (yellow) and Forbbiden citadel (red) of Thang Long citadel (*Source: hinhanhvietnam.com*)

- Phòng Tuyến (Battlement): a parapet at the top of a wall, fort, or castle that has regularly spaced openings for shooting through. This is where direct fighting takes place between the siege and the defenders.

- Tường Giậu (Merlon): the solid upright section of a battlement (a crenelated parapet) in fortifications. Narrow, vertical embrasures sometimes pierce merlons, step tapered, or slits designed for observation and fire.

Merlon on Hoành Sơn citadel (built in 1833)
(*Source: PhongNhaExplorer*)

- Xạ Điểm (Crenel): The space between two merlons is called a crenel, and a succession of merlons and crenels is a crenellation. Crenels designed in later eras for use by cannons or firearms were called embrasures (Châu Mai).

Crenel of Nam Xương fort (built in 1803)
(*Source: https://dantri.com.vn/van-hoa/ngam-phao-dai-phong-thu-duoi-thoi-vua-gia-long-1433047356.htm)*

- Bình Lũy (Flattop Battlement): refers to a rare battlement with loopholes but no crenellation.	 Flattop Battlement of Trấn Bình Đài fort (Huế) (*Source: https://tienphong.vn/trang-moi-thuong-thanh-hue-chuyen-o-mang-ca-post1326195.tpo*)
- Pháo Nhãn (Loop Holes): a protected small opening which allows a canon to be aimed and discharged while providing cover and concealment for the artilleryman. Loopholes can also be seen on battleships.	 Loop holes of Đông Thành Thủy Quan gate (Huế) (*Source: https://24hsongxanh.vn/wp-content/uploads/2020/06/choang-ngop-1.jpg*)
- Đại Pháo Môn (Canon Embrasure): Similar to "Pháo Nhãn" but was used for large cannons. The arch port increases the firing angle and makes it easier for the gunner to take the line of sight.	 Canon Embrasure of Đông Thành Thủy Quan (*Source: https://image.phunuonline.com.vn/ fckeditor/upload/2020/20200702*)

- Nghinh Lâu (Albarrana Tower): a rectangular bastion or a stand-alone tower connected to another defensive system by a bridge or an arcade. Platforms are built-in positions with a broad view for combat, observation, or command.	Albarrana tower of Huế citadel (*Source: https://sdl.thuathienhue.gov.vn/?gd=4&cn==2284)*
- **Nguyệt Thành (Barbicans):** a fortified wall that completely encloses the gatehouse. It is typically rectangular or semicircular in shape and can enclose the gatehouse from either outside or inside. Nguyệt Thành was designed to delay enemy assault and, whenever the chance presents itself, lure a portion of enemy troops inside, separate them from the army's main body, and annihilate them. The wall of Nguyệt Thành is usually built to the same height and thickness as the main city wall and comes complete with its battlement, gatehouse, and tower.	Barbicans of Triệu Tường (1803) (*Source: https://vnexpress.net/phuc-dung-kinh-thanh-hue-thu-nho-2563673.html)*

- Đột Giác (Bastion): a projecting part of a fortification built at an angle to the line of a wall so as to allow defensive fire in several directions. The bastion is a particular component of the Vietnamese fortification, which only began to appear in 1790 after the introduction of the European Vauban style.	 Bastions of Huế citadel (*Source: https://cloudfront.net/images/guides/origin/anh-resize-flycam-dai-noi-hoang-cung-hue.jpg*)
- Tử Giác (Corner Bastion): Similar to Đột Giác but located at the intersection of 2 city walls, it has the largest observation and gunnery range.	 Corner bastions of Tây Thành fort (*Source: https://vcdn-vnexpress.vnecdn.net/2020/07/12/phao-dai-Tay-Thanh-6559-1594506313.jpg*)
- Thú Lâu (Sentry Tower): built on top of a city wall; also has secondary functions as temporary or permanent shelter as accommodation for city security guards.	 Sentry tower of Huế citadel (*Source: https://static.tuoitre.vn/tto/i/s626/2011/10/15/V78WdY6v.jpg*)

- Mã Đạo (Wall-scaling): refers to the facility that allows the defending troops to access the battlement at the top of the wall, typically incorporating both a stairway and ramp.	 Wall scaling of Đào Duy Từ Citadel (*Source: http://redsvn.net/chum-anh-quang-binh-quan-noi-ghi-dau-nhung-trang-su-song-gio/*)
- Hỏa Dược Khố (Ammunition Warehouse): The building was built on the walls to serve as a place to store weapons, firearms, and ammunition. Because it contains flammable and explosive components, it is often placed out of sight of the siege side.	 Ammunition warehouse of Tây Thành fort (*Source: media-cdn-v2.laodong.vn/Storage/Kinh-Thanh-5.jpg*
- Điếm Canh (Guard House): a temporary or permanent shelter built on top of a city wall or inside the city that primarily serves as accommodation for city security guards.	 Guard house of Hue Citadel (*Source: https://baothuathienhue.vn/sap-duoc-thay-diem-canh-tren-ky-dai-a31416.html*)

- Đại Môn (City Gate): As with all fortifications worldwide, the gate is the most vulnerable - and often the most heavily fortified - part of a Vietnamese city. The Vietnamese term Đại Môn can refer to both the gate door itself as well as the gatehouse securing the entrance.

City gatehouse of Thăng Long citadel (*Source: http://redsvn.net/vi-sao-nguoi-phap-pha-do-thanh-ha-noi-2/*)

A typical Vietnamese city gate door is a heavy wooden door, almost always rectangular in shape of the 'Solid-bed door' type construction. Outwardly, it is not too dissimilar to a typical ledged door. However, instead of simply securing the ledges to the boards using nails and metal bracing, the ledges of a city gate door are directly slotted into the boards with sliding dovetail joints and secured from the sides with mortice and tenon joints, which make for a solid entry.

North city gate of Thăng Long citadel and it's wooden structure (*Source: https://media.doanhnghiepvn.vn/Images/Upload ed/Share/2019/12/16/Bi-mat-chua-tung-tiet-lo-ve-Cua-Bac-thanh-Ha-Noi_6.jpg/*)

- Môn Đạo (Gateway tunnel): Early Vietnamese gateway tunnels were trapezoidal and supported by wooden columns and beams to maintain structural integrity. However, such a design was highly flammable, thus, it was swiftly replaced by the more fire-resistant arched tunnel as soon as the Vietnamese Figured out how to construct a brick arch and later a stone arch. Consequently, the majority of surviving Vietnamese city gateways feature arched tunnels.	 Gateway tunnel of Thăng Long citadel (*Source: kienthuc.net)*
- Thông Đạo (Branch Tunnels): Due to its size, a Vietnamese gatehouse has a relatively deep entrance tunnel. Typically, but not always, gate doors are situated deep within the tunnel to shield them from the elements and indirect fire artillery. However, if the enemy enters the tunnel and begins pounding on the doors, it will be difficult for the defenders on the wall to expel them. Gateway tunnels of bigger gatehouses generally include smaller branch tunnels that connect to the wall for flank counter-attacks.	 Branch tunnels of Thăng Long citadel (*Source: kienthuc.net)*

- Định Môn Bảng (Gate plate panel): Each rampart has nameplates located at the gates. The way to place the board is always in the middle, symmetrically, just above the arch. These signs may indicate the common name of the city but may also indicate the location of the gate in the East-West-South-North.	Gate plate panel of Thăng Long with the scarving "Chính Bắc Môn" (*Source:*
- Diềm (Cornice): This reinforces the connection between two different material systems or structures and is also a place to decorate and redirect rainwater to avoid causing moss and mold on the wall's surface	The cornice of Thang Long citadel between the brick and stone structure (*Source: kienthuc.net*)
- Murder holes: a particular ditch resembling a manger or watering trough constructed just above the gates and contains up to five drain holes. Its principal use is to allow the defenders on the wall to extinguish fires inside the gateway tunnel (especially if the gate doors catch fire). Still, the defenders can also throw other hazardous liquids down the ditch upon unwary attackers inside the tunnel.	The murder hole of the Thang Long citadel and its supporting slots (*Source: kienthuc.net*)

- Tiêu Thủy Ngạch (Drain Troughs): part of the stone pillar has grooves connected to the water channel, used to drain rain water on the wall's surface.	\n\nThe drain trough of Thang Long citadel\n(*Source: kienthuc.net)*
- Môn Lâu (GateHouse): a type of fortified gateway. Gatehouses are typically the most heavily armed section of a fortification to compensate for being structurally the city gate (weakest and the most probable attack point by an enemy).\n\nDifferent from a Western gatehouse, the Vietnamese gatehouse is actually a relatively featureless block of rammed earth and bricks, with one or several gateways tunneled through it. Most of the defensive features of a Vietnamese gatehouse are taken up by the guard tower built on top of it.	\n\nGatehouse of Hue citadel (*Source: https://www.vietnamonline.com/media/uploads/froala_editor/images/hue-city-5151869_640.jpg)*
- Guard Tower of GateHouse: built as a traditional wooden building. Not only is the place for defensive activities or a garrison for the guards, but a gatehouse tower is also a place for worship activities, sacrifices, and significant national occasions; Import and export rituals when there are critical royal events.	\n\nGuard Tower of Thang Long Citadel\n(*Source: kienthuc.net)*

The interior of gatehouse towers often uses brick walls of the same material as the city walls, but the interior and roof structure use traditional wooden house architecture. The symmetrical spatial layout resembles Chinese-style buildings. Later, despite introducing the French Vauban ramparts, the gatehouse towers still retain the traditional design.

Beam structure of Thang Long Citadel 's Guard Tower
(*Source: kienthuc.net)*

- Thủy Quan (Water Gate): a fortified gate led directly from a castle or town wall onto a quay, river side, or harbor. It enabled people and supplies to reach the castle or fortification directly from the water and equally allowed those within the castle direct access to water transport.

Water gate of Hue Citadel and it's position on map
(Source: thethaovanhoa.vn/2010/11/09/songnguha.jpg)

- Xạ Lâu (Turret): The fortified tower is operated by military personnel and was structured and built in the areas of established control. This type of fortification is a variation on the tower incorporated into the walls of the citadel. Guard tower soldiers can be equipped with ranged weapons like bows, ballista, rifles, or even cannons.

Some coastal turret/watchtowers can act as lighthouses or place the symbol of the fortress guard.

Turret of Ha Noi Citadel *(Source: travelmag.vn/files/ngocthuy/2020/05/25/cot-co7-1448.jpg)*

- Vọng Lâu (Watch Tower): is a type of fortification used in scouting. It differs from a turret in that it is usually a freestanding structure without being heavily armed. Its main purpose is to provide a high, safe place from which a sentinel or guard may observe the surrounding area. In some cases, it may also be used as a weathercast tower or commanding tower.

Watch tower of Hue Citadel
(Source: vcdn-vnexpress.vnecdn.net/2021/01/11/quan-tuong-dai-2511-1610363046.jpg)

- Kỳ Đài (Flag Station): the high-rise buildings and used to fly the defenders flag. This work is more spiritual than military. The purpose was to assert sovereignty and send a signal of encouragement to the soldiers who kept the citadel in battles against sieges.

Flag station of Hue Citadel *(Source: statics.vinpearl.com/ky-dai-thump_1633167442.jpg)*

- Đồn Bảo (Garrison): certain facilities that constitute a military base or fortified military headquarters. In some cases, Garrison is considered an independent part of the citadel, which strengthens the citadel's defensive capacity.

Mang Cá Garrison *(Source: codohue.vn/uploads/images/ 202107/image_750x_610120f5afa0c.jpg)*

Champa Kingdom military landscape

With the advantage of terrain adjacent to the East Sea, the Cham people soon developed the seafaring profession. Besides the professions of fishing, there is a profession that brings great profits to the Champa economy: piracy. Pirates from the Cham tribe made continuous raids along the Indochinese coast. As a result, they were perpetually in conflict with the Vietnamese and the Khmer: from the tenth through the thirteenth centuries, Champa and the developing Khmer Empire waged war on each other. In 1177, Cham monarch Jaya Indravarman IV launched an unexpected attack on the Khmer capital Yasodharapura (Angkor), which he defeated at the Battle of Tonlé Sap. Jayavarman VII, the new Cambodian emperor, rose to power in 1190, repelled the Cham, and began his conquest of Champa. In 1203 he defeated the Cham and placed Champa under Khmer rule for 17 years. In 1220, after the Khmer withdrew voluntarily from Champa, a Cham prince named Angsaraja proclaimed Jaya Paramesvaravarman II of Champa, reestablishing Cham independence.

Champa continued to face a northern counter-power after being liberated from Khmer control. In 982, 1020, 1044, 1069, and 1252, the Vietnamese pushed for war against Champa. For a brief while, the new Mongol Yuan menace drew together two adversarial kingdoms, Champa and Dai Viet. Simhavarman IV (r. 1307–1312), the Cham king, attempted to resist the Vietnamese agreement in 1307 but was defeated and taken prisoner. Champa thus became a subordinate state of Vietnam from 1312. In 1318, the Cham revolted. In 1326, they defeated the Vietnamese and reclaimed their independence. [72] [73] (Figure 91).

Figure 91. Variation in territorial disputes between Dai Viet and Champa from 1220 to 1327.
(Source: http://webmap.iwmi.org/mapper.asp)

Royal turbulence continued inside the Cham court until 1360, when a strong Cham monarch known as Po Binasuor (r. 1360–90) was enthroned. Champa reached its zenith during his thirty-year reign. Po Binasuor defeated the Vietnamese invaders in 1377, pillaged Hanoi in 1371, 1378, 1379, and 1383, and came dangerously close to unifying all of Vietnam for the first time in the 1380s. However, during a maritime battle in early 1390, King Po Binasuor was assassinated by Vietnamese firearms forces, effectively ending the Cham kingdom's brief ascendancy. During the following decades, Champa reverted to its pre-war state of calm. In 1428, Cham monarch Indravarman VI (r. 1400–41) renewed peace with Le Loi's second kingdom of Dai Viet. Following Indravarman VI's demise, succession issues devolved into civil war between Cham princes, eroding the kingdom's strength. In 1446, the Vietnamese used this situation and invaded Vijaya. In 1471, King Le Thanh Tong attacked Champa, massacred 60,000 people, and abducted 30,000 prisoners, including the Cham monarch and royal family. Champa was reduced to the rump kingdom of Panduranga, which survived until the Vietnamese Empire completely annexed it in 1832. (Figure 92) [74]

Figure 92. The process of invading Champa territory and merging it with Dai Viet over the years (left) and the royal order of the Nguyen Dynasty on the eradication of the indigenous culture of Champa (right) *(Source:* *https://upload.wikimedia.org/wikipedia/commons/8/84/Nam_Tien.PNG)*

Thus, political instability and war can be seen in Champa. Not only did Champa constantly have to confront powerful opponents from Khmer and Vietnam, but also encountered a lot of instability in the country when civil wars between aristocratic princes occurred after each change of throne. An unsustainable economy, heavily dependent on pirates, is also a cause of the weakening and destruction of the Champa kingdom. The political, military, and economic instability often caused the Champa people to leave their citadel and capital. New capitals built later are simpler in shape and more in favor of tactical elements due to the ruling of Vietnamese politics until the day it was completely annexed.

Architecture and Decoration

Studying Champa's art in terms of distinct "styles" associated with different historical eras and geographic areas is possible. Numerous scholars have sought to establish a taxonomy of historical styles through their research: Philippe Stern (The Art of Champa (formerly Annam) and its Evolution, 1942), Jean Boisselier

(Statuary of Champa, 1963). Based on the work from these scholars, the following styles and sub-styles of Champa architecture and decoration are:

- Mỹ Sơn E1 (7th to 8th century)

- Dong Duong (9th to 10th century)

- Mỹ Sơn A1 (10th century)

    o Khuong My (first half of the 10th century)

    o Trà Kiệu (second half of the 10th century)

    o Chanh Lo (end of 10th century to the mid-11th century)

- Bình Định (11th to 14th century)

Each style is named after a place in Vietnam at which works exemplative of that style have been found. [75]

Table 5. Champa architecture and decorative styles *(Source: Tran Ky Phuong, "The architecture of temple-towers of Ancient Champa", 2009; The Museum of Cham sculpture in Danang; AD Hardy, M Cucarzi, P Zolese, "Champa and the Archaeology of Mỹ Sơn (Vietnam)", 2009; summarized by author)*

Characteristics of Champa's art styles
Mỹ Sơn E1 style (7th to 8th century): The earliest identified style is My Son E1. The style of this period reflects outside influences of pre-Angkorian culture and also Dvaravati and Southern Indian art[3]. This is the opening style for the trend of localizing foreign-acquired elements.

| In terms of architecture, the My Son E1 style is typical for the type of temple with a large size and carving around. This architecture consists of many pieces assembled with a mortise on top and is considered the early standard for the later construction of Cham towers. | |

Decorative of Mỹ Sơn E1 shows the life of monks (or Rishi) with various activities such as practice, ritual, teaching, meditation, and resting in the sacred forests.	Some details simulate the architecture of a tower, such as steps, arches, door pillars, and decorative motifs of flowers and leaves.
In front of the steps also illustrates dancers performing a delicate and vivid dance of the divine scarf to honor the Gods.	Many iconic metaphors for a temple, representing the legendary mountain Meru in Indian mythology.

Some patterns of floral décor and character costumes imply resemblances with the sculptures of Mon-Dvaravati art in Thailand and pre-Angkor (Cambodia) in the 7th – 8th centuries.

Đồng Dương style (9th to 10th century): This style has been described as a highly original style of "artistic extremism," "with exaggerated, almost excessively stylized features."[21]

Đồng Dương style started with Hòa Lai temple. In the first half of the 9th century, this type had round multi-pronged arches with octagonal buttresses made of sandstone, with the decoration of curved leaves coiled inwards.

In the second half of the 9th century, the Đồng Dương style changed. The decorations turned into floral patterns facing outwards. In addition, Indrapura-style towers had pilasters and angled and filtered windows.

Sculptures of this period were flexible, diverse and showed the carvings closer to the Cham people than the images of the gods. The statues have thick noses and lips without smile.

Mỹ Sơn A1 Style (10th to 11th century): a style characterized by dynamic shapes, seemingly dancing, and graceful beauty. This period has been called the "golden age" of Cham Art.

The My Son A1 style had complicated shapes and archways. The tower's body was high, with the floors gradually getting smaller.	The pilasters stand in pairs with a human-shaped wall in the middle.

Statue of Siva in the Guimet Museum	The images of Shiva, Apsara dancers, elephants, and griffins are very popular in My Son A1 style.

My Son A1 style had been formed by the combination of massive architecture yet elegant appearance with the delicate sculpture on bricks and stones, soft branches and leaves, and human and animal figures.

Bình Định Style (11th to 14th century): Architectural and artistic designs gradually turned into a strong style with fewer carving shapes giving a strong impression. This transformation showed the similarity with the Angkorian art style.

The arches retracted and shot up into the shape of a spear. The small towers on the upper floors curled into bold and strong blocks.	The pilasters completely joined into the wall and formed a flat block. The wall surface of the tower embossed veins.

Hiện vật Champa: Đài thờ từ Tháp Mắm, thế kỷ 12-13 | Nguồn: danangfantasticity.com

The carving in this style focused on the details rather than the general beauty and dynamics of the objects.	One of the motifs of Bình Định style is carved in stone with a row of women's breasts images around the base of an altar.

b. Military tactical and technology

Historically, the Cham employed a high number of soldiers in their infantry, as well as an elephant corp. They were armored in a variety of ways, including leather, scale lamellar, chainmail, and buff jackets. Though the Cham were traditionally seafarers, their fleet mainly consisted of enormous war boats propelled by oars that could take many marines into close-quarters combat with Khmer and Vietnamese ships (Figure 93). However, following the gunpowder era, most Southeast Asian kings in Dai Viet, Lan Na, and Luchuan bought and used Chinese armaments, including rockets and pistols. However, Champa and Ayutthaya were slow to adapt this technology and paid the price. Po Binasuor, the great Cham monarch, was killed in a naval battle in 1390 [76] relates his death to a weapon named Huochong, which was long assumed to refer to a cannon but is more likely to refer to a handgun (Figure 94). The application of these new military technologies contributed to a lasting shift in the power balance between the two kingdoms.

Figure 93. Champa territory was expanded after Po Binasuor's campaign from 1360 to 1390 *(Source: DragonHistorian Channel)*

Figure 94. The painting depicted the turning point of the Vietnam-Cham war when King Po Binasuor of Champa was suddenly killed in battle by Dai Viet's musket attack. *(Source: https://znewsphoto.zingcdn.me/w660/Uploaded/mdf_n sozxd/2019_04_05/tran_khat_chan.jpg)*

- Army: The Champa army was a professional army that was provided with food and clothing by the king on the basis of wealth obtained from the people, instead of being self-sufficient according to the policy of agrarian residence as in other empires at the same time. The monthly salary for soldiers consisted of 2 bushels of rice (1 bushel equal to 1 kg and equal to 20 -22 kg) along with 3 -5 uniforms for winter and summer. In addition, the commanding levels of the Linyi - Champa army also had many ranks, from Lord (Rajah) to lower ranks such as Mahasenapati (General), Senapati (Officer), Agrasenapati (Batlion Commander). In the Cham Pa federation, the Highlands communities such as Ede, Jarai, Raglai, Churu, or K'ho played the role of vassals and allies, forming a strong and elite military alliance. [77]

Table 6. Champa military and warfare technologies (Source: Ikeuchi Katsushi, "Digital Bayon Temple - e-monumentalization of large-scale cultural-heritage objects," 2007; Michel Jacq-Hergoua1c'h, "The Armies of Angkor: Military Structure and Weaponry of the Khmers," 2007; The Museum of Cham sculpture in Danang; AD Hardy, M Cucarzi, P Zolese, "Champa and the Archaeology of Mỹ Sơn (Vietnam)"; Min, "Battle of Tonle Sap: Champa and the Khmer Empire's Southeast Asian version of Wu Yue hegemony", 2022;

https://en.wikipedia.org/wiki/Cham%E2%80%93Vietnamese_War_(1471); summarize by author)

Military and warfare technologies
The composition of the Champa army included infantry, cavalry, war elephant, and navy. The army's size remained at 40,000-50,000 people, with the unit organization being 5-person combat groups. The marching signals of the Champa army were the horns and drums, and when entering the battle, the orders to attack were the sound of battle drums. The basic battle formation of the army is composed of 1 war elephant supported by five cavalry and 30 foot soldiers divided into groups of 15 people in the front and 15 in the back.

The military organization of the Cham and Khmer is depicted through the fresco "Battle of TonleSap" at Bayon Temple Cambodia in the 12th century.
(Source: https://media.istockphoto.com/photos/warship-picture-id137227137)

Illustration based on a bas-relief from the Bayon temple, depicting a fighting unit with war elephants, cavalry, and foot-soldiers. *(Source: khmerknowledgekeepers.weebly.com/uploads/2/6/6/4/26648619/1410856.jpg?660)*

Restoration of Khmer military organization from the carvings at Bayon temple. *(Source: asianetworkexchange.org/articles/10.16995/ane.280/)*

War Elephant: According to Odoric de Pordenone, who visited Champa cities in the 14th century, the number of Champa war elephants amounted to 14,000. The war elephant of Chams is equipped almost like that of the Chen La army. On the elephant's back, there is an umbrella for the commander's seat. A Cham Pa war elephant consists of a mahout dressed in military uniform as an infantry along with combat soldiers armed with iron javelins, bows, and arrows. War elephants were used in the Champa army as a shock division, breaking the enemy's ranks. In some battles, such as the war with the Song army of China in 446, King Fan Yang Mai II of Champa even deployed iron armored war elephants to repel the Liu Song army.

The the ornate armor of war elephants, based on data from the sculptures of Angkor. *(Source: Michel Jacq-Hergoualc'h, 2007, "The Armies of Angkor: Military Structure and Weaponry")*

Illustration and 3d rendering based on a bas-relief from the Bayon temple showing archers fighting on elephant-back. *(Source: khmerknowledgekeepers. weebly.com/key-featues-of-the-khmer-empire.html)*

Cavalry: Among the troopers, the cavalry force was the latest to present in the Champa army. The time of the appearance of cavalry in the Chams army was in 1171 when the Chams king at that time, Jaya Indravarman IV, was trained cavalry tactics by soldiers of the Song dynasty who was shipwrecked on the coast of Champa. When the Champa king, Maha Sajan

(Reign from 1460 to 1471) attacked Hoa Chau citadel in 1470, a large part of the Cham army in the attack was cavalry.

Champa cavalry according to the description on the Bayon temple *(Source: Angkor Wat S Gallery W Wing main gallery)*

Cavalry commanders are depicted as a unicorn raider *(Source: Angkor Wat S Gallery W Wing main gallery)*

Evidence shows the appearance of a war chariot archer in the Champa army *(Source: Angkor Wat S Gallery W Wing main gallery)*

The diverse genres of war chariots are also evidenced in other monuments found in Vietnam. *(Source: Alamy stock photo; Danang Champa Museum)*

War Engines: In the first time marching to the territory of the Khmer empire for the "Battle of TonleSap", the Champa army numbered thousands of chariots (according to the history of Cambodia). These are carts drawn by animals such as cattle, used to transport supplies, military equipment, and soldiers, and also war engines to serve directly in conflict. Historically, there has been no mention of the Cham using catapults or large siege weapons.

Siege engine of Champa army *(Source: Angkor Wat S Gallery W Wing main gallery)*

Siege elephant and double-bow ballista *(Source: Stephen Turnbull, "Siege Weapons Of The Far East")*

An ox-drawn cart of Champa army *(Source: Angkor Wat S Gallery W Wing main gallery)*

Double-bow ballista *(Source: Angkor Wat S Gallery W Wing main gallery)*

- Naval: In the Champa timeline, the powerful naval fleet is the key element that brought Champa to the peak of its prosperity and power. The ancient Chams were talented and mighty sailors, as evidenced by their epic texts about the glorious past, scurrying on the waves like the Po Riyak Epic (God of Wave). The ancient Cham merchant ships used to travel not only to the North to the Chinese ports but also to the islands of Southeast Asia (Nusantara). The Cham Pa warship is compact and has a moderate load that can carry dozens of soldiers, easily glides quickly, and rotates easily when going into battle. The oarsmen of the Cham ships were mounted through the hole in the center of the long shields. Also, a rattan trellis was mounted on the boat to protect all the sailors. Warships are equipped with 5 to 6.5 meters side hooks, which are used to throw over the side hook on the enemy ship and then link the two ships to form a navy melee combat. The Champa warship is also equipped with a sharp wooden head and a slightly curved back under the ship, which acts as a log to pierce the side or stern of the enemy ship.

Sculpture depicting Champa warship with rowers and marine warriors *(Source: Angkor Wat S Gallery W Wing main gallery)*	TonleSap naval battle between the Khmer navy (left) and the Champa navy (right) *(Source: Angkor and the Khmer Empire: Splendor and Ruin)*

- Equipment: The Cham army was formed from young adults who grew up in jungle or river life, with adept hunting, javelin, and seafaring skills. The factor that made the strength of the Cham warriors in the battles was agility, speed, and surprise campaigns. This has been historically demonstrated through the rapid attacks of the Cham on the Khmer capital or the territories of Dai Viet. To gain speed advantage, the basic equipment of Champa soldiers was cut down some of the weight and clothing, which limited movement speed and reduced fatigue. The hot and humid climate and many rivers also made the Cham warriors ignore large metal plate armor instead of leather jackets and shields - a material readily available in the central and southern Vietnam forests. In general, the equipment of the Khmer army has no advantage in terms of equipment or weapons. Besides, their biggest weakness is the lack of large siege weapons and absolutely no firearms.

Due to the hot climate all year round, the Champa army did not use metal plate armor because the moisture of the jungle and rivers would cause rapid rust. Instead, light armor of leather and cloth was chosen for giving protection from the sun and not rust or be destroyed easily. Champa warriors might also not wear anything at all into combat, or wear "Sak Yant" (a kind of coat with incantations written on) to protect themselves as seen on the walls of Angkor and Bayon temples.

To improve the weakness of lack of protection, Cham soldiers use effective large shields, buckle, and arm shields designed to be used both as protective tools and the weapon itself with the combined technique of shield bashing and sword slashing.

Equipment of Khmer warriors (left) and Champa (right) as depicted in the mural "Battle of Tonlesap" in 1177 *(Source: https://thumbs.dreamstime.com/b/bas-relief-sculpture-elephant-charging-battle-cham-khmer-bayon-temple-angkor-thom-siem-reap-cambodia-114919557.jpg)*

Round-shield and kite-shield of Champa warrior *(Source: https://www.quora.com/What-kind-of-armor-was-used-in-Medieval-Thailand-Burma-Cambodia-Laos-Indonesia-and-Malaysia)*

Officers and heavy infantry were equipped with ornately decorated helmets, which, in addition to protection purposes, were used to distinguish ranks and at the same time, increased morale through spiritual beliefs.

War helmet of Champa army in 1177. Not only for protection, the helmets are also elaborately decorated to show the status and class of the warrior.
(Source: https://www.quora.com/What-kind-of-armor-was-used-in-Medieval-Thailand-Burma-Cambodia-Laos-Indonesia-and-Malaysia)

The weapons of the Champa soldiers included a variety of range bows/crossbows (Tnoo), polearms (Phkap/Lompang), swords (DHA) and daggers (dao). Melee weapons - due to Cham's high aesthetic value - are often intricately carved and decorated, somewhat affecting their functionality and reducing mass production efficiency.

Champa army melee weapons *(Source: kunkhmerwarrior.com)*

Champa army range weapons *(Source: kunkhmerwarrior.com)*

Figure 95. Map of Cham archaeological sites in Vietnam *(Source: Đà Nẵng Museum)*

c. Fortifications

Some features characterize Champa citadels: the geographical context of the Champa citadel sites in terms of spatial organization and construction method. Citadels of the Champa were frequently located near rivers. Simhapura (4th century), Kandapurpura (5th century), Hoa Chau (9th century), Vijaya (10th century), and Ho-Kauthara (14th century) all have enlarged spaces along their citadels' corners or exterior sides. They all served a defensive purpose. The Vijaya Citadel, in the instance, had bigger extended areas near the citadels and was perhaps more defensively oriented than the other citadels. According to the Champa citadel chronology, the political center of the Quang Nam–Thu Bon region between the fifth and eleventh centuries was located at the Chiem Son location, which lacked a defensive wall. The citadels of Simhapura, Ho-Kauthara, and Co Luy served as citadels at an earlier phase of Champa history. However, between the fifth and ninth centuries, there appears to have been no citadel in the Thu Bon River basin of Quang Nam Province, where, as the inscriptions indicate, one of mandala Champa's political capitals was located during this period. Recent archaeological discoveries in this region indicate that the Chiem Son site in Duy Xuyen District served as the region's political center during this era. A citadel without defensive citadels did exist on this site. This is an interesting point to ponder while considering the mandala Champa's power structure. Mandala Champa attained the status of "integrated society" during this period. The grandeur of the Cha Ban Citadel and the absence of extensive territories outside its fortifications attest to this [78] (Figure 95).

Table 7. Correlation of the location of the Champa citadel with the existing rivers

Simhapura (4th century)	Kurung (5th century)	Kandapurpura (5th century)

Amaravati (9th century)	Vijaya (10th century)	Ho-Kauthara (14th century)

On the central of Vietnam, there are many traces of ancient Champa citadels such as Co Luy citadel (Quang Ngai), Vijaya citadel (Binh Dinh), Hoa Chau citadel, Kandapurpura citadel (Hue). These citadels are often built in naval key positions near river mouths, seaway, or river confluences. The Champa people took full advantage of the natural terrain such as rivers, mounds, hills, and mountains to strengthen the defense. Typical examples can be found in Quang Binh province, such as the citadel of Hoanh Son, Lin Yi citadel (Quang Trach district); Ke Ha citadel, also known as Khu Tuc citadel, Kandapurpura citadel (Bo Trach district), and Ninh Vien citadel (Le Thuy district). These traces provided some general information about the characteristics of the Champa citadel [79].

Table 8. Champa citadel material and decorative motif

Material & techniques	
Earthen	Wooden ramparts filled with earth
Châu Sa Citadel *(Source: http://redsvn.net/wpcontent/uploads/2019/01/Thanh-Chau-Sa-02.jpg)*	Sri Banoy Citadel *(Source: https://vi.wikipedia.org/wiki/Thành_Thị_Nại)*
Brick	Stacked stones

Long Wall of Quãng Ngãi *(Source: wikipedia.org/wiki/Long_Wall_of_Quang _Ngai)*

Vijaya Citadel *(Source: https://vi.wikipedia.org/wiki/Thành_Thị_Nại)*

Decorative motifs: According to excavation results, artifacts found in Champa's ancient citadel show diverse and sophisticated decorative motifs. The relics of pottery kilns, handicraft villages of stone carving, and making statues around the citadel are also proof that the Champa citadel in the past had very sophisticated artistic decorations like Cham temples. It is possible to consider some monuments of similar civilizations such as India, Ayutthaya, and Khmer for understanding.

Ancient Champa lion statue in Vijaya citadel *(Source: Nguyễn Đông Sơn, 2010)*

Ancient Champa elephant statue in Vijaya citadel *(Source: http://redsvn.net/wp-content/uploads/ 2018/12/Voi-da-thanh-Do-Ban-01.jpg)*

The reliefs decorated with animal gods such as birds, snakes, and lions typical of Hindu are found in temples and towers in the ancient Champa citadel *(Source: Da Nang Cham Museum).*

Hiện vật Champa: Tượng chim thần Garuda và rắn Naga từ Tháp Mắm, thế kỷ 12-13 | Nguồn: giadinhvatreem.vn

Statue of Garuda bird and Naga snake found in Mẫm tower relic - 12th century *(Source: giadinhvatreem.vn).*

Champa artifacts found in the ruins of Simhapura Citadel *(Source: Tra Kieu Cham Museum).*

Drawings of the Khmer citadel, with many similarities with the artifacts found in the Champa citadel *(Source: EFEO museum).*

Champa citadels are located in an important strategic position. This is the main reason why they tend to be demolished when being captured by the army from the Vietnamese dynasties to avoid the risk of recapturing. All Cham citadels in Vietnam nowadays have been destroyed along with the destruction of the Cham dynasty. The remaining relics and ruins are enough to visualize the overall layout. But more archeological and bibliographic data are needed to reconstruct the model of the intact morphology of a Cham citadel.

2.4 Western-influenced period (1873 – 1920)

2.4.1 French invasion and the influence of Western architecture on Vietnam

While capitalism flourished in Europe in the mid-nineteenth century, Vietnam's economy remained focused on agriculture, a primitive decadence. The majority of farmers subsisted on agriculture, while industry and trade developed but were likewise constrained by feudal regulations.

Europeans arrived in Vietnam in the 16th century via Christian evangelists. They also introduced monastic and church architecture to Vietnam. In August 1858, a French army invaded Da Nang and then moved south to seize Saigon. The Nguyen Dynasty did not resist and tributed three southeasts and   six

southern provinces as the trade for ceasing fire. In 1873, the French captured Hanoi and established their colonial and semi-feudal policies in Indochina. In June 1884, the Patenoote Peace Treaty was signed in Hue Capital, dividing Dai Nam (the former name of Vietnam) into three regions: Cochinchina (French colony), Tonkin, and Annam (placed under French protectorate with the Nguyen Dynasty remaining nominally in authority).

The Notre Dame Cathedral in Saigon (1880) and the Hanoi Cathedral (1880) were the pinnacles of these architectures in the late nineteenth century (1884). Phat Diem Church at Ninh Binh, which took over three decades to build with the completion of many items in 1896, was likewise a unique fusion of European cathedral architecture with Vietnamese architecture.

According to Nguyen Dinh Toan, a researcher, French architecture in Vietnam went through three distinct phases:

The first phase: lasted from 1873 until 1900. Pre-colonial architecture

The second phase: lasted from 1900 to 1920. Forming of colonial architecture

The third phase: lasted from 1920 to 1945. Colonial architecture evolved and formed an identity. It is also feasible to mention a brief period between 1945 and 1954 when France occupied Hanoi and other provinces; however, architectural growth was little during this time period due to the war between the French and Viet Minh [80].

Figure 96. Map of Hanoi during French colonial *(Source: Nguyen Dinh Toan, Vietnamese architecture through Dynasties, Construction Publisher, 2014)*

Figure 97. Map of Saigon during French colonial *(Source: Nguyen Dinh Toan, Vietnamese architecture through Dynasties, Construction Publisher, 2014)*

Figure 98. Saigon City Hall (Mairie et Re2gion Saigon) *(Source: Nguyen Dinh Toan, Vietnamese architecture through Dynasties, Constructuon Publisher, 2014)*

a. The first phase (1873–1900)

The French began construction of solid works on the concession area during this phase, thus inaugurating the period for their large-scale construction in Hanoi and the provinces of Vietnam using the imported European way of urban construction. The main structure was designed in accordance with the idea of arranging European trade in foreign countries, using the typical layout of symmetrical axes and geometric streets (Figures 96, 97, and 98).

b. he second phase (1900 to 1920)

Since 1900, the French government in Indochina has been constructing its headquarters in Hanoi. The architecture consists primarily of mansions, offices, and half-mansion buildings, as well as several official French architectural styles (tile roof, with roof basement).

Figure 99. Facade, Perspective, Plan and Interior of Presidental Palace in Hanoi
(Source: https://en.wikipedia.org/wiki/Presidential_Palace,_Hanoi)

This phase's architecture was also extensively examined in order to disassociate it from pre-colonial building's plain functionalism. Neoclassical architecture was popular in the offices of the French colonial administration, with the symmetry layout expressing the majesty and beauty of the major facades through an architectural form that was heavy downwards and concentrated on detail embellishment (Figure 99).

Auguste Henri Vildieu was the architect who oversaw all construction work in Hanoi.

c. The third phase (1920 to 1945)

New architectural styles were experimented with to replace the imported classical French architectural styles. The exploration of Asian-European pairings, utilizing traditional architectural traits but also paying attention to the local environment and materials, was a movement. A noTable movement during this period was the Art Deco style, which eschewed classical architectural details

in favor of simplified geometric and linear shapes. It developed into a strong, parallel development in the Indochinese style. Both of which had bequeathed numerous priceless architectural works (Figure 100).

Figure 100. Indochine museum "Blanchard de la Brosse" in Saigon *(Source: http://www.historicvietnam.com/saigons-earliest-museums/musee-blanchard-de-la-brosse-1929/)*

Governor Maurice Long (1921) made a significant contribution by bringing in renowned architects from France and other colonies, such as Emest Hébrard, Arthur Kruze, and others.

The French tropicalized Hanoi, Saigon, Hue, Hai Phong, and Nam Dinh, as well as seashore resorts at Da Lat, Nha Trang, Vung Tau, Bach Ma, and Do Son.

Simultaneously, the French introduced new materials, processes, and construction technologies that altered the city's appearance, including cement, reinforced concrete, iron, tile, brick-fired technology, and iron and ceramic water sewer pipes.

While the French constructed architectural works for them, Vietnamese architecture developed from the traditional folk architecture in the royal palace and villages. During the Nguyen dynasty, under French colonial control, the

architecture of urban centers, towns, and rural areas in Vietnam continued to develop. Most of the dwellings were constructed using traditional brick, wood, and tile materials. The distinction between rural and urban areas appeared to be minimal.

2.4.2 The interplay of two architectural styles in Vietnam's colonial architecture

French architecture, which had penetrated Vietnam, had developed in conjunction with indigenous architecture for a lengthy period. There were two opposing trends throughout this period, namely Europeanization and anti-Europeanization, both in culture and architecture.

Traditional architectural components were phased out during the initial phases and replaced with new ones. However, by the early twentieth century, French architecture had been changed to accommodate the natural surroundings and indigenous culture; Vietnamese architecture had also affected French architecture.

During the first phase (1984–1920), most of the French colony's major structures were replicated in France, including the Governor Palace in Saigon, the King's House, the Supreme Court, and the Hanoi railway station. These buildings were designed in the European Neoclassical style, emphasizing rigorous symmetry in the axis, column, and structure beam system, similar to the Renaissance style. Following that, during the second phase (1920-1945), the French maintained European-style architecture, combining research into local climate conditions to create colonial architecture with adaptability and identity shape.

The trade process began to alter the architecture's appearance, transforming Vietnamese architecture into a new style [40].

2.4.3 Colonial architecture: types and styles

The French litigated numerous types of architecture during their occupation of Vietnam, including citadels, the construction of military camps, housing, public buildings, churches and monasteries, and landscape architecture. Additionally, a significant contribution was the development of a range of architectural styles, including prehistoric colonial, neo-classical, indigenous French, Art Nouveau or Art Deco, and Indochina architecture.

Table 9. French architectural styles were introduced and formed in Vietnam in the early 20th century

Pre-colonial style: Pre-colonial style buildings often have had a simple rectangular plan with wide corridors running around. The house usually had two floors. The second floor uses steel beams to support the brick shape above. The roof was sloped by tiled or corrugated iron. The brick-built top retaining wall is used to decorate the facade. It has a few simple decorative forms, such as rows of lathes or cemented flowers and leaves shapes. The corridor around the house was created in the form of an arc or hemisphere with an arch lock.

French military headquarters in Hanoi
(Source: Ashui.com)

French Town Hall in Hanoi
(Source: Ashui.com)

Neo-Classical Style: Neo-Classical style is the dominant architectural style for large public buildings in Vietnam during the French colonial period. This style had the strongest effect and impression during this whole period. The layout was balanced with having a lot of classical orders, sloping western roofs, or stone tiles. Diverse decorative forms use Classical Roman, Renaissance, and Baroque styles and details.

Gouvernement général de l'Indochine *(Source: https://vi.wikipedia.org/wiki/Phủ_Chủ_Tịch)*

Sài Gòn Municipal Theater *(Source: blisssaigon.com/the-municipal-theatre-saigon/)*

Indigenous French: The local French-style buildings in Hanoi are generally bold, nostalgic, and charming, bearing many architectural features of the northern regions of France and Paris. However, there were specific changes to suit the new functions and the hot climate of Vietnam.

The School for Indigenous Girls in Ha Noi
(Source: https://ashui.com/mag/images/stories/ 200906/truonghoc_phap3.jpg)*

French lyceum in Ha Noi
(Source:
http://armellesuz.free.fr/alas
/alas_photos_classes.html)

Art Nouveau: Constructions following the art nouveau style often use classic shapes in spatial layout, including square and rectangular blocks combined with semi-cylindrical blocks to create a modern and simple architectural form. In addition, decorative motifs are bending steel or embossed with cement and plaster with soft lines to reduce the roughness and heaviness of the main blocks.

Banque de l'Indochine in Ha Noi
(Source: https://en.wikipedia.org/wiki/Banque
_de_l%27Indochine)

Real estate credit fund
headquarters
(Source:
ashui.com/mag/images/stories/
200906/hanoi_artdeco4.jpg)

Indochine style: Architecture in Indochinese style had the prevailing French style plan structure and shaped at that time. However, there were changes in terms of space and architectural structure to improve the adaptation to local climate conditions, landscapes, and cultural traditions. Architects who followed this style often used traditional Vietnamese and Khmer architectural forms and details in creating roofs, door panels, and other decorative motifs.

Louis Finot Museum in Hanoi
(Source: upload.wikimedia.org/wikipedia/
commons/4/47/4G4A7248A_HDR.jpg)

Université Indochinoise in Hanoi
(Source: vcdn-
vnexpress.vnecdn.net/2017/11/09/dai
-hoc-dong-duong-2-5251-
1510228553.jpg)

2.4.4 Vauban Citadels in Vietnam

European missionaries first arrived in Vietnam in the 16th century. In 1790, Nguyen Anh picked Saigon as the capital, renaming it Gia Dinh, and then relied

on two French army officers, Olivier de Puymanel and Théodore Lebrun, along with the bishops Ba Da Loc and Tran Van Hoc, to sketch European fortifications for the creation of Gia Dinh Citadel (Octagonal Citadel). In August 1858, a French army invaded Da Nang and then moved south to seize Saigon. The Nguyen Dynasty did not resist, transferring three southeast provinces to six southern provinces. In 1873, the French captured Hanoi and established their colonial and semi-feudal policies in Indochina. In June 1884, the Patenoote Peace Treaty was signed in Hue Capital, dividing Dai Nam (the former name of Vietnam) into three regions: Cochinchina, which was a French colony, Tonkin, and Annam, which were placed under the French protectorate, with the Nguyen Dynasty remaining nominally in authority.

Figure 101. Structure of a Vauban bastion style *(Source: Mario Morini, Atlante di Storia dell"Urbaniica, Editore Ulrico Hoepli Milano, 711-582, 1963, p. 241)*

Nguyen Anh was the first person in Vietnamese history to make touch with the French troops and accept their assistance and receive the French fortification technology. For defense, Nguyen Anh King adopted Sébastien Le Prestre de Vauban's fortification model, which he dubbed the Vauban style. This military stronghold was built in the conventional Western style of the period, with the zig-zag type serving as the model for the citadel. The Citadel was constructed on the square, with entrances, forts, thick walls, corner observatories, and a front moat system. According to Phan Thuan An, a researcher, the majority of

Vauban's bastions were constructed using square or polygonal layouts with five, six, or eight edges at the time. A convex angle bastion was constructed between two neighboring edges. Constantly convex angles gave the appearance of a star. Bastions were constructed in this manner as a complex series of buildings that were inextricably linked and provided a strong defensive system. In general, it consisted of the major components from the inside to the outside, such as a citadel, fort, or angle fortress, a wall connecting two forts, fired walls, a covered road, a defensive moat, and closed roads.

The Vauban bastion type was characterized by the presence of bastions, lunettes d'angle, embrasures, berms, and glacis in the event that the military was armed with gunpowder-firing weaponry. Thus, prior to contact with the West and the acquisition of this weaponry, it was evident that this citadel type would not exist in Vietnam (Figure 101).

According to Do Van Ninh, a researcher, during his reign, Nguyen Anh received literature translated into Vietnamese by Eveque d'Adran in order to study the French fortification's construction. Then, in 1790, the Frenchmen Philippe Vansier, Jean Baptiste Chaigneau, De Forcans, and especially Olivier de Puymauel assisted Nguyen Anh in constructing Saigon's first Vauban fortress. Then, between the reigns of Gia Long and Minh Mang, the subsequent Kings built almost all of the major cities such as Hue, the provinces of Hanoi, Cao Bang, Lang Son, Bac Ninh, Tay Son, Hung Yen, Hung Hoa, Nam Dinh, Hai Duong, Thanh Hoa, Vinh, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Bien Hoa, Vinh Long, and small Ngoc Vung, Co To.

Additionally, the French researcher proved that Louis Bezacier was a French scholar who studied military fortifications in Vietnam. After researching and examining the citadels built during the reigns of Vietnamese kings, he classified the Vietnam Citadel into two distinct categories: The first bastion type, originating from China, was built between the Chinese invasion (111 BC – 939

AD) and the 18th century, such as Co Loa Citadel, Thanh Long Citadel, and Ho Citadel, which were quadrangular, without forts, and without angle forts (sans bastions ni lunettes d'angles), and so on. The secondary bastion style originated in France via Colonel Olivier de Puymanel, with the first citadel being Gia Dinh Citadel (1790) [81] (Figure 101; 102).

Figure 102. Map of Sai Gon in 1815 *(Source: https://picryl.com/media/citadel-of-saigon-1815-5d88cd)*

Figure 103. Map of Gia Dinh Citadel in 1815 *(Source: https://alchetron.com/Citadel-of-Saigon)*

2.5 Modern warfare period (1920 – 1975)

2.5.1 Blockhouses

The French Army's use of blockhouses in their various colonial adventures was based on excessive faith in this tactic and the ability of these isolated small-scale outposts (typically located within line of sight of one another) to secure logistical road networks and populated areas, as well as provide early warning and information about enemy movements and activities. A relationship built on trust that lasted longer than that of other armies. This approach (which was first widely employed in colonial North America) became synonymous with French occupation tactics and colonial warfare [82] (Figure 103).

Figure 104. French blockhouses in Spain
(Source: https://monlegionnaire.files.wordpress.com/2017/12/spain.png)

Following WWII, the French in Indochina continued to rely on the massive network of these blockhouses and mini forts to battle the Viet Minh and began building an increasing number of these (of varying construction) to control pacified areas better. Toward the end of that struggle, the French redoubled their efforts on a large static defense plan for the north, establishing what was to be an interlocking belt of over 1,200 (900 were built) of these forts, dubbed the De Lattre Line informally. Numerous fortifications at De Lattre were designed to withstand intense enemy fire and resembled concrete pillboxes during the French conquest of Indochina (Figure 104).

Hanoï. Blockhaus de la rive gauche, vue à vol d'oiseau.

Figure 105. French blockhouses in Hanoi
(Source: Jack Wagner, 2018)

Most indigenous constructions were enormous clay mounds that created a high wall surrounding important towns, garrisons, and royal palaces. The citadels of Hanoi (Thăng Long), Hue, Saigon, Lang Son, and Son Tay were among them. Smaller towns and villages had miniature replicas of an earthen mound, often topped with a bamboo wall, to defend them from Chinese bandits (pirates known as the Black Flags). These boundaries would be encircled by a fence of bamboo poles and enormous mounds of cleared vegetation (Figure 105). The French diagrams demonstrate that the iconic "punji-stick" traps were a frequent practice long before the Americans arrived. The walled villages would feature a single central entrance that would be locked and heavily guarded at night. The road leading to this gate was frequently surrounded by rice paddies for several hundred feet, significantly limiting an invading adversary's frontage [83, p. 1].

Figure 106. typical French walled village in Vietnam
(Source: Indochine Sud Est Asiatique Magazine, 1954)

The terrain was also a significant factor in selecting the site of French bases. Along key rivers, commanding locations were created, and some images depict garrisons perched on precipitous spurs and outcroppings. Blockhouses frequently dominated strategic terrain surrounding French bases and were critical for preserving line-of-sight communications during the pre-wireless period (Figure 106).

Figure 107. French blockhouses are usually built-in flat and clear terrain for tactical purposes
(Source: manhhai flickr, 2014)

The French began consolidating their successes during the invasion of Tonkin by capturing existing fortifications and towns and then fortifying them in a typically European method (Figure 105). Clearing fire fields, reinforcing parapets, and surveying and laying artillery positions. Numerous barracks, shops, sTables, and magazines in the western style were completed, as well as the requisite blockhouses. These were constructed to provide a final fallback point for the main defensive lines–a fort within a fort. Outside the major bases, blockhouses were also constructed on hilltops for optimum sight and on defensible terrain to assist in guarding the expanded region. During the Siege of Tuyên Quang (Nov 1894–Mar 1895), the blockhouse erected on the west side of the perimeter served to thwart many Chinese assaults on the outpost [84, p. 2].

La cuisine dans les fossés de la citadelle.

Frontier blockhouse, Hanoi

Figure 108. Colonial fortifications will be used to renovate into French blockhouses
(Source: Jack Wagner, 2018)

In conclusion, the early blockhouses built in Indochina were larger and more commanding than the structures constructed there following French WWII. Blockhouses were rectangular, three or four stories high, with an open-air top floor covered in thatch or tile. As previously stated, their construction was frequently linked to an existing military perimeter and frequently served as a gatehouse at the garrison town's primary (and only) entrance. Eventually, these blockhouses would be erected at one-kilometer intervals along critical communication lines and be known as poste kilométrique.

2.5.2 Tunnels and trenches

Trenches were used sparingly during World War II's mobile warfare in Europe. In comparison, the Japanese in the Pacific theatre severely fortified several of their islands with chains of deeply dug caves and bunkers in response to overwhelming American artillery and airpower. During the Korean War, North Korean and Chinese soldiers employed similar tactics when attacked by American airpower. In the Conflict of Dien Bien Phu (March 13–May 8, 1954), the communist-led Viet Minh employed classic 18th-century siege tactics and advanced a complex system of trenches to neutralize the impacts of French artillery and airpower in the run-up to the battle [85] (Figure 106).

Figure 109. Tunnels and trenches of Dien Bien Phu battlefield between Viet Minh and the French army
(Source: laodong.vn)

Another typical example of Vietnam's trench warfare art is Cu Chi Tunnels - a common name for different tunnel systems formed between 1946-1948 during the Indochina war. During this time, the soldiers and people of the two

communes of Tan Phu Trung and Phuoc Vinh An dug short tunnels with simple structures used to hide and store documents and weapons. It is also suggested that the excavation of the tunnels was started by the people of this area spontaneously in 1948.

Residents dug individual trench and tunnels to avoid raids by the French army and provide shelter for the Viet Minh army. Each village built a separate tunnel. Then due to the need to travel between the village's tunnels, the tunnel system was linked together to form a complex and continuous tunnel system, which later expanded. In many places, especially the six northern communes of Cu Chi, the structure of tunnels has been improved to become a place to hide forces. When fighting, they can communicate and support each other [86] (Figure 107).

Figure 110. The section diagram of Cu Chi tunnels showed underground storage and assembly complex *(Source: https://www.researchgate.net/Figure/The-Cu-Chi-and-Iron-Triangle-tunnels-were-constructed-in-Old-Aluvium-soils-which-had-high_fig10_331255616)*

Thus, it can be seen that the introduction of large-scale destructive

weapons along with air force weapons has made large-scale walled citadels obsolete. Instead, fortifications in modern warfare has a sharp divide between a dominant party in firepower and technology that will build dense, fortified bunker systems and control large areas of the ground; on the other side, the resistance force which is backward in terms of weapons will give priority to developing encircling or evading trenches in order to fight guerrilla-style.

The fortifications in this period played a decisive role in the formation of offensive and defensive tactics from the squadron level to the division level of both sides. The historical value of fortifications is evident as it exemplifies an age of ideological warfare. However, in terms of art and decorative, the fortications of this period hardly carried as much value as the feudal citadel. The symbolic massive-scale architectural works representing the strength of a nation in old-type citadels were replaced by large-scale structures that were dispersed, shaped simply and functionally to match the war objectives.

CHAPTER III: LAYOUT AND CHARACTERISTICS OF TYPICAL FORTIFICATIONS IN VIETNAM

Located on the edge of the Southeast Asian continent, Vietnam is a tropical country with mostly mountainous terrain (accounting for 3/4 of the territory), mainly low hills. The plains occupy only 1/4 area. On a national scale, lowland plains and hills (under 1,000 m) account for 85% of the area. High mountainous terrain (over 2,000 m) accounts for only 1% of the country. The topographic structure is diverse, with a gradual decrease from the northwest to the southeast. Less than 20% of the land can be used for agriculture. The country is divided into mountainous areas, the Red River Delta in the north, Truong Son Range, the Central Highlands, the central coastal plain, and the Mekong River Delta in the south. Because Vietnam has large rivers and scattered plains, the culture was influenced by two great civilizations, China and India. This special geopolitical position makes Vietnam the only country in Southeast Asia that existed in both Indosphere and Sinosphere civilizations before the Western and Indochine influences with Vauban style. These zones affected culture, politics, economy, society, and architecture, including citadel architecture [87]. Due to that, it is possible to divide the types of ramparts in Vietnam into four main groups below.

+ **The Indosphere style** is a group of fortifications belonging to countries influenced by the Indian civilization that existed in Vietnam, such as Funan, Oc Eo, Khmer, and Champa.

+ **Viet/Sinosphere style** is a typical fortification of the ancient Vietnamese and a group of fortifications influenced by the Chinese style due to the Northern domination period. This style was common in the North of Vietnam, later expanding to the entire territory.

+ **Vauban style** is fortifications with typical elements commonly found in the Vauban-French citadel. This style was introduced to Vietnam through French missionaries, engineers, officers, and military engineers who came to Vietnam in the early 18th century to assist the Nguyen Lords in fighting the Tay Son army.

+ **Modern Warfare style** is a particular form of fortification, developed in modern warfare with the appearance of great destructive power weapons and air force amphibious. All traditional walled fortifications were obsolete due to these weapons. This type of fortifications has a clear difference between the defense bunkers built to control the territory and the underground facilities of the resistance army built to hide and conceal the force.

1. Indosphere/ Champa style

Table 10. Óc Eo Citadel.

Óc Eo Citadel	
_ First Governing Kingdom: Funan _ Built time: 1ˢᵗ century AD _ Area: 450 hectares _ Location: Thoại Sơn, An Giang 10.24870355187191, 105.1475353569575	 *Funan Empire map in 400–500 AD (Source: Youtube)*
_ **Historical background:** Oc Eo culture was an ancient culture that formed and developed in Southern Vietnam from the 1st to 7th centuries AD. This was a great culture in Vietnamese history, associated with the existence of Funan - a powerful kingdom in Southeast Asia in the early centuries AD. The distribution of this culture spread not only in the South but also in Cambodia, Angkor, Myanmar, and part of Malaysia	
_ **Characteristic:** Oc Eo was a great port of the Funan kingdom from the 1st to 7th centuries. A high density of archaeological relics appeared in this area which illustrates that Oc Eo Citadel *"is a capital city, a prosperous port, a lively economic center with tense trade relations between Europe and Asia. In addition, the ancient Oc Eo town was also a typical relic representing the earliest ancient civilization formed in Southeast Asia"*. From the excavation results on February 10, 1944, archaeologist Louis Malleret estimated that the Oc Eo citadel was designed in a rectangular shape with about 1,500 m in width and 3,000 m in length	 *Óc Eo Citadel map (Source: tungvk1781, 2011)* *Artifacts excavated from the ruins of Oc Eo citade (Source: Óc Eo An Giang Museum)*

Table 11. Ninh Viễn Citadel.

Ninh Viễn Citadel	
_ First Governing Kingdom: Champa _ Built time: 4th century _ Area: 20 hectares _ Location: Lệ Thủy, Quảng Bình 17°12'50"N 106°48'6"	 *Location of Ninh Viễn Citadel (Source: Author)*
_ **Historical background:** Ninh Vien Champa Citadel (The Ngo Dynasty Citadel): The Champa Empire built the citadel. From 1069 onwards, Le Thuy land belonged to Champa. King Chiem built a fortress to guard the northern frontline with Dai Viet. The location of this citadel was mentioned in "Ô châu cận lục" of Duong Van An: *"The citadel was in Uan Ao commune, Le Thuy province. Binh Giang river (Kien Giang) flowed in the front while Ngo Giang river (hói Quy Hau) was in the back. The West and North rivers met at a point. Three sides of the citadel were rivers; the other was the mountain. This characteristic was the crucial point in controlling unique lines of defense. The South gate had a stone slab engraved with three words Ninh Vien Thanh".*	 *Map of Ninh Vien citadel with surrounding rivers (Source: Wikimapia)*
_ **Characteristic:** The citadel had an unsymmetrical rectangular structure, following the Southwest - Northeast axis. (The Southeast width is widened compared to the Northwest width due to the eastern terrain). The size measured in the southeast ramparts is about 370m (±10m), and the northeast (in the northeast ramparts) is 480m (±10m). The citadel was built of earth and stone with 5m in height, 5m or 10m in some places in width, and the total area is approximately 5,000 m. The city has four gates opened in four directions east -	 *The current remnants of the Ninh Vien citadel (Source: Author)*

west - south - north, and each gate has a sentry above.	

Table 12. Kurung (Khu Túc/Cao Lao Hạ/Lồi) Citadel

Kurung (Khu Túc/Cao Lao Hạ/Lồi) Citadel	
_ First Governing Kingdom: Linyi _ Built time: 380 AD _ Area: 5,1 hectares _ Location: Quảng Bình 17°42'44"N 106°25'10"E	 *Location of Kurung Citadel* *(Source: tungvk1781, 2011)*
_ **Historical background:** After the revolt of Sri Mara in 192 AD, the Cham people continued to build and restore their citadel on the old land of the Han people. A Cham emirate called Ragdrapura with Cao Lao Ha citadel as the administrative center. The citadel has the role of protecting the leader's residence, with wooden structures worthy of the status of its owner. _ **Characteristic:** Cao Lao Ha citadel was built on a high, open slope in complex terrain. The mountains spread from the West - South to the East - South. A large river (Gianh river) flowed from the West - North to the East - North. Fertile fields surrounded the citadel, and the river system was convenient for transportation. The citadel had a rectangular shape. The high and low ramparts were not equal. The northeast ramparts were 197m long, 5.6m wide, 2.5m high, and 10.5m wide, while the east-south ramparts were 255m long, 5.5m wide, 2.2m high, and 11.3m wide. The west-northwest ramparts were 255m long, 6m wide, 1.8m high, and 11.7m wide. The citadel was not large, but it was once the administrative center of a kingdom.	 *Map of Kurung citadel with surrounding rivers* *(Source: Wikimapia)* *The current remnants of the Kurung citadelng* *(Source: Author)*

Table 13. Kandapurpura Citadel

Kandapurpura Citadel	
_ First Governing Kingdom: Linyi _ Built time: 4th century _ Area: 23 hectares _ Location: Huế 16°26'55"N 107°33'19"E	 *Location of Kandapurpura Citadel (Source: tungvk1781, 2011)*
_ **Historical background:** Kandapurpura (Buddha city) is one of the two capitals of Linyi, the next capital is Simhapura. Kandapurpura was built and used for about a century from the beginning of the 4th century to the end of the 4th century (after 380) during the period when Hinayana Buddhism (Thevada) and Hinduism heavily influenced Linyi.	 *Map of Kandapurpura citadel with surrounding rivers (Source: tungvk1781, 2011*
_ **Characteristic:** The citadel structure of Kandapurpura Citadel makes full use of the natural topography, so the extra layer of soil that creates the wall is only 5m high, inside is reinforced with broken bricks and large cobblestones. This reinforced brick layer is usually 1.8m-2.0m away from the wall, with an average thickness of 30cm-50cm, up to 1m in some places. The three sides of this area are surrounded by the Perfume River as a natural moat, creating favorable terrain for waterway traffic and defense strategies. In addition, the system of reservoirs and moats inside and outside the citadel are considered to be a place to store water and regulate the system of ditches surrounding the citadel.	 *Artifacts excavated from the ruins of Kandapurpura citadel (Source: Huế Monuments Committee)*

Table 14. Simhapura (Trà Kiệu) Citadel

Simhapura (Trà Kiệu) Citadel	
_ First Governing Kingdom: Linyi _ Built time: 4-5th century _ Area: 8,8 hectares _ Location: Quảng Nam 15°49'19"N 108°14'0"E	 *Map of Simhapura Citadel* *(Source: Nishimura Masanari, 2017)*
_ **Historical background:** After attacks from Jiaozhou by the governor Wen Fangzhi (温放之), the capital Kandapurpura was destroyed. Linyi moved the capital to Tra Kieu area and established a new capital with the name Simhapura around the end of the 4th century and the beginning of the 5th century. The next attack from Giao Chau by General Luu Phuong in 605 led to the destruction of Simhapura's citadel.	 *3D simulation drawing Simhapura Citadel* *(Source: Anton Nguyen Truong Thang, 1987)*
_ **Characteristic:** The citadel is nearly rectangular in shape, running from east to west with a circumference of 4000 meters. The citadel is 3.1 meters high, the foot is 33 meters wide, is covered with stone in the middle and bricked on both sides. The tiled part on both sides has the base of the foundation reinforced with a layer of stone. The entire foot of the wall is 6 meters wide, of which the foot of the inner brick foundation is 1.4 meters wide. The outside brick wall is 2.86 meters high and the higher it goes, the wider it gets (at a height of 2.44 meters, the wall is 1.9 meters thick). Through the excavated artifacts, it can be	 *Artifacts excavated from the ruins of Simhapura citadel (Source: chammuseum.danang.vn)*

| seen that Simhapura was a large city opening to the sea through the harbor. | |

Table 15. Virapura Citadel

Virapura Citadel
Location of Virapura Citadel (Source: tungvk1781, 2011)

_ First Governing Kingdom: Kraukavamka _ Built time: 757 AD _ Area: Undefined	_ Location: Estimated in the Area of Phuoc Dan tow, Ninh Phuoc district, Ninh Thuan Province. 11°30'48.9"N 108°55'10.3"E

_ **Historical background:** The Hoan Vuong period marked the ascension of the leaders of the Cau tribe (Kraukavamka) in the South in the two regions of Kauthara and Panduranga. The capital moved from Simhapura in the north to the south at Panduranga with the new name of Virapura, and the religious sanctuary also moved from My Son in the north to the holy site of Po Nagar in Nha Trang today.

Being the capital of Champa for a relatively short period of about 100 years, there are not many records about this capital, and archeologists have not yet unearthed certain traces of the characteristics and location of the capital. The current location is estimated to be south of Phan Rang, around the area of Phuoc Dan town, Ninh Phuoc district, Ninh Thuan province. The inscription says that Virapura was attacked and destroyed by the Javanese in 787, after they had attacked and destroyed the religious holy place at Po Nagar in 774. This was the period of the capital in the South, so most of the religious buildings were located near this area. In addition to the dilapidated buildings, there are still Hoa Lai and Po Nagar towers built during this period.

Table 16. Indrapura Citadel

Indrapura Citadel	
_ First Governing Kingdom: Champa _ Built time: 875 _ Built time: 875 _ Location: Quảng Nam 15°40'31.2"N 108°17'39.7"E	 *Location of Indrapura Citadel (Source: tungvk1781, 2011)*
_ **Historical background:** The last king of the Hoan Vuong dynasty was Vikrantavarma, who was based in Virapura (in Phan Rang, Ninh Thuan) without a son to inherit, so after his death, the court chose a person from the Coconut tribe in North took over. The newly crowned king named Indravarman II moved the capital to the north, at the location where his family lived before and named the capital Indrapura. This is also the official beginning of the name Champa.	 *Aerial view of Indrapura Citadel (Source: Author)*
_ **Characteristic:** A very special thing about Indrapura is that the city and the religious sanctuary are located in the same place. It was in the center of the capital Indra that the Champa kings built the largest Buddhist monastery in Southeast Asia, worshiping the god Laksmindra - Lokesvara. However, at present, no research has been carried out on the Indrapura citadel, only studies on the Buddha Institute. The main structure of the Buddha Institute is a 1330 meter long structure running east-west. The main shrine is located in a rectangular belt 326 meters long and 155 meters wide. From there, a road 763 meters long runs to a wide rectangular area (300 meters long, 240 meters wide).	 *Artifacts excavated from the ruins of Indrapura citadel (Source: EFEO museum)*

Table 17. Cổ Lũy Citadel

Cổ Lũy Citadel	
_First Governing Kingdom: Champa _ Built time: 9-10th Century _ Area: Undefined _ Location: Quảng Ngãi 15°05'27.4"N 108°49'10.1"E _ **Historical background:** Co Luy Citadel is an outpost consisting of three linked citadels to prevent enemy ships from entering Dai Co Luy gate, which is connected with Chau Sa citadel on the left bank of Tra Khuc river. _ **Characteristic:** Co Luy Citadel defense system has three solidly linked fortification as a front-line defend for Chau Sa citadel: 1/ Co Luy rampart: 700m from Dai harbor to the west. The remaining trace is a small citadel which is 3-5 m high and 2 m thick. 2/ Ban Co Citadel: covered with earth in a trapezoidal shape. The edge of the citadel was built with large bricks, with high calcination. Inside the citadel is flat land, with an area of about 1000 m2. This is the main work in the Co Luy Citadel defense system to observe and signal all situations at sea. 3/ Hon Yang Citadel: located in the north of Ban Co citadel, covered with earth on a natural hilly foundation, with a height of 40 m. The first wall and the second wall are 2.5 m thick, many broken bricks were found in the sand.	 *Location of Cổ Lũy Citadel (Source: Author)* *Co Luy rampart (top picture), trace of Ban Co Citadel (bottom left picture) and Hon Yang Citadel (bottom right picture) (Source: Author)*

Table 18. Amaravati (Châu Sa) Citadel

Amaravati (Châu Sa) Citadel	
_ First Governing Kingdom: Champa _ Built time: 9-10th century _ Area: 60 hectares _ Location: Quảng Ngãi 603703N 108°8457584"E _ **Historical background:** Amaravati Citadel located in the downstream area, on the left bank of Tra Khuc river, in Son Tinh district - Quang Ngai province. Indrapura - Quang Nam is considered the capital of the Cham people from the 9th to 10th centuries, while Chau Sa citadel is the economic and military center in the southern region.	 *Location of Amaravati Citadel (Source: tungvk1781, 2011)*
_ **Characteristic:** Amaravati Citadel has 2 layers: inner citadel and outer citadel. The inner citadel is rectangular, covered with earth, nearly square in shape (580m x 540m). The current wall height is 4-6m, the foot is 20-25m wide, the wall is 5-8m wide. Around the citadel there is a moat 20-25m wide. The inner citadel opens 5 gates which the main gate is in the south. The east, south and southwest doors all have brick towers. A special feature of Amaravati citadel is that between the inner and outer citadel, to the south, there are two frames in the shape of a crab's claw symmetrically across the north-south axis. The citadel combines excavation and embankment sections with natural topography, skillfully taking advantage of low hills and small rivers, canals, ponds and lagoons, which are crisscrossed in the region.	 *Aerial view of Amaravati Citadel (Source: PTQ channel, Author)* *Traces and artifacts excavated from the ruins of Amaravati citadel (Source: EFEO museum)*

Table 19. Vijaya (Đồ Bàn/Chà Bàn) Citadel

Vijaya (Đồ Bàn/Chà Bàn) Citadel

_ First Governing Kingdom: Champa

_ Built time: 1005

_ Area: 154 hectares

_ Location: Bình Định

13°55'35.1"N 109°04'15.7"E

*Location of Vijaya Citadel
(Source: tungvk1781, 2011)*

*Aerial view and map of Vijaya Citadel
(Source: Bình Định Channel, Viet Flycam)*

_ **Historical background:** Vijaya Citadel is the name of the capital of Champa during the Champa period with the national title of Champa. Vijaya is also the name of one of the four regions/regions/sub-states of Champa, Vijaya Region.

_**Characteristic:** The citadel is spread out on a fairly flat field and has a rectangular plan of 1,400 meters in the north-south direction and 1100 meters in the east-west direction. Binh Dinh river is a natural moat protecting the north face of the citadel.

"The city had a stone wall, with four gates in and out, and someone was ordered to stand guard. The house in which the king dwelt was tall and wide. It had a small tiled roof in the shape of a shield on it. There, the four enclosing walls were built with ornate brick and lake decorations. Very neat, the doors were made of solid wood, decorated with wild animals and livestock carvings. Houses in which people live have thatched roofs. The height of the roof ledge (from the ground) cannot exceed three inches (1m = 2.79 inches)" (Recorded by a Chinese envoy on a visit to Vijaya in 1413).

*Canh Tien tower and ancient statues of
Vijaya Citadel (Source: reds.vn)*

Table 20. Sri Banoy Citadel

Sri Banoy Citadel	
_ First Governing Kingdom: Champa _ Built time: 12th century _ Area: 78 hectares _ Location: Bình Định 13°53'20.7"N 109°10'51.0"E	 *Map of Sri Banoy Citadel (Source: Author)*
_ **Historical background:** Sri Banoy citadel is an ancient citadel located on the bank of Thi Nai lagoon - the gateway to Binh Dinh by waterway, acting as an outpost for the Vijaya capital of the Champa kingdom. This citadel took place many fierce battles between Champa - Yuan Dynasty in 13th century and Champa - Tran dynasty (14th century) and Le dynasty (15th century) _ **Characteristic:** Remains show that the citadel was built on a high promontory sandwiched between two distributaries downstream of the Kon River, the Cau Dun River and the Go Thap River. The citadel has a rectangular structure. The length running in the East-West direction is 1,300m, and the width is more than 600m. In the architectural complex related to Thi Nai citadel, the most obvious one is a tower located in the east of the citadel, Binh Lam tower. The Sri Banoy citadel was described in the history of Ming China in 1413, clearly confirming its role as a protective outpost for Thi Nai harbor.	 *The position of Sri Banoy citadel as defending base for Thi Nai seaport (Source: Author)* *Remnants of the earthen wooden rampart and the remains of the temple tower in the center of Sri Banoy Citadel (Source: Wikipedia)*

The number of troops and people residing in the citadel was about 60 households, ruled by 2 officers.	

Table 21. Hồ-Kauthara Citadel

Hồ-Kauthara Citadel	
_ First Governing Kingdom: Champa _ Built time: 14-15th century _ Area: 65 hectares _ Location: Phú Yên 13°01'12.8"N 109°12'38.7"E **_Historical background:** After the conquest of King Le Thanh Tong in 1471,	

the Champa kings continuously attacked both Hoa Anh and Nam Ban, recapturing the buffer zone previously occupied by Dai Viet; at the same time, they completely halted all temple building activities throughout the kingdom to devote all efforts to erecting Hồ-Kauthara Citadel as a strong fortification to protect the meager territory left in the south.	*Map of Hồ - Kauthara Citadel (Source: Author)* *Topographic section and simulated status of the Hồ - Kauthara Citadel (Source: tapchikientruc.com.vn*
_ **Characteristic:** The citadel has a rectangular plan with 8 doors, 3 - 5m high, 15 - 25m wide, four watchtowers in four corners. The southern wall running along the Da Rang River, 825m long, has been eroded by river water. The east wall is 732m long, the west wall is 940m long, and the north wall is 738m long. Inside the citadel, there is a fifth wall running in the north-south direction, parallel to and 700m from the east wall, dividing the area into two parts, east and west. The western part is the inner citadel, narrow but higher than the eastern suburb, with a flag court of 34 x 34 m wide and 10 m high. Finally, parallel to the outside and 28m from the western wall, there is also a sixth retaining wall, built on the mountainside as a shield, 360m long, called a retaining wall.	*Traces and artifacts excavated from the ruins of Hồ-Kauthara citadel (Source: tapchikientruc.com.vn)*

Table 22. Bal Battinol (Sông Lũy) Citadel

Bal Battinol (Sông Lũy) Citadel	
_ First Governing Kingdom: Panduranga _ Built time: 18-19th century _ Area: 87 hectares _ Location: Bình Thuận	

11°12'47"N 108°19'19"E	
_ **Historical background:** Bal Battinol Citadel is located in the plain area adjacent to the mountains to the west, using the available natural geographical conditions of the river to protect the north face of the citadel. The citadel built in the Champa period became a vassal of the Nguyen Dynasty - Vietnam. This is also the last Cham citadel ruins.	*Location of Bal Battinol Citadel (Source: Author)*
_ **Characteristic:** The citadels have four unequal sides, the east and west sides are in the right direction, and the north and south faces are slightly off. On the southwest side are fortress citadels made of embankment and gravel mounds 6-7m high. From the west side of the citadel, it extends from north to south to the north bank with a length of 910 m. The diameter between the west bank and the middle of the east wall is 950 m. The ring is located on the surface of the River Luy with the purpose of supporting the north-facing facade. In the rainy season, the river becomes a fast-flowing stream, creating an impregnable defense line in this direction. Due to lack of protection, now the ruins of Bal Battinol citadel have been damaged almost completely.	 *Remains of the city of Bal Battinol. Currently, the citadel has been heavily damaged and there are almost no traces left. (Source: Author)*

From the information mentioned above, the Champa citadel was built with the following main characteristics:

- **Morphology:** The Champa citadel was built with a non-fixed plan. It is generally still rectangular, but there were some variations for adapting to the terrain characteristics and optimizing the defensive function. "Indosphere" is the term used for the citadel belonging to the territories influenced by Indian civilization. Therefore, the Champa citadel had all the design thinking characteristics of Indian cultures, such as the god

Shiva worshiping the sacred animals. The architecture contains diverse shapes and sculptures. Especially, worship architecture always occupied a particular position in the planning of the Champa citadel.

- **Location:** The Champa people had a powerful navy. The Champa economy played an important role in trading and developing piracy in the region. To optimize these advantages, the essential ramparts of Champa were always placed in positions capable of controlling major rivers and protecting key trading ports.

- **Terrain:** Different from the worshiping towers of Champa, which were always built on high hills and mountains, the ramparts of Champa were planned in the plains with borders faced by natural rivers and lakes. The city walls were built along these rivers. The high rainfall characteristics of South Vietnam made the rivers become large natural moats protecting the citadel, almost impregnable. The Cham people also take advantage of natural tributaries or cut artificial canals into the area inside the ramparts to serve the purposes of military transport and trade. Wells connected to the underground water sources were also the water supply for the daily activities of the residents and soldiers in the city.

- **Scale:** Champa citadel had no fixed model. There was a considerable difference in circumference between the ramparts of Champa. This can be explained by the historical invasion of the Vietnamese and Khmer. The Cham people had to leave their capital many times. Each time the capital was moved, the entire system of defensive ramparts had to be rebuilt and restructured from the beginning around the center of the new capital. Due to the context, recapturing territories and reconstructing the citadel caused overlaps between the new and old strongholds. Because of these reasons, the Cham citadel did not increase or decrease in size but was significantly dependent on historical context.

2. Viet/Sinosphere style

Table 23. Cổ Loa Citadel

Cổ Loa Citadel	
_ Governing Kingdom: Âu Lạc _ Built time: 3rd century BC	

_ Area: 500 hectares _ Location: Hà Nội 21°06'43.3"N 105°52'18.8"E	*Location of Co Loa Citadel (Source: tungvk1781, 2011)*
_ **Historical background:** In Au Lac's time, Co Loa was located at the top of the Red River delta triangle and was an important place of communication between waterways and roads. From here, it is possible to control both the plains and the highlands. The relocation of the capital from Phong Chau here marked a period of development of the ancient Vietnamese population, the period when the Vietnamese moved the center of power from the semi-mountainous Midlands to settle in the plains.	*Map of Co Loa Citadel shows spiral rampart layers (Source: tungvk1781, 2011)*
_ **Characteristic:** The citadel takes advantage of the natural terrain, so the curve of the contour according to the terrain. Co Loa citadel consists of 9 spirals but currently has three spirals remaining. The circumference of the outer circle is 8km, the center circle is 6.5km, the inner circle is 1.65km. Each citadel has a moat surrounding the outside. The average moat is from 10m to 30m wide. The trenches are connected to each other and to the Hoang River. The combination of rivers, moats, and walls had no definite shape, making the castle like a labyrinth, a military area that was both good for attack and good for defense.	*3d model reconstructing 3 layers of the innermost ramparts of Co Loa Citadel (Source: Author)*

Table 24. Hoa Lu Citadel

Hoa Lu Citadel	

_ First Governing Kingdom: Đinh Dynasty

_ Built time: 968 AD

_ Area: 300 hectares

_ Location: Ninh Bình

20°17'04.0"N 105°54'19.0"E

_ **Historical background:** In 968, Dinh Bo Linh completed the rebellion of 12 warlords, unified the country, ascended the throne, established the Dinh dynasty, and became the first emperor of Vietnam after 1000 years of Northern domination. He developed Hoa Lu - his first army base - into the capital of the new dynasty

_ **Characteristic:** Hoa Lu citadel was spread over an area of about 300 hectares, divided into two areas, which the eastern is the outer citadel, and the western is the inner citadel. The outer and inner are two separate areas but adjacent to each other and can be accessed easily to a connected corner. The outer and inner parts have ten citadels connecting the mountains to create two closed rings close to each other.

Hoa Lu citadel was built according to the natural topography. The outer citadel as well as the inner part, are surrounded by four high mountains. The castle was spacious and dangerous without many constructions. Both the outer city and the inner city were able to take advantage of a Hoang Long River branch flowing along the wall to make an underwater traffic road.

As a military base, Hoa Lu Citadel is a rare military architecture in Vietnam's history due to the way of topography is linked.

Map of Hoa Lu Citadel shows a special layout following the natural topography (Source: wikipedia.org/wiki/Cố_Đô_Hoa_Lư)

Aerial view of Hoa Lu Citadel with mountains acting as natural ramparts and guard towers (Source: wikipedia.org/wiki/Cố_Đô_Hoa_Lư

One of the temples and monuments still preserved within the city (Source: wikipedia.org/wiki/Cố_Đô_Hoa_Lư)

Table 25. Thang Long Imperial Citadel

Thang Long Imperial Citadel	
_ Governing Kingdom: Lý Dynasty _ Built time: 11th century _ Area: 18395 hectares _ Location: Hà Nội 21°02'03.4"N 105°50'24.6"E _ **Historical background:** In the Ly dynasty (from the year 1009), the national construction work began to enter on a large scale, laying a solid and comprehensive foundation for the development of the nation and of the independent feudal country. Unable to continue to place the capital, the head of the nation in the mountainous region, in the winter of 1009 Ly Cong Uan ascended the throne. The following autumn, he decided to move the capital to Thang Long citadel. _ **Characteristic:** Thang Long citadel has three layers: Outer, Inner, and Forbidden. Over the historical periods, the Outer and Inner have undergone many extensive changes, but the Forbidden City, in terms of location and scale from the 11th to the late 13th centuries, has remained almost unchanged. This is the workplace of the court and the solemn ceremonies of the country and is also the royal family's residence. The palaces, attics, and Forbidden City changed over the dynasties and were times destroyed by wars or civil conflicts. Overall, the scale changed more or less into expanding trend.	 *Map of Thang Long Citadel during Later Le Dynasty (Source: wikipedia.org/wiki/ Thanh_Thang_Long_thoi_Le.JPG)* *Thang Long citadel gate today (top picture) and 3d diagram of the reconstruction of Thang Long citadel under the Ly Dynasty (bottom picture)* *(Source: https://spiderum.com/bai-dang/Quy-hoach-Cam-thanh-Thang-Long-thoi-Ly-krv)*

Table 26. Tây Đô (Hồ) Citadel

Tây Đô (Hồ) Citadel	
_ Governing Kingdom: Hồ Dynasty _ Built time: 1397 _ Area: 77 hectares _ Location: Thanh Hóa 20°04'27.2"N 105°36'24.6"E	 *Location of Hồ Citadel with strategic advantages* *(Source: wikipedia.org/wiki/Thành_nhà_Hồ)*
_ Historical background: Tay Do citadel was built in 1397 under the Tran dynasty under the command of the god Ho Quy Ly, who soon (1400) founded the Ho Dynasty. Tay Do was the capital of the new dynasty, so Tay Do citadel was popularly known as Ho Dynasty citadel. _ Characteristic: The location of the citadel is surrounded by rivers and mountains with strategic defensive significance. The outer wall is covered with earth with a volume of nearly 100,000 cubic meters, surrounded by dense bamboo and a deep moat with a surface of nearly 50m wide. Inside the outer citadel is the inner citadel with a rectangular plan in the North-South direction 870.5m long, and 883.5m long in the East - West direction. The outer surface of the vertical wall is made of block stone with the average size of 2 m x 1 m x 0.70 m. The inner surface is covered with soil. The gates are all built in arched style, with pomelos arranged in stone.	 *Map of Hồ Citadel and the ruins of four stone gates* *(Source: http://khaocohoc.gov.vn/images/ uploads/default/thanhnhaho.gif)* *Artifacts excavated from the ruins of Hồ Citadel* *(Source: nguoikesu.com/dia-danh/thanh-nha-ho)*

Tay Do Citadel shows a peak level of stone military architectural techniques at that time.

Table 27. Xích Thổ Citadel

Xích Thổ Citadel

_ Governing Kingdom: Mạc Dynasty
_ Built time: 16th century
_ Area: 2,2 hectares
_ Location: Quảng Ninh
21°0'34"N   107°4'1"E

_ **Historical background:** Xich Tho citadel was built to control and protect the commercial port of Van Don. This was considered the headquarters of the

Xích Thổ citadel is located in a strategic position, to guard the Van Don commercial

Mac army at that time. Due to the proximity to Cua Luc Bay, the Mac army concentrated its elite marines here.

_ **Characteristic:** Xich Tho citadel has a tetrahedral shape, but due to its natural topography, the northeast and southwest faces have to be folded in half. The four sides of the wall are covered with soil 3-4m high. Some sections take advantage of the hills to make walls.

The wall surface is 4-5m wide. The base is 10-12m wide. The outer wall of the citadel is built with stone embankments, with lime mortar used as a binder. The citadel has a circumference of 1,220m, opening five doors: the South Gate, the East Gate, the Elephant Cage gate, the North Gate, and the West gate. From the South gate (main door), you can look directly at the bay, right to Cua Luc in the distance. Two watchtowers on the North and South sides to strengthen the defense. The four outer sides have a moat, dug 10m or more from the heart, about 9m-12m wide. In the citadel, an artificial moat connects with the bay, allowing boats to enter and exit the South gate.

port
(Source: Author)

Site of Xích Thổ citadel (Source: Do Van Ninh, "Ancient Vietnamese citadel, 2016)

Relics of Xích Thổ citadel (Source: https://baoquangninh.com.vn/thanh-xich-tho-trong-he-thong-thuong-cang-van-don-2205205.html)

"Sinophere" is a word used to refer to countries influenced by Chinese civilization. Before the first China colonial era, Co Loa Citadel was built based on the typical cultural thinking of the ancient Vietnamese ethnic groups. Then, the process of Chinese domination for thousands of years made the northern ramparts of Vietnam have the characteristics of Chinese-style ramparts. The great capitals had a 3-layer layout: La Thành (Outer Citadel), Hoang Thanh (Inner Citadel), and Cấm Thành (Forbidden City) [88]. The decoration and architecture took the image of the Dragon representing the Royal Family. The

strongholds of vassals or small military forces were a simple form and mainly served military functions.

Although there were many similarities with Chinese-style fortifications, Vietnam citadels still had their peculiarities in shaping and construction techniques. Specifically, the application of stone architecture, techniques of arranging large-scale defensive artillery battles (the Ho citadel), and shapes with the image of Champa's beast (Dragon decoration of the Ly Dynasty) [89].

2. Vauban style

With French engineers' aid, Vietnam learned and constructed many defensive systems to preserve and protect its feudalism. Under the Nguyen Dynasty in Vietnam, a system of thirty-three citadels and numerous lesser strongholds were constructed from the North to the South. According to the administrative management of the capital Imperial City of Hue, the defensive Citadel (Gia Dinh Citadel in Saigon and North Citadel in Hanoi), and the provincial citadels, the Nguyen Dynasty citadel system was decentralized [90].

During their 1858 invasion of Vietnam, the French not only acclimated to the local culture and religion but also pioneered numerous military techniques in the construction of fortifications of the Vauban variety. In Vietnam, the lords and kings of the Nguyen Dynasty constructed an average of thirty-three citadels and numerous strongholds from north to south (Figure 111 and Table 27).

According to the book Dai Nam Nhat Thong Chi, there were 29 provinces with citadels in addition to Hue Citadel and Thua Thien Hue Prefecture.

- North Vietnam had 13 provinces: Hanoi, Son Tay, Hung Hoa, Tuyen Quang, Cao Bang, Lang Son, Quang Yen, Hai Duong, Bac Ninh, Hung Yen, Nam Dinh, Ninh Binh, Thai Nguyen.

- Central Vietnam has 11 provinces of Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri, Quang Nam, Quang Ngai, Binh Dinh, Phu Yen, Khanh Hoa, Binh Thuan and Phu Thua Thien

- South Vietnam had 06 provinces: Phien An (renamed Gia Dinh in 1836), Bien Hoa, Dinh Tuong, Vinh Long, An Giang, Ha Tien.

Figure 111. The location of Vauban style Citadels during the Gia Long Emperor period 1820-1841 *(Source: Nguyen Vu Trong Thi, Vietnam Citadel system under the Nguyen Dynasty and the case of Quang Tri Citadel, Ph.D. Thesis, UNIVPM, 2016)*

Table 28. Statistics of Vauban fortifications in Vietnam *(Source: Ngo Duc Tho, Nguyen Van Nguyen, Philippe Papin, The descriptive Geography of the Emperor Đồng Khánh, E1cole francayse d'Extrême-Orient, Institute of Chinese language Research, Map Publisher; Do Van Ninh, Vietnam's ancient Citadel, Technique Schience Publisher, Hanoi, 1983; Quốc Sử Quán triều Nguyễn (The Association of History of the Nguyen Dynasty), Đại Nam Nhất Thống Chí (Dai Nam Comprehensive Encypaedia), Translation: Institute of History, Social science Publisher, Hanoi, 2006; Exhibition of "Archive de la cité de l'architecture, Paris", (1930); Gallois, Chabert, Atlas Général de l'Indochine, 1909; Romanet du Caillaud, F., La conquete du delta du Tonkin, 1877; Nguyen Vu Trong Thi, Vietnam Citadel system under the Nguyen Dynasty and the case of Quang Tri Citadel, PhD thesis, UNIVPM, 2016; Vo Ngoc Duc, The quality of Hue Citadel in the urban development of Vietnam, approach from Architectural Heritage and Landscape Value, PhD thesis, UNIVPM, 2019; and Google Map.*

No.	Citadel of	Current Location	Con-truc-tion time	Pirime-ter (m)	Wall's Height (m)	Wall's Thick-ness (m)	Moat's Width (m)	Moat's Depth (m)	Wall's mate-rial	Shape
1	Cao Bang	Cao Bang City	1836	748	2.98	4.25	4.25-5.53	2.13 - 4.25	Brick & Soil	
02	Lang Son	Lang Son City	1834	2,520	4.37				Brick & Laterite & Soil	
03	Thai Nguyen	Thai Nguyen City		1,384	2.98	1.91 & 7.65	8.5	2.13	Brick & Soil	
04	Tuyen Quang	Tuyen Quang City	1814	1,105	4.12		2.13-4.25	2.13 - 4.25	Soil	
05	Hung Hoa	Phu Tho Prov-ince	1822	1,347	5.14	3.87	11.9	3.83	Laterite & Soil	
06	Quang Yen	Quang Ninh Prov-ince	1826	1,254	3.83				Soil	
07	Hung Yen	Hung Yen City	1831, 1834 - 1837	1,357	4.25	5.1	38.25	1.62	Brick & Soil	

08	Bac Ninh	Bac Ninh City	1824	2,262	3.83	0.77 & 1.28	38.25	4.25	Brick & Soil	
09	Son Tay	Son Tay Town	1822	1,386	4.68	4.04& 6.38	28.48	4.25	Laterite & Soil	
10	Hai Duong	Hai Duong City	1824	2,342	4.76		46.75	2.55	Laterite & Soil	
11	Nam Dinh	Nam Dinh City	1833	3,531	3.91		42.5	2.55	Brick & Soil	
12	Hanoi	Hanoi	1820 - 1831	5,464	4.68	17	21.25-34	25.5	Brick & Soil	
13	Ninh Binh	Ninh Binh City	1824	1,674	4.63		17	3.4	Brick & Soil	
14	Thanh Hoa	Thanh Hoa City	1828	2,678	4.25		39.53	2.98	Brick & Laterite & Soil	
15	Nghe An	Vinh City	1831	2,678	4.89		34	3.4	Laterite & Soil	

16	Ha Tinh	Ha Tinh City	1824	819	4.25		10.63	0.94	Brick & Laterite & Soil	
17	Quang Binh	Dong Hoi City	1824	1,959	4.25	1.28 & 1.7 & 12.75	29.75	2.98	Brick & Laterite & Soil	
18	Quang Tri	Quang Tri Town	1833, 1837	2,081	4.55	0.72	34.85	2.13	Brick & Soil	
19	Hue (capital)	Hue City	1805, 1822, 1832	10,571	6.46	21.25	24.23	4.25	Brick & Soil	
20	Da Nang	Hai Chau District	1822	591	5.1		19.13		Brick	

16	Ha Tinh	Ha Tinh City	1824	819	4.25		10.63	0.94	Brick & Laterite & Soil	
17	Quang Binh	Dong Hoi City	1824	1,959	4.25	1.28 & 1.7 & 12.75	29.75	2.98	Brick & Laterite & Soil	
18	Quang Tri	Quang Tri Town	1833, 1837	2,081	4.55	0.72	34.85	2.13	Brick & Soil	
19	Hue (capital)	Hue City	1805, 1822, 1832	10,571	6.46	21.25	24.23	4.25	Brick & Soil	
20	Da Nang	Hai Chau District	1822	591	5.1		19.13		Brick	
22	Quang Ngai	Quang Ngai City		2,126	4.25		10.63		Laterite & Soil	
23	Binh Dinh	An Nhon Town		2,566	4.67		31.87		Laterite & Soil	
24	Phu Yen	Song Cau Town	1838	1,445	3.61		12.75		Soil	

No	Province	Location	Year						Material	Image
25	Khanh Hoa	Dien Khanh Town	2.714	3.4		19.12			Soil	
26	Binh Thuan	Ham Thuan District	1837	1,717	2.64	0.51	5.1		Soil	
27	Bien Hoa	Bien Hoa City	1934, 1937	1,649	3.61		2.89		Laterite & Soil	
28	Gia Dinh	District 01	1829, 1835	2,230	5.53	31.88	65.88	5.96	Laterite & Soil	
29	Dinh Tuong	My Tho City	1825	1,496	4.04		34		Soil	
30	Vinh Long	Vinh Long City	1832	2,125	4.25		25.5		Soil	
31	An Giang	Long Xuyen City	1834	1,539	3.83		20.,74		Soil	
32	Ha Tien	Ha Tien Town	1834	396	2.98				Laterite	
33	Trieu Tuong	Ha Trung District	1821	774			12.75	1.28	Brick & Soil	

Based on the information mentioned above, historical bibliography, and historical maps, the construction time of the citadel system in Vietnam can be divided into three main periods as below.

Table 29. Development stages of Vauban-style fortifications in Vietnam
(Source: Pham Tan Long, 2016)

Over the past hundred years of existence, the current state of the Vauban citadel has been affected by different influences, which are evaluated through the following statistical Table:

Table 30. General classification of Vauban Citadels in Vietnam (*Source: Author summarizes*)

	Name of citadel	Alternative name	Location (city)	Construction time	Destroyed time	Shape	Boundary area (meter)	Structure	Material	Current situation	Note
1	Cao Bang citadel	x	Cao Bang	Gia Long King period, 1836	Destroyed in the Minh Mang King period and reinforced in 1936	Square	720	Citadel has 2 gates. Three sides of the boundary are moats, while the other leans on the mountain.	brick and rock	Completely destroyed. There is no evidence of the original citadel. There are some flag poles inside which are reconstructed	
2	Lang Son citadel	Doan Thanh	Lang Son	Gia Long King period, 1834	Destroyed in Minh Mang King period and reinforced in 1837	Rectangle	1560	Citadel has 4 gates and is surrounded by moats	wooden hammer brick	There are 2 gates remain (West and South) and a small part of the original Southern wall	recognized as a national historical architectural heritage in 1999
3	Hung Hoa citadel	x	Phu Tho	Minh Mang King period, 1822	1844	Square	1440	Citadel has 4 gates and is surrounded by moats	laterite	Completely destroyed. There is no evidence of the original citadel. There is a flagpole inside which is reconstructed	
4	Son Tay citadel	x	Ha Noi	Minh Mang King period, 1822	-	Square	1304	Citadel has 4 gates and is surrounded by moats	laterite	Almost destroyed. Some small parts of the wall remain. There is the foundation of the East gate left. The South and West gates are damaged	recognized as a national historical architecture heritage in 1994

No.	Name		Location	Built period	History	Shape	Number	Gates/moats	Material	Current state	Recognition
5	Thang Long imperial citadel	x	Ha Noi	Gia Long period, 1803	Destroyed in Minh Mang King period and reinforced in 1831. Destroyed again under the resistance war against France period.	Square	5140	Citadel has 5 gates and is surrounded by moats	Laterite, greenstone, hollow brick	Almost destroyed resistance war against France period. There are a flagpole and a North gate remain	
6	Bac Ninh citadel	x	Bac Ninh	Gia Long period, 1804	Destroyed in Minh Mang King period and reinforced in 1841	Hexagon	2128	Citadel has 4 gates and is surrounded by moats	At the beginning: earth, then: laterite	Three gates, a part of fortified walls, moats, and two cannons remain. Particularly, there are the main gate, a watchtower,and a flagpole (approximately 20m)	recognized as a national historical architecture heritage in 1890
7	Hung Yen citadel	x	Hung Yen	Minh Mang King period 1834	-	Square	15561	Citadel has 4 gates and is surrounded by moats	earth	Completely destroyed	
8	Hai Duong citadel	Dong citadel	Hai Duong	Gia Long period, 1804	Destroyed in Minh Mang King period and reinforced in 1842	Hexagon	2204	Citadel has 4 gates and is surrounded by moats	laterite	Ruin of moats remains but they are heavily polluted	
9	Nam Dinh citadel	x	Nam Dinh	Gia Long period, 1804	Destroyed in Gia Long King period and	Square	3320	Citadel has 4 gates and is surrounded by moats	At the beginning: earth, then: brick	A small part of the fortified walls is in a residential area. The flagpole is	

No.	Citadel	Other name	Location	Built	Reinforced / Destroyed	Shape	Area	Gates / Moats	Material	Current condition	Recognition
10	Thanh Hoa citadel	Hac Thanh citadel/ Tho Hac citadel	Thanh Hoa	Gia King period, 1804	reinforced in 1814	Hexagon	2520	Citadel has 4 gates and is surrounded by moats	rock	Moats (surrounding Ho citadel) and pond (along front gate) remain	
11	Vinh citadel	Nghe An citadel	Nghe An	Gia King period, 1804	Destroyed in Minh Mang King period and reinforced in 1831	Hexagon	1440	Citadel has 3 gates and is surrounded by moats	earth	Fortified walls are completely destroyed. Three gates and the surrounding lake remain	
12	Dong Hoi citadel	Bac Dinh citadel	Quang Binh	Gia King period, 1812	Destroyed in Minh Mang King period and reinforced in 1824	Octagon	1860	Citadel has 3 gates and is surrounded by moats	hard burnt brick	Half of the citadel still remains. The east wall, three gates, and South-North bridge. The East bridge is not in its original shape. 2/3 part of South wall is nearly original condition	recognized as a national historical architectural heritage in 2005
13	Quang Tri	x	Quang Tri	Gia King period, 1809	Destroyed in Minh Mang King period and reinforced in 1827	Square	2000	Citadel has 4 gates and is surrounded by moats	At the beginning: earth, then: brick	The main gate (Tien gate) and fortified wall, moats remain. The three other gates are destroyed completely	recognized as a national historical architectural heritage in 1994
14	Hue imperial citadel	x	Hue	Gia King period, 1805	Reinforced in 1836, 1839, 1842, 1844, 1848.	Square	10571	Citadel has 10 gates and is surrounded by moats	earth inside and brick outside	Hue outer citadel with moats and the main gate remains. Some gates were destroyed and have been conserved	recognized as a national historical architectural heritage in 1998. Recognized by

newly reconstructed

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						Shape		Gates/Moats	Material	Condition	UNESCO in 1993
15	Dien Hai citadel	x	Da Nang	Gia Long period, 1813	Destroyed in Minh Mang King period and reinforced in 1823	Square	556	Citadel has 2 gates and is surrounded by moats	brick	There are one gate, fortified walls, and dried moats that remain. The gate is now conserved	recognized as a national historical architectural heritage in 1988
16	Vinh Dien citadel	La Qua citadel/ La citadel	Quang Nam	Minh Mang King period, 1834	Destroyed in Minh Mang King period and reinforced in 1836	Square	1956	Citadel has 4 gates and is surrounded by moats	At the beginning: earth, then: brick	Almost destroyed. There are some moat evidences	
17	Quang Ngai citadel	Nui But citadel/ Cam Thanh citadel/ Gam citadel	Quang Ngai	Gia Long period, 1807	Destroyed in 1847	Square	2200	Citadel has 4 gates and is surrounded by moats	laterite	Small parts of the East wall and South wall remain. Moats are filled up except for the West moat which is reinforced newly by rock	
18	Binh Dinh citadel	x	Binh Dinh	Gia Long period, 1815	-	Square	4000	Citadel has 4 gates and is surrounded by moats	At the beginning: earth, then: laterite	Almost destroyed. There are some small parts of the fortified wall that remain.	
19	An Tho citadel	x	Phu Yen	Minh Mang King period, 1832	-	Square	800	Citadel has 4 gates and is surrounded by moats	earth, limestone	There is just a small part that remains as a ruin. Almost area transforms into residential buildings, public buildings, and agricultural land	recognized as a national historical architectural heritage in 2008
20	Dien Khanh citadel	x	Khanh Hoa	Nguyen Anh period, 1793	-	Hexagon	2694	Citadel has 4 gates and is surrounded by moats	earth	4 earth gates and fortified walls remain. Moats have dried up and are	recognized as a national historical architectural

											heritage in 1988
21	Bien Hoa citadel	Cuu citadel/Ken citadel/Xang Da citadel	Dong Nai	Minh Mang King period, 1834	Destroyed in Minh Mang King period and reinforced in 1837	Cresent	1352	Citadel has 4 gates and is surrounded by moats	At the beginning: earth, then: laterite	There is a laterite fortified wall, and the citadel is a villa that is hardly damaged	
22	Bat Quai citadel	Quy citadel	Sai Gon	Nguyen Anh period, 1790	Destroyed 1835	Octagon	3176	Citadel has 8 gates and is surrounded by moats	laterite	Completely destroyed without any evidence	
23	Gia Dinh citadel	Phung citadel/ Phuong citadel	Sai Gon	Minh Mang King period, 1836	Destroyed 1859	Square	1900	Citadel has 4 gates and is surrounded by moats	laterite	Almost destroyed. There is a small fort that remains	
24	Tran Dinh citadel	My Tho fort	Tien Giang	Nguyen Anh period, 1792	Destroyed 1826	Square	2430	Citadel has 2 gates and is surrounded by moats	earth	Completely destroyed without any evidence	
25	Vinh Long	Long Ho citadel	Vinh Long	Gia Long King period, 1813	Destroyed 1867	apricot blossom (5 sides)	3000	Citadel has 5 gates and is surrounded by moats	earth	Completely destroyed. Now, the citadel has Huu Gate which is newly reconstructed	

The construction of provinces was based on a variety of plans. However, the Vauban design was predominant. Citadel was constructed from brick, stone, or laterite, depending on the materials available locally. The perimeter citadel measured between 120 and 160 meters. Nam Dinh Citadel was the largest, measuring 333 meters in circumference. The circumference of even the tiniest Ha Tien was barely 38.5 meters. (Table 30) [91]

In addition, there was a system of posts, forts, and coastal forts in estuaries. This fortification system was constructed using sturdy materials like brick and stone.

Regarding the citadels' shape, square-shaped citadels and fortifications were the norms throughout the Nguyen period. Sometimes the four sides of the citadel were the same size, and sometimes they were not. In addition, there were hexagonal shapes, particularly circular and semicircular shapes. At each corner was a convex fortification. Each corner fortification included two steep ramps on its two sides (Table 31).

Table 31. Shape Classification of Vauban citadel in Vietnam *(Source: Author summarizes)*

N.o	Style	Name of Citadel	Construction year	Shape
1	4 edges	Square	Cao Bang citadel_Cao Bang	1836	
2		Square	Hung Hoa citadel_Phu Tho	1822	

3		Square	Quang Tri citadel_Quang Tri	1809	
4		Square	Dien Hai citadel_Quang Nam	1813	
5		Square	Vinh Dien citadel_Quang Nam	1834	
6		Square	Binh Dinh citadel_Binh Dinh	1815	
7		Square	Gia Dinh citadel_Sai Gon (Ho Chi Minh city)	1836	
8		Square	Tran Dinh citadel_Tien Giang	1792	
9		Square zigzag	Thang Long imperial citadel_ Ha Noi	1803	

10		Square with bastion	Hung Yen citadel_Hung Yen	1834	
11		Square with bastion	Son Tay citadel_Ha Noi	1822	
12		Square with bastion	Nam Dinh citadel_Nam Dinh	1804	
13		Square with bastion	Dong Hoi citadel_Quang Binh	1812	
14		Zigzag square	Hue fortification_Hue	1805	
15		Square with bastion	Quang Ngai citadel_Quang Ngai	1807	
16		Square with bastion	An Tho citadel_Phu Yen	1832	

17		Rectangle	Lang Son citadel_Lang Son	1834	
18	5 edges	Pentagon	Vinh Long citadel_Vinh Long	1813	
19		Hexagon 1	Bac Ninh citadel_Bac Ninh	1804	
20		Hexagon 2	Hai Duong citadel_Hai Duong	1804	
21	6 edges	Pentagon	Thanh Hoa citadel_Thanh Hoa	1804	
22		Pentagon	Vinh citadel_Nghe An	1804	
23		Irregular hexagon	Dien Khanh citadel_Khanh Hoa	1793	

24	8 edges	Octagon	Bat Quai citadel_ Sai Gon (Ho Chi Minh city)	1790	
25	Elip	Arc	Bien Hoa citadel_Dong Nai	1834	

Table 32 shows the major changes in the shape of the Vauban citadel of the early and later periods. During the previous period, the citadel's construction was supported by French engineers and military advisors supported the citadel's construction. In contrast, in the later period, the construction activities of the citadel were transferred to Vietnamese engineers. In the early period, the shapes and features of the Vauban were similar to the original Vauban in France, with a distinct star formation. In addition, there is a significant variation in the total area to suit the terrain. In the later period, the ramparts still retain the Vauban-style characteristics of bastions, but the overall plan returns to the familiar square shape like the Sinophere ramparts of previous feudal dynasties.

Construction year

Early Period (1790 - 1805)

Later Period (1806 - 1841)

1790 1792 1793 1802 1803 1804 1805 1807 1809 1812 1813 1815 1820 1822 1832 1834 1836 1841

The design of French military engineers
(Main shapes are diverse types of polygon)

The design of French military engineers and tranfered to Vietnamese
(Main shapes are squares)

Bat Quai citadel (1790)

Dien Khanh citadel (1793)

Bac Ninh citadel (1804)
Thanh Hoa citadel (1804)
Vinh citadel (1804)

Hue imperial citadel (1805)

Thang Long imperial citadel (1803)

Hai Duong citadel (1804)

Quang Tri citadel (1809)
Dien Hai citadel (1823)
Vinh Dien citadel (1834)
Gia Dinh citadel (1836)

Son Tay citadel (1822)
Gia Dinh citadel (1834)

Dong Hoi Citadel (1812)
Quang Ngai citadel (1807)

Nam Dinh (1812)

An Tho (1832)

Table 32. The transformation of the shape of the Vauban citadel over time
(Source: Pham Tan Long, 2012; Author edit)

Thus, the characteristics of the French Vauban influenced the type of Vauban citadel in Vietnam. However, the Vauban citadel in Vietnam is much simpler than the Vauban citadel in France. The shape of the Vauban citadel in Vietnam mainly revolves around shapes including square, hexagon, and octagon. Construction materials are local materials near the construction site, such as stone, terracotta bricks, honeycomb bricks, and compacted earth.

However, the citadel built in the Vauban style in Vietnam still retains traditional oriental features. Feng shui is strictly applied in choosing the location and the direction of the citadel. Following Fengshui, a mountain was considered the background, a stream of water meaning gathering and applicable rules for opening the city gate. These were the elements required for every citadel construction. Some architectural parts, such as the towers and the guard towers, were built of light materials, roofed with yin and yang tiles. The roof had curved corners and curved edged. The truss column was carved and painted. The gates of the citadel were named in Chinese characters. The flag tower maintained the Western-style. The Vauban citadel adopted flexibility in Vietnam.

4. Modern Warfare style

In the early 20th century, regarding the development of science and technology - including military science - the citadel architecture became obsolete. The citadel system of the Nguyen Dynasty, which was very effective in the previous war, was defeated by the French attack with the rear-loading cannons. Then, the Vietnamese army became weaker in almost field. The concentrated form of citadel construction regarding the traditional type (the uprising period from 1858 to 1931) was quickly detected and attacked by the French. In that situation, the Vietnamese army chose guerrilla warfare, hiding in the mountains, natural caves, and especially the underground tunnel system to avoid the French army's confrontations [92]. These tunnel systems gradually developed into "underground citadels" that were solid and effective even in the wars against Japan and the United States.

In addition, the French army had a defensive mindset in dealing with the guerrilla war in Vietnam. This mindset was shaped by building a citadel from the Middle Ages to World War 1 (shown in the Maginot line). French blockhouses and bunkers connected into continuous lines to control key traffic axes. Although these works showed strategic ineffectiveness, their vestiges remain and become part of the military landscape of Vietnam.

Table 33. Củ Chi underground citadel

Củ Chi underground citadels system	
_ Governing: Vietnam _ Built time: 1946 _ Total length: 250 kilometers _ Location: Củ Chi – Việt Nam 11°08'28.8"N 106°27'43.4"E _ **Historical background:** The Củ Chi underground citadels are a vast network of interconnected tunnels. During the Vietnam War, they were the site of multiple military campaigns and served as the Viet Cong's base of operations for the 1968 Tết Offensive. _ **Characteristic:** Area residents dug individual tunnels and tunnels to avoid raids by the French army and to provide shelter for the Viet Minh. Each village built a separate tunnel. Then due to the need to travel between the tunnels of the villages, the tunnel system was connected to form a complex and continuous tunnel system, which later expanded. The structure of tunnels has been improved to become an underground citadel with barracks, hospitals, food stores, weapon stores, and housing quarters. Above the ground is a traffic belt and trenches interlaced with tunnels, battle mounds, minefields, nail pits, tunnels, etc., arranged in continuous clusters to create a solid battlefield in the area. Guerilla warfare - The tunnel networks were crucial to the Viet Cong's battle against American forces	 *Location map and distribution of Cu Chi tunnels (Source: Author)* *The tunnel section shows the layout with full command, defense, combat, living, ambulance like a military fortress. (Source: https://secret-life.org/wp-content/uploads/2021/09/so-do-dia-dao-cu-chi-2_optimized.jpg*

and helped to counteract the expanding American military effort.	

Table 34. The Lattre Line blockhouses system

De Lattre Line	
_ Governing: French Indochine Colonial Government _ Built time: 1950 _ Location: Red River delta (Northern Vietnam) _ Total length: 378 kilometres _ Historical background: The French constructed the barrier to protect the vital lines of communication between the towns of Hanoi and Haiphong and to protect the densely populated and economically significant Delta region from attacks by both the Việt Minh and and Communist Chinese. _ Characteristic: The Line was to consist of 1200 individual concrete blockhouses capable of withstanding 155mm artillery, organized into 250 clusters of 3 to 6 blockhouses providing mutual fire support across 235 km (378 km). Each blockhouse was required to house at least ten men. Additionally, a defensive redoubt was to be constructed within 35 kilometers (22 miles) of the port of Haiphong to protect it from artillery attack. All of these new defensive lines were to be connected by 30-ton tank-capable roadways. While the De Lattre Line provided some security and served as an	 *Map of the defense line The Lattre Line which built to cut off the supply lines of the Viet Minh army (Source:* *https://www.globalsecurity.org/military/world/europe/fr-forts-de-lattre-line.htm* *Typical French style blockhouse in Vietnam* *(Source: EFEO Museum)* *In October 1954, following the French retreat, the De Lattre Line was abandoned. Today, the decaying blockhouses are either abandoned or utilized by farmers. (Source: Author)*

anchor point for French mobile operations outside the Delta, it was by no means impregnable, since whole Vit Minh combat battalions could readily penetrate the gaps between strongpoints.	

Due to the fierceness of modern warfare, military constructions in this period ignored all decorative elements and focused only on form and function. It can be summarized by the following characteristics:

_ Morphology: The structure did not concentrate on a large-scale architecture like a fortress. Instead, it was a combination of small works scattered and linked together by corridors, trenches, or underground tunnels.

_ Scale: These structures were often planned over a large scale to achieve maximum control effect (for the invading army's construction) or increase flexibility and strength (for the defender's construction).

_ Location: Military buildings for the siege, attack, and split purposes (De Lattre Line) were located in crucial routes and key cities. The surrounding terrain was flattened to create the best visibility and maximize firepower. The architectures that protected resistance forces long-term (Cu Chi tunnels, Viet Bac war zone) were always located in dense forest areas for effectively hiding and against large-scale battles.

5. Conclusion Chapter III:

In chapter III, the forms of the Vietnam fortifications are studied and clarified through the typical representatives of 4 groups, including Champa, Vietnam, Vauban, and Modern Warfare. The scale, location, shape, and characteristics of each type are shown. Chapter IV clarifies the values of this fortification's heritage: Cultural values of fortifications in Vietnam.

CHAPTER IV: CULTURAL VALUES OF FORTIFICATIONS IN VIETNAM

1. Heritage value assessment according to the UNESCO criteria system

Ten selection criteria of UNESCO are established as a world standard to asset and rank heritage [93]:

Table 35. Selection criteria for asset and ranking heritages *(Source: UNESCO)*

Selection Criteria:
1. To represent a masterpiece of human creative genius; 2. To exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design; 3. To bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared; 4. To be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history; 5. To be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change; 6. To be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria); 7. To contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance; 8. To be outstanding examples representing major stages of earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features; 9. To be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, freshwater, coastal and marine ecosystems and communities of plants and animals; 10. To contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation. The protection, management, authenticity, and integrity of properties are also important considerations.

In ten criteria, the first six criteria are used to identify the type of cultural heritage, whereas the last four criteria are for natural heritage evaluation.

Therefore, the first six selection criteria are employed to assess the value of the citadel system in Vietnam.

i. to represent a masterpiece of human creative genius:

To achieve this UNESCO criterion, an architectural heritage, besides its functional value, and visual aesthetics, is required. Not many citadel buildings meet these UNESCO criteria because fortifications are a type of construction for combat purposes, inclined to rational function. Almost all local-level fortifications in Vietnam do not meet this category.

However, to show the dynasty's power, the defensive structures for cities were also chosen to be the capitals. For that reason, the physical appearance of fortifications, including shapes and forms, was considered carefully. Furthermore, each period's artistic quintessence, such as architecture, painting, and sculpture, was seriously engaged in the citadel or interior construction. Remarkably, the Thang Long Imperial Palace belonging to the Ly - Tran dynasties had a unified and proportionate layout with the unique, sophisticated Vietnamese dragon and phoenix decoration (Figure 112). Another impressive citadel is the Imperial Citadel of Hue, belonging to the Nguyen Dynasty. Outstanding decorative and unique shapes known as "Trùng Diêm, "Trùng Thiềm," and "Thượng Thu Hạ Thách" were combined in a plan which presented both Eastern feng shui values and Western military science (Figure 113). The artifacts and historical relics of the protective fortifications of Vietnamese capitals in various dynasties found today can prove the "masterpiece" value in UNESCO's [i] standard.

Figure 112. Perspectives on the restoration of Thang Long citadel under Ly dynasty *(Source: disantrangan.vn/wp-content/uploads/2021/02/hinh-anh-hoang-thanh-thang-long-700x438.jpg)*

Figure 113. Fengshui layout of Hue Citadel *(Source:.researchgate.net/Figure/1-Impact-of-Feng-Shui-principles-on-the-formation-of-Hue-*

ii. to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning, or landscape design:

The history of Vietnam had many conflicts and changes amongst various continuous periods of domination and independence. Besides, Vietnam is influenced by both Chinese and Indian civilizations due to geographical characteristics. These reasons lead to the transformation of political, social, and cultural terms. Fortifications, known as military architectural types, also became the first objects to change. There is some evidence for this.

- Co Loa citadel had a mixture shape after being colonized by the Han dynasty. It was the combination of the original of the Bach Viet ethnic in outer citadel construction following natural topography and the Han dynasty in inner forbidden citadel construction with the square shape. (Table 22)

- The Ho Dynasty Citadel was built of stone and completed in a short time of 3 months. This is evidence of the power transferring period of power

from the Tran dynasty to the Ho dynasties in the context of the imminent threat of invasion of the Ming Dynasty. This is a particular type of military citadel that appeared to adapt to the demand for national protection at that time. (Table 25)

- The Vauban Citadel system of the Nguyen Dynasty marked the influence and interference of Western military science and technology. (Table 27)
- The system of bunkers is evidence of the French colonial period and the fighting strategy during the Indochina war period. (Table 33)
- The Cu Chi tunnel system demonstrates the period of long-term resistance of the Vietnamese people against the powerful military through guerrilla warfare strategy. (Table 34)

Thus, it can be affirmed that Vietnam's fortifications built during the war periods contain values according to UNESCO's [ii] standards

iii. to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization that is living, or which has disappeared;

Figure 114. The citadel heritage is proof of the existence of the once glorious Champa civilization *(Source: https://www.vietvisiontravel.com/wp-content/uploads/2017/05/The-complex-of-My-Son-Santuary-where-tells-the-stories-of-Champa-Kingdom.jpg)*

Champa is a civilization with more than 2000 years of history and developed with many achievements in both science, religion, and especially art. Champa civilization is an interesting case for world cultural study because of inheriting the values of Funan culture and interfering with other branches of Indian civilization such as Angkor and Khmer. Unfortunately, the entire development process of this civilization was interrupted in 1832 by the destruction of the whole empire. The majority remains from a glorious time is the system of temples and military citadels, with its science, culture, history, and art values. Hence, the citadels of Champa represent a vanished civilization, according to UNESCO's [iii] criteria (Figure 114).

iv. to be an outstanding example of a type of building, architectural or technological ensemble, or landscape that illustrates (a) significant stage(s) in human history;

During more than 1000 years of Chinese domination, the Vietnamese citadel system was influenced by Chinese design thinking. The Imperial Citadel of Thang Long is a typical example highlighting the Chinese way of planning the three citadels. It was organized from La Thanh to the Imperial Citadel and Forbidden City in the form of symmetrical rectangles lying on the same axis. The design of wooden architecture was linked to the duo on. The roof had a curved blade with dragon and phoenix motifs similar to Chinese architecture (Table 24). Besides influencing the Chinese style, other fortifications, such as the Vauban citadel system of the Nguyen Dynasty, were proof of the Vauban-style fortifications architecture, which is extremely rare in Asia. This type only appeared in two countries, Japan and Vietnam (Table 31). Besides, it is essential to consider the Ho citadel with the characteristic of being the only citadel in Asiat built entirely of stone (Table 25). The three mentioned citadels as specific representations in different periods show the diversity in the types of fortifications in Vietnam, which meet the "examples" as understood by UNESCO standards [iv].

v. to be an outstanding example of a traditional human settlement, land use, or sea use that is representative of a culture (or cultures) or human interaction with the environment, especially when it has become vulnerable to the impact of irreversible change;

As mentioned in chapter III, one of the types of fortification in Vietnam is the Geology type. This type of fortification is the ability to exploit the local terrain for strengthening defense purposes. For example, the Co Loa citadel is the first type of military stronghold recorded in the history of Vietnam. The characteristic of this citadel was following the Hoanh River flow to create an extraordinary terrain of 9 vortexes. This created favorable conditions for agriculture and aquaculture and a solid defensive position (Table 22). Another case study is the Cu Chi tunnel system of Vietnam. It was created as an "underground super base" with a complete command post, armory, hospital,

school, and housing with a sophisticated system of traps, protection, and command (Table 33). The above cases are both "outstanding examples of a traditional human settlement, land-use," and "human interaction with the environment," and at the same time are facing the risk of being "vulnerable under the impact of irreversible change," completely exactly according to UNESCO [v] standards.

vi. to be directly or tangibly associated with events or living traditions, ideas, beliefs, and artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria);

Vietnam is known as a small country without a powerful military, but there have been many conflicts and wars with mighty armies throughout history, namely China, Mongolia, France, Japan, and America. These victories were the contributions of many national heroes. In each local fortification, local living habits and cultural festivals are formed to commemorate it. Some of them are mentioned below.

- Hung Temple Festival was held in Co Loa citadel to commemorate the reign of the Hung King. [94]
- Hoa Lu festival is held in Hoa Lu citadel to acknowledge King Dinh Tien Hoang. [95]
- Lam Kinh festival is held in Tho Xuan, Thanh Hoa, to commemorate hero Le Loi.[96]
- Festival of the Cham community at the monuments of ancient temples and towers in memory of the kings of Champa. [97]
- Festivals of Hue citadel to acknowledge the expansion of the realm of the Nguyen lords, such as Xa Tac altar ceremony, Cau Ngu ceremony, Boat racing ceremony, Thuong Tieu ceremony, Thu Te ceremony, Sinh village wrestling, Huyen Tran Princess ceremony. [98]

The festivals in the citadel in Vietnam have become a cultural beauty and are associated with local customs, becoming an indispensable part of the local community. Thus, it can be seen that the citadel monuments have been directly and tangibly associated with events, living traditions, and beliefs of the community. This is also the standard [vi] of UNESCO.

2. Intangible cultural values

2.1 Historical values:

The historical values are identified based on original information, arguments, and historical, scientific data. According to "Timeline of Vietnamese History," Vietnamese history dates to 25000 BC with the pre-historic period. If counting from the first state, Xich Quy, in 2879 BC, it has been 4900 years of history. The tangible cultural heritages are the core of historical memories.

If architectures are the most significant evidence of the existed civilizations, the palaces and fortifications are the most obvious marks of the feudal dynasties of Vietnam. From these relics, later generations can learn and understand the historical process of forming and developing a community and dynasty. Without historical artifacts and architectural heritage, the historical values of human civilization would not be explored. For example, Angkor Wat (Khmer: អង្គរវត្ត) is a complex of temples and fortifications in Cambodia and the largest religious monument in the world (1,626,000 square meters). But this great masterpiece was forgotten for four centuries until the French explorer Henri Mouhot found it in 1860 and revived a brilliant splendor of civilization [99]. Another is Troy - Canakkale was associated with the famous Trojan War, built-in 3000BC, but its vestiges were forgotten until 1870 to be found by Heinrich Schliemann [100]. Without discovering these relics as a witness to history, the Troy story would not be identified.

In the case of Vietnam, historical data was influenced by wars and dynastic and institutional changes. The heaviest part of China's assimilation

process was with Dai Viet, and Dai Viet dominated Champa. This assimilation leads to the latter era's historical and cultural facts. Fortunately, the cultural sediments hidden in the historical sites are found. Historical values can be demonstrated through the following aspects.

2.1.1 The historical value of the country's establishment process

The central relic site of Thang Long Imperial Citadel, including archaeological relics discovered in the ground and relics on the land, reflects a near-continuous history. The historical timeline covers from the capital of Annam, the Đại La citadel during the 7th - 9th centuries under the Tang Dynasty, to the Forbidden Citadel of Thang Long from the Ly dynasties to the Tran, Early Le, Mac, Later Le at the end of the 18th century [101]. Finally, it shows Thang Long - Hanoi under the Nguyen Dynasty in the 19th century, from the French colonial period to today. The outstanding historical value of the relic site is the rich history of a political center. This place, nowadays, is still the capital - center of politics in Vietnam in Ba Dinh, Ha Noi.

Figure 115. Ancient "Giang Tay Quan" bricks, Dai La Pipe Tiles, and Dai La Wells of Thang Long Citadel *(Source: baotanglichsu.vn)*

On an excavated area of 19,000 m2, archeology has discovered architectural vestiges and relics of Dai La citadel in the deepest cultural layer, including relics of foundation bundles, pillars, sewers, and three wells of the same type. Gray bricks and tiles, including "Giang Tay Quan" brick and pipe top with typical decorations of the Duong Dynasty, are also found. The relic site is completely located inside Dai La citadel. Ly dynasty layer of relics is above Dai

La relics. The Dai La well has a row of Ly dynasty red bricks above, proving that the Ly Dynasty built Thang Long citadel in Dai La citadel by combining Dai La architecture [102] (Figure 115).

Since the establishment of Thang Long capital in 1010, the Ly dynasty has evidence of the densest architectural vestiges on the entire area of archaeological relics. There are significant architectural monuments with three compartments, nine compartments, and thirteen compartments, with trusses of 3 columns, six columns, and seven columns that can be identified through the pillars supporting the foot of the rock column. Archeology also found many hexagonal structures with six circular foundations around and 1 square foundation in the middle, and one large-scale octagonal structure. There is also a drainage system, a water well, and architectural materials typical of the Ly dynasty in the Ly dynasty cultural layer [103] (Figure 116).

Figure 116. Architectural relic (left picture) and "Hexagonal Floor" Relic (right picture)
(Source: Author)

The relics of Tran dynasty architecture inherited and reused some works of the Ly dynasty. Many new architectures created a unique appearance for the Tran dynasty. Tran architecture also covered the foundation, built the foundation, and bundled the foundation, but the curb border was in the style of brick-shaped lemon flowers, which was typical of the Tran Dynasty. The water well in the Tran Dynasty was built with red bricks in the style of a herringbone cross (Figure

117). Building materials such as bricks, tiles, terracotta statues with decorative patterns of dragons, phoenixes, lotus petals, and chrysanthemums like the Ly Dynasty, but the style was more unrestricted.

Figure 117. Water fountains (left picture) and bricks with carved words "Hoang Mon Thu" (Emperor 's palace) (right picture). *(Source: baotanglichsu.vn)*

The archeological site also explores relics of the Early Le dynasty, partly overlapping the Ly and Tran dynasties and partially demolishing some of the previous architectures. Many lakes and rivers were awakened. It seems that the Forbidden City planning underwent some critical changes. Many monuments, drainages, and wells were found with the Early Le dynasty types of bricks, lotus tiles (ngói mũi sen), bar blue tiles (ngói lưu ly), and yellow royal tiles (hoàng lưu ly). They are distributed among the vestige (Figure 118).

Figure 118. The bowl has "Long Lac Palace" and "Water Well" - Artifacts representing the Later Le dynasties overlapped with the Ly and Tran dynasties, a typical example of the overlapping historical and cultural layers between the dynasties. *(Source: baotanglichsu.vn)*

During the French colonial period, Hanoi was the capital of French Indochina, and the ancient city of Hanoi was a French military area. In this area, the French people built some new structures, including a building built on the foundation of Kinh Thien Palace as the artillery headquarters. From 1954 to 2004, the Hanoi Citadel area was the Headquarters of the Vietnamese People's Army.

The central relic site of Thang Long Imperial Citadel includes both archaeological relics discovered in the ground and parts above ground in Hanoi's ancient citadel, existing for thirteen centuries as an authority's center. It existed for ten centuries as the Forbidden Citadel of Thang Long and the central axis of the Citadel of Hanoi. There are many capitals with a history of more than a thousand years in the world. Hence, in this case, the continuity and permanence of a power center until modern development. This makes the outstanding feature and historical value of the Central Monuments of the Imperial Citadel of Thang Long.

2.1.2 The historical value in the process of fighting against foreign aggressors

Vietnam fought with many powerful militaries throughout its history, consisting of the Chinese dynasties, powerful feudal kingdoms such as Lanna, Angkor, Khmer, Siam La, and the Ho Dynasty citadel as the center for defense purposes against the Ming invaders in 1406 [8] (Figure 120).

Figure 119. The artillery marks on the surface of the gate of Hanoi citadel are proof of the fierce battle between the Nguyen dynasty against the invasion of the French army in 1882. *(Source: Author)*

Figure 120. The citadel of the Ho Dynasty, with a very special monolithic material is a testament to the period when the country was in danger before the invasion of the Ming army in 1406. *(Source: hanoijourney.com/citadel-ho-dynasty-unique-stone-work-14th-century/)*

In modern warfare, fortifications were the most critical evidence to assess historical values during the struggle against foreign aggression. During the Indochina war, the system of Decastriline trenches and groups of strongholds built by the French people was used to deal with the Viet Minh. This was a testament to France's trench warfare style in World War 1. However, this fighting strategy was not effective and was defeated by the "concentrated fire, scattered fire" strategy of the Viet Minh army. Based on the strategy using tunnels and trenches, in the Vietnam war, a series of large-scale continuous military bases were brought underground and organized into a dense network of underground tunnels with rudimentary tools. For that reason, today, the Cu Chi tunnel system is not only an attractive tourist destination but also shows a great history of Vietnamese people against an enemy with specific weapons, outstanding science, and technology.

2.1.3 Value of the history of East-West cultural interference

Besides the fortification influenced by Chinese style and influenced by Champa heritage, in the cultural background of Vietnam, there is also a Vauban-style fortification system, which is considered the transaction system of different

periods. Through the years of war, the ancient citadels of Vauban were the evidence of the first imprints of the French in Annam, but they also captured the characters of the Asian culture.

In the early 14th century, the appearance of gunpowder in Europe became a weapon of terrifying destructive power [104]. This kind of weapon destroyed several forts which existed strongly for many decades. Because of that, the buildings turned into monuments. Therefore, most European strongholds from the 17th century were built in a particular style, optimizing defensive purposes. This architectural style is collectively known as Vauban - named after its creator - architect Sébastien Le Prestre de Vauban (1633 - 1707) - master of siege artillery tactics. The ancient citadel with Vauban architecture is a complex system of citadels with outstanding defense capabilities and a notorious name "impregnable city" [105].

From the 19th century, Vauban architecture was applied to the construction of many fortifications in Western countries and colonial areas, including Vietnam. The work that was the foundation for the Vauban architectural style in Vietnam is the Bat Quai citadel (Phien An citadel) – built in 1790 by King Gia Long (Nguyen Anh) (Figure 121). This fortification led to the construction of more than 50 citadel systems in the Vauban style until 1841. In Southeast Asia and Asia in general, only two countries, including Japan and Vietnam, had this type of fortification [106]. Thus, it can be seen that the Vauban-style citadel is not only a precious heritage of Vietnam but also considered the world's heritage. Its historical value not only marks a period of transformation in military science and highlights the initial cooperation and cross-cultural relations between the French and the Vietnamese.

Figure 121. Citadel of Saigon - the first and also the typical example of the Vauban citadel in Vietnam. *(Source: https://alchetron.com/cdn/citadel-of-saigon-85aa46a3-d3a2-40ae-a99a-3abdce0aef8-resize-750.jpg)*

2.1.4 The historical value of perished civilization

Throughout the history of the Cham ethnic group, experiencing the transformation of society, and the intervention of nature, hundreds of Champa architectural works still exist in the strip land of Middle Vietnam or the mountains of the Central Highlands. With the unique value of architectural art and decorative motifs, Champa towers are recognized as national architectural art historical relics. My Son relic site (Quang Nam) was honored by UNESCO as a Cultural Heritage of Humanity (1999) [107]. In addition, the results of recent archaeological excavations show that the Champa architectural ruins are a precious source of historical material. There are some case studies below.

_ In Quang Binh province, the head of Champa culture is located to the North. If in 192, the ancient nation of Lam Ap was established and merged into Dai Viet

territ in 1069; the Champa culture in this space had nearly 1000 years of development. However, until now, there is no Champa architecture exists. Foremost of them are ruins. In 1927 and 1928, researchers excavated two significant architectural ruins: Dai Huu and Trung Quan. The excavation explored large-scale tower architecture traces and many related artifacts hidden inside the Tower.

- In Quang Tri province, there were 22 tower areas in the northern part of the Champa region in the past. However, until now, there are only ruins. Many architectures stand until the 18th century, but now, there is only brick mounds like the Trung Don tower sites remain. Some areas had traces of three architectures, but some areas just left one architecture. The ruins are distributed in many places, often concentrated along the banks of large rivers. [108]

- In Thua Thien Hue Province, there are more than 30 places with traces of Champa culture to previous surveys. Many structures also existed until the beginning of the 20th century, such as the Linh Thoi tower. However, nowadays, it is collapsed. The survey results in recent years show that there are thirteen architectural sites and ruins here, including the My Khanh temple, which was discovered in 2002. [109]

- In Da Nang, no Champa architecture exists until now. However, some ruins were recognized as Champa archeological sites. These sites have not been conducted for further research [110].

- Quang Nam province is known as the central kingdom of Champa. Besides tower architecture, there is also a diverse architecture system of ruins. For example, the excavations in Tra Kieu in 1928 uncovered many gorgeous architectures and items. In Tra Kieu's archeological sites, there are at least six ruins. Excavations at the ruins of Chanh Lo tower (1904) or Van Khanh (1998) provided many valuable documents about Champa architecture [111].

- In Binh Dinh province, besides the current tower system in Binh Dinh province, there are more than seven locations with thirteen towers. In addition, the surveys showed that there were a series of collapsed architectural ruins in the area. [9]

- In Phu Yen Province, the Nhan tower is still standing. In addition, the area still preserves in the valley many other architectural ruins such as "Kauthara-Champa" [112].

The monuments and temples of Champa are evidence of the existence and demise of civilization in the territory of Vietnam for thousands of years.

2.2 Economic values

2.2.1 Tourism development

Vietnam has eight heritages recognized by UNESCO as cultural and natural heritage of the world. There is five cultural heritage including relics of Hue, ancient capital (complex of Hue monument), Hoi An ancient town, My Son temple, and tower area, central relic area of Thang Long Imperial Citadel - Hanoi, Ho Dynasty citadel; two natural heritage consisting of Ha Long Bay and Phong Nha Ke Bang national park; one landscape complex named Trang An [113]. There are five in eight heritage that relates to the fortification system involving Hue Citadel (relics of Hue's ancient capital), Thang Long Citadel (Thang Long Imperial Citadel), Indrapura Citadel (My Son), Ho Citadel, and Hoa Lu Citadel (Trang An landscape complex, Ninh Binh). These heritages are not only proof of the diversity of Vietnamese natural landscapes, cultural identity, and history but also as attractive destinations for domestic and international tourists.

i. Complex of Hué Monuments - UNESCO world heritage

The complex of Hue monuments is located along the banks of the Perfume River and some surrounding areas of Thua Thien - Hue province. The complex

of Hue monuments is the first heritage of Vietnam recognized by UNESCO in December 1993.

From 1802 to 1945, Hue was the capital of unified Vietnam under the reign of thirteen Nguyen kings. Also, at this time, valuable historical and cultural architectural works were formed here, such as Hue Citadel, the forbidden city (with 253 works), seven clusters of mausoleums of nine Nguyen kings, Nam Giao altar, Ho Quyen, Hon Chen Palace [114]. The Complex of Hue Monuments is a typical example of Eastern feudal capital. (Figure 122)

Figure 122. Hue citadel – typical example of Eastern feudal capital (Source: Author)

Prominent in the complex of Hue monuments are three citadels involving the Capital Citadel, the Outer Citadel, and the Forbidden Citadel, arranged in opposite directions throughout on a South-North axis. The system of fortifications and palaces had a harmonious combination of Eastern and Western

architectural quintessence. Moreover, they were placed with natural setting factors, including Ngu Binh Mountain, Huong Giang stream, Gia Vien dune, and Boc Thanh dune. To the west of the Citadel, on both sides of the Perfume River, the mausoleums of the Nguyen kings have a completely different style. Yet, today, the ancient capital of Hue still preserves Vietnamese tangible and intangible cultural heritages, also the key point of tourism attraction.

Figure 123. Statistics showed that the number of domestic and international tourists has increased significantly over the years (Source: Thua Thien - Hue Department of Tourism).

Legend (from left to right):
Historical monuments, tombs, internal imperial, imperial architecture/historical site, Landscape, Huong River, Truong Tien Bridge, Ancient landscape, Friendly local community, Kind local community, Pagoda, Good food, Diverse Food, unique Food, Bun bo, Hue traditional music, Craft villages, green city (many plants), Clean and clear streets, Safety, Boat experiences with music, many tourist attractions.

Figure 124. Rates for properties are over 10% of visitors selected for Hue tourist destination (Unit: %) *(Source: compiled from survey data, 2017).*

Not only the types of tourism towards the ancient citadel but the feat of Vietnam's victory over the great powers in the modern war also creates great attractions and potential in tourism. Monuments such as Cu Chi tunnels, prisons, and war zones are always attractive destinations for tourists, military researchers, and veterans who want to know about the Vietnam War.

2.2.2 Entertainment

a. Historical films

Historical films are indispensable for any cinema, especially for countries with a long historical tradition. This kind of film series is considered a gold mine with many works with towering sales. Most historical films depict a historical event or person as accurately as possible within the range of available historical documents; or stories based on actual persons and historical facts. So, history's

famous tower defense battles will always be an attractive topic for filmmakers and audiences. In the line of war movies set in the fortress, good examples have achieved excellent revenue and professional evaluation results. For instance, in the film Troy (2004, 533 million USD), the background and main subject of the ruins of Troy at Canakkale, Turkey, in 1865, discovered by archaeologist Heinrich Schliemann played a massive role in confirming the existence of this citadel in history, as well as providing valuable information. For Asian cinema, there are also many typical works for the film series set in the siege war, such as the work "The Floating Castle (のぼうの城, Nobō no Shiro)" (2012). They are produced based on real defending with a fortress system. These works are not merely entertainment and commercial but also have the value of nation historical. For a country with a long and fierce war history like Vietnam, themes and backgrounds for movies will be explored with many themes. Therefore, the value of the citadel heritage in cinema still has excellent potential for further development.

b. Films set in the Âu Lạc Period (214 — 111 BC)

Table 36. Vietnamese history films with themes are set in the citadel *(Source: Author summarizes)*

Films set in the Âu Lạc Period (214 — 111 BC)

Title	Release date	Time period	Setting	Notes
My Chau's Love	1992	210 BC—207 BC	Âu Lạc (Vietnam) & Cổ Loa Citadel	About the story of Princess Mỵ Châu and Prince Zhongshui in the Co Loa citadel siege.

c. Films set in the Independence period (938 — 1945)

Table 37. Vietnamese history films with themes are set in the citadel *(Source: Author summarizes)*

Films set in the Independence period (938 — 1945)

Title	Release date	Time period	Setting
Dai La Citadel 's on fire	1989		Đại La Citadel - Đại Cồ Việt (Vietnam)
Emperor Dinh Tien Hoang	2013	924—968	Citadels ruled by 12 rebellions - Đại Cồ Việt (Vietnam) &
Ly Cong Uan: Road to Thang Long	2010	974—1009	Thang Long citadel - Đại Cồ Việt (Vietnam)
Thang Long's ambition	2010	974—1009	Thang Long citadel - Đại Cồ Việt (Vietnam)
Legendary history of the way to Thang Long	2011	999–1009	Thang Long citadel - Đại Cồ Việt (Vietnam)
To the new capital Thang Long	2010	1003-1009	Thang Long citadel - Đại Cồ Việt (Vietnam)

Title	Release date	Time period	Setting
Đêm hội Long Trì	1989	after 1770	Thang Long citadel - Đại Cồ Việt (Vietnam)
Thăng Long champion swordman	1989	18 century	Thang Long Citadel - Đại Việt (Vietnam)
Tây Sơn cavalier	1990	18 century	Citadel of Binh Dinh - Đại Việt (Vietnam)
Ngọc Trản martial arts	1990	18 century	Citadel of Binh Dinh - Đại Việt (Vietnam)
Tây Sơn Heroes	2010	18 century	Thang Long Citadel - Đại Việt (Vietnam)
Long Thành's divine song	2010	18—19 century	Thang Long Citadel - Đại Việt (Vietnam)
Thiên Mụ's bell sound	1957	19 century	Hue Citadel – Vietnam (French Indochine)
Hero Nguyễn Trung Trực	2012	19 century	Gia Dinh Citadel – Vietnam (French Indochine)
Hoàng Hoa Thám	1987	19—20 centuries	Ha Noi Citadel - Vietnam (French Indochine)

Title	Release date	Time period	Setting
Pacifier Marshal	2013	19—20 centuries	Gia Dinh Citadel, Dinh Tuong Citadel, Bien Hoa Citadel - Vietnam (French Indochine)
The Imperial Palace's Candles	2004	after 1925	Hue Citadel - Vietnam (French Indochine)

Films set in the Modern Age (1945 – Now)

Table 38. Vietnamese history films with themes are set in the citadel *(Source: Author summarize)*

Films set in the Modern Age

Title	Release date	Time period	Setting
The 17th parallel	1972	after 1954	North Vietnam (Vietnam) & the 17th parallel
The divided river	1959	after 1954	Vietnamese Demilitarized Zone - V-DMZ
Legendary markers	2013	1960s	French and VietMinh base and in Dien Bien Phu
Hà Nội during the 12 days bombardment	2003	1972	North Vietnam (Vietnam) and inside Hanoi city
The smell of burning grass	2012	1972	North Vietnam (Vietnam) & Quang Tri Citadel

Title	Release date	Time period	Setting
Scarlet Flower	1994	1954	French and VietMinh base and in Dien Bien Phu
Dien Bien Phu – Battle between Tiger and Elephant	2009	1954	French and VietMinh base and in Dien Bien Phu

d. Historical theme game

Considering the types of entertainment that have a rapid and widespread influence on the public, especially young people, it has to mention video games. Game series such as Total War by Creative Assembly (Japan's Sengoku period), Napoleonic war, Punic war, and Three Kingdoms of China exploited the context, characters, citadel system, and fortress. The new technology of virtual reality creates a high interactive level between knowledge of game and user through devices such as VR headsets and remotes. These games also provide players with the most intuitive and vivid knowledge about the functions and operating structure of the fortification. Game series are also a way to convey a country's cultural values and specific terms.

Figure 125. Vietnamese fortification scene in Au Lac era was used in the game "Stronghold: Warlords" launched in January 2021 *(Source: Firefly Studios Company)*

Figure 126. Vietnamese fortification scene during the revolt against Ming dynasty era was used in the game "Age of Empires II" *(Source: Microsoft)*

In Vietnam, there have been many games deployed in the context of the citadels as well as historical and legendary events of Vietnam, such as "Stronghold: Warlords" (January 2021), set in the context of famous historical and mythological characters (Figure 123); "Rise of the Rajas" exploits the resistance war against the Ming invaders (Figure 124); "7554" with the battlefield of Dien Bien Phu; or Cu Chi campaign in the game "Tunnel Rats: 1968". Hence, delivering accurate information about the characteristics with the value of the citadel heritage through historical theme games projects has the potential for economic and cultural transmission.

f. Performing arts

The theater is a collaborative form of performing art with the most significant symbolic value. Dramas, plays, Traditional operetta, folk songs, and dances are considered entertainment forms and effective communication methods for a community. For example, the play "Les Troyens" is always performed annually by famous theaters in the UK, France, USA, Italy, and many other theaters in the world. In Thailand, the show "Siege of Ayutthaya " delivers the background of Burmese - Siamese wars between Burma and Siam from the 16th to 19th centuries. These art performances are often exploited for tourism development and culture exchange events. Vietnam's traditional art is also a great

heritage, with some performances recognized by UNESCO as an intangible cultural heritage. All kinds of ancient historical concerts, plays, places folk operas, and dramas not only revolve around royal stories and have the theme of battles. The background and materials for these are battles and fortifications. The following plays can be mentioned in Table 39.

Table 39. Vietnamese history performing arts with citadel sceneries.
(Source: Author summarizes)

Name of show	Released year	Scene set
Mê Linh 's drum sound	1977	Giao Chỉ (Vietnam) during the first China colonial
Kim Lân Thượng Thành	18th century	Warring states periof of China c. 260 BCE
Quang Trung defeat the Qing Army	1918	Battle between Quang Trung King and Qing Dynasty Invaders in 1789
General Giap and the battle at Dien Bien Phu	2013	Battle at Dien Bien Phu 1954
Le Van Duyet – Governor of Saigon	1994	Gia Dinh Citadel 1820
Holly Crossbow	1998	Co Loa Citadel, 3rd century BC

Performing arts plays an essential role in the art and history of each country in the world and Vietnam, in which the citadel heritage and related topics have great potential for developing arts, culture promulgating, and tourism.

2.3 Social values

2.3.1 Traditions / Customs / Festivals

Fortifications can be seen as a particular type of battlefield. The solidity of the fortification creates a sustainable strength compared to the other plains, rivers, or seas battlefields. Thus, the fortifications can be seen as a historical witness. Furthermore, local people respect the feats and many heroes as the patron gods of the village. Therefore, festivals and celebrations are held every year on the citadel or the base in some cities of the world. These festivals often

reenact heroic victories, attracting many domestic and foreign tourists. For example, Japan has a Shingen-ko festival held at Koju castle and an Odawara Hojo Godai festival at Odawara castle in Kanagawa prefecture (Figure 125). In Europe, there are famous festivals such as Monteriggioni in Tuscany, Italy, and the Medieval Tarnovgrad festival in The Tsarevets citadel in Veliko Tarnovo (Figure 126). All local commercial activities and tourist services are also developed significantly during the festival (Figure 127).

Figure 127. Shingen-ko Festival at Koju castle (left picture) and Odawara Hojo Godai Festival at Odawara castle (right picture) *(Source: Wikipedia)*

Figure 128. Monteriggioni Festival in Tuscany castle and Medieval Tarnovgrad Festival in Tsarevets citadel *(Source: Rove.me online news & Verliko Tarnovo Today online news)*

Figure 129. Festival Medieval de Sedan - A festival taking place at the Citadel of Sedan attracts many domestic and foreign tourists *(Source: Carnifest.com)*

In Vietnam, traditional festivals are considered a part of many local communities' spiritual life. Especially, celebrations at the citadel systems or historic sites related to a national formation or protection have become the national festivals. There are some festivals in Table 40.

Table 40. Historical Festivals in Vietnam are associated with the citadel heritage.

(Source: Author summarizes)

Festival	Location	Tribute	Time	Pictures
Hùng Kings Temple Festival	Cổ Loa citadel - Phú Thọ	Hùng Kings	10 March of Lunar Calendar	Hùng King Temple Festival in 2018 *(Source: https://vnanet.vn/vi/anh/anh-thoi-su-trong-nuoc-1014/gio-to-hung-vuong-le-hoi-den-hung-2019-3818599.html)*

Hoa Lư Festival	Hoa Lư Citadel	Đinh Tiên Hoàng – King of Đinh Dynasty	6 to 10 March of Lunar Calendar	Hoa Lư Festival 2020 *(Source: http://icdn.dantri.com.vn/zoom/1200_630/ 2019/04/13/4-1555139966504.jpg)*
Lam Kinh Festival	Lam Sơn revolt base heritage site – Thọ Xuân, Thanh Hóa Province	Lê Lợi and the campaign against Ming dynasty	22 August Lunar Calendar	Lam Kinh Festival 2021 *(Source: https://filesdata.cadn.com.vn/filedatacadn/ media//data_news/Image/2021/th9/ng21/i mage007e.jpg)*
Kate Festival	All Champa Heritages site in the Middle of Vietnam	Po Ina Nagar Godess	1 of July in Champa Calendar (September or October)	Kate Festival 2018 *(Source: https://vcdn-vnexpress.vnecdn.net/2018/10/22/thap-cham-3-6216-1540203603.jpg)*

Đống Đa Mound Festival	Bình Định Province's citadels	Quang Trung King and the battle with Qing invasion army	5 of January in Lunar calendar	Đống Đa Mound Festival in 2014 *(Source: https://www.nghiaphat.vn/uploads/userfiles/image/tin-tuc/2014/1/6/le-hoi-dong-da-tay-son-tinh-binh-dinh-1.jpg)*
Huế Festivals	Huế Citadel and nearby towns	Nguyễn Dynasty	9 to 13 April, every 2 years	Huế Festival in 2018 *(Source: https://file3.qdnd.vn/data/images/0/2022/01/07/vuongthuy/festival.jpg?dpi=150&quality=100&w=870)*
Nam Giao Alta Ceremony	Hồ Citadel	Hồ Dynasty and the battle with Ming invader	20 March	*Nam Giao Alta Ceremony in Ho Citadel (Source: https://photo-cms-baophapluat.zadn.vn/dataimages/201206/original/images658070_Chuong_trinh_nghe_thuat_cha.gif)*

It can be seen that fortification is a central place to organize various historical events, specific national festivals, local honor festivals, and community activities. Historical and cultural values and the citadel's existence are the core of national traditions preserved through many periods and taken advantage of for tourism development.

Belief

Beliefs have been considered a cultural factor and an indispensable part of communities. From the ancient period, people showed their respect for nature through beliefs. By the time empires were formed, religion was a way to show respect and gratitude to people who had significant contributions to society or empire growth. As a result, there are many warriors canonized as saints. This thesis mentions a few Christian saints with outstanding contributions associated with fortifications (Table 41).

Table 41. Catholic Saints who have life history associated with stories and feats
related to the fortification heritages (Source: Author summarizes)

Image	Name	Martyrdom	Location	Church	Citadel related
	Demetrius of Thessaloniki	306	Thessaloniki	Anglicanism, Catholic Church, Eastern Orthodox Church, Lutheranism, Oriental Orthodox Churches	Hero of Salonica citadel
	Barbara	267	Heliopolis, Phoenice, Roman Empire	Aglipayan, Anglicanism, Catholic Church, Eastern Orthodox Church, Orient	*Barbara chained to tower of Heliopolis*

Image	Name	Martyrdom	Location	Church	Citadel related
				al Orthodox Churches	
	Joan of Arc	1431	Rouen, Normandy	Catholic	*Siege of Orléans citadel in 1428*
	Martin of Tours	397[7]	Candes-Saint-Martin, Gaul	Catholic	Tours citadel - France

In Vietnam, the belief in gods has gained popularity in every village. The most prominent is the village's worship. All villages build a system of communal houses, temples, and shrines for worship. Therefore, Thanh Hoang god is the most sacred symbol of the whole village, known as a combination of human worship and god worship []. Besides natural Gods such as Mountain, River, and Earth Gods, the country's heroes are also considered Gods. The temples are usually located at the citadel monuments and become an essential part of the

heritage to enhance the cultural, religious, and awareness values. The prominent Human Gods associated with the citadel monuments are on the table 42.

Table 42. Temples and historical Figures of Vietnam who have life history associated with stories and feats related to the fortification heritages (Source: Author summarize)

Temple	God	Location	Picture
Hùng Temple	Hung Kings of Văn Lang	Việt Trì (Capitol of Văn Lang Dynasty)	Hùng King Ancient Temple is a part of relic associated with Co Loa Citadel *(Source: https://photo-cms-vovworld.zadn.vn/w500/Uploaded/vovworld/q osrgt/2019_04_12/kpvn01_DBBG.jpg)*
Thượng Temple	An Dương Vương - King of Âu Lạc	Cổ Loa Citadel	Thượng Temple inside Co Loa Citadel *(Source: thegioidisan.vn/assets/media/ 2016/Thang%204/2242016/Co-loa1.jpg)*

Sỹ Nhiếp 's Temple	Sỹ Nhiếp (Shi Xie) – General in Vietnam during Han Colonial time	Luy Lâu Citadel	Sỹ Nhiếp Temple in Luy Lâu Citadel *(Source: https://file.qdnd.vn/data/images/0 /2020/03/30/vuhuyen/1232019huyen00104 47.jpg?dpi=150&quality=100&w=575)*
Hai Bà Trưng 's Temple	Trưng Trắc and Trưng Nhị - Empresses of Lĩnh Nam	Cẩm Khê - Mê Linh (Fortress base of Hai Bà Trưng Revolt)	Trưng Trắc and Trưng Nhị Temple in Cẩm Khê Citadel *(Source: nguoimelinh.vn/me-linh-24g/van-hoa-the-thao/huyen-me-linh-dua-den-hai-ba-trung-thanh-diem-du-lich-van-hoa-tam-linh-267)*
Mai Hắc Đế 's Temple	Mai Thúc Loan - King of Vạn An	Vạn An Citadel	Mai Hắc Đế Temple in Vạn An Citadel *(Source: giadinh.mediacdn.vn/JwwZ8Sxq8D R6JFmiDN6mapoWccccc/Image/2012/02/v anan1_baff0.jpg)*

Quả Sơn Temple	Lý Nhật Quang – Prince of Lý Dynasty	Quả Mountain battlefield, where Lý Nhật Quang was killed in battle	 Quả Sơn Temple in Quả Mountain military landscape *(Source: http://dulich24.com.vn/du-lich-huyen-do-luong/den-qua-son-id-5519)*
Hoành Đông Temple	"Đông Hải Đại Vương" Đoàn Thượng (Warlord of Easten Sea Đoàn Thượng)	Giao Thủy – Nam Định (Fortress base of Đoàn Thượng 's revolt)	 Hoành Đông Temple in Fortress base of Lord Đoàn Thượng 's revolt *(Source: http://www.didulich.net/tin-tuc-su-kien/den-hoanh-dong-tho-dong-hai-dai-vuong-doan-thuong-25584)*
Po Romê Temple	Po Rome (?-1651) – King of Champa ruled from 1627 to 1651	Ninh Thuận (Akhar Thrah) – Capitol of Panduranga, Champa Kingdom	 Po Romê Temple in Akhar Thrah Citadel of Panduranga *(Source: https://kenhhomestay.com/wp-content/uploads/2020/01/thap-po-rome.jpg)*

2.3.3 Education

In education, the visual element in learning and teaching has always been an essential factor in all disciplines, especially history. In many countries, the localities that still retain the citadel heritage can be exploited to organize practical tours. These activities increase the efficiency of knowledge transmission by vivid visual thinking. These trips improve teaching effectiveness and bring exciting experiences for students combined with archery, climbing, fencing, initiative exercises, and many other activities. (Figure 130)

Figure 130. School trip in Warwick Castle (Germany) and Normandy Castle (France)
(Source: https://www.theteachco.com/uploads/special-issues/TopSchoolTrips_Secondary3_20220420.pdf

In Vietnam, heritage citadels such as the Thang Long citadel, Ho Dynasty citadel, and Hue citadel are engaged sites visited by all levels of education, including undergraduate and post-graduate levels (Figure 131 & 132). The citadel heritage tours are not only useful for historical subjects but also a premise for painting, architecture, culture, and art at higher education levels. Thereby, we can see the great value of the citadel heritage system for academic and educational purposes.

Figure 131. School trip to learn about Hue Citadel (left picture) and Ho Citadel (right picture)
(Source: Tùng Nguyễn, 2015

Figure 132. School trip to learn about Thang Long Citadel (left picture) and Quang Tri Citadel (right picture) *(Source: Tùng Nguyễn, 2015)*

3. Tangible cultural heritages
3.1 Urban and architectural values
3.1.1 Creation of architectural identity

Of several arts, architecture contains the others. Architecture delivered the art of construction and the visual arts embodied in painting and sculpture. On the other hand, architectural works include elements of specific aesthetic art representing a period or a civilization. In terms of the dynasty, palaces and citadels are the most apparent legacy that proves the strength of a dynasty. Fortification architectures are heritages that still survive after the brutal war and reflect those periods' construction arts and design thinking. For example, the Great Wall represents the dictatorship of Qin Shi Huang, but now it has become a famous Chinese heritage and a wonder of the world.

The histories of different countries leave various fortification heritages. Therefore, their values take different roles in their countries. In Vietnam, fortification heritages experience the transformation and transaction of architecture in many historical periods. Fortification heritages are collected from Hung King periods, invasion by China, mutual layers, and overlaps with Champa culture and Western science. The diversity of cultural transformation through long history makes the identity of Vietnamese fortification heritage (Figure 133).

Lí Dynasty Thăng Long Imperial Palace

Lê Dynasty Thăng Long Imperial Palace

Nguyễn Dynasty Thăng Long Imperial Palace

Nguyễn Dynasty Huế Imperial Palace

Figure 133. The architectural features of Vietnam are gradually formed through each historical timeline *(Source: Tim Tran, 2021)*

3.1.2 Urban development

In Vietnamese, urban combines the prefix "Đô" and "Thị." "Đô" was the place for community gatherings, while "Thị" meant market. Hence, with this explanation, urbanization in Vietnam was formed by commercial activities, particularly the exchange of goods. These activities led to the establishment of market zones and commercial zones and development into central zones called urban or cities. Because of that, urban areas were often located in areas with lots of advantages in transportation and accessibility. Due to the core function of a

community, these areas need to be protected, so the fortification system was constructed and named Citadel city.

The development of the citadel served military purposes and also controlled the expansion of commercial activities. This increased activities and population density inside the citadel, particularly in the central core. Nowadays, the locations of the ancient central core locations have become important centers for modern city orientation development. Hue, Vinh, Bac Ninh, Quang Tri…provinces - which capture a lot of fortification heritage - are responsible for becoming national heritage cities. The citadel's axes become the main development axis for urban designs and urban renewal projects. [115] (Figure 134).

Figure 134. Ancient fortification heritages are key factors that are always focused on preserving and embellishing in modern urban planning *(Source: https://saigoneer.com/vietnam-heritage/18626-vauban-architecture-the-foundation-of-central-and-northern-vietnam-s-citadels)*

In the case of Bat Quai Citadel, Gia Dinh Citadel in Ho Chi Minh city, and Thang Long Imperial Citadel in Ha Noi, although the citadel systems have been destroyed without any traces, their boundaries and axes are the foundation for cities' main routes planning. Figure 4.22 can be explained clearly that when the citadel collapsed, ruins and material from fortifications were re-used. The

infrastructure pieces of evidence from road, pavement, and landscape remained and were reused for the following city development process as a way to save local resources [116]. Hence, the locations of ancient citadels are developed into centers of modern cities nowadays. In terms of commercial and urban development and heritage conservation, fortifications, ruins, or citadel locations keep the urban memory and make urban places.

Figure 135. The first Vauban citadel protecting Saigon was Quy citadel (red) built in 1790 and then destroyed in 1835. Its bricks and ruins were used to build Phung citadel (black) in 1836
(Source: https://en.wikipedia.org/wiki/Citadel_of_Saigon)

3.1.1 Sustainable city

The concept of a sustainable city appeared at the beginning of the 20th century, but it was applied in some ancient cities. A sustainable city achieves unity in a sustainable framework in all three aspects, economically, socially, and environmentally, to improve the quality of life of the present generation without compromising the quality of life and affecting the development of future

generations. Ancient cities had to consider the high density with limited land areas regarding the characteristics of having a surrounding fortification system for defensive purposes. This led to an increase in land use coefficient and consequences of cities' waste and degradation of living quality. Some cities in the Middle Ages in Europe, for military purposes, had to accept the consequences of hygiene, epidemiology, and clean water causing the plague [117]. However, the cities in Vietnam developed in the other form, which was an urban-type constructed on a large area surrounded by citadels. This allowed people to plan a system of canals and artificial ditches to maintain the quality of life for residents.

Figure 136. The system of artificial waterways and canals in Vietnamese fortifications ensures the supply of water for the entire city *(Source: https://en.wikipedia.org/wiki/Citadel_of_Hue)*

In Hue Citadel, the Ngu Ha canal system (Imperial Rivers) was artificially made to connect with the Perfume River to supply water, drainage water in flood-prone conditions, transport agricultural products and goods, and coordinate the marine force to protect the citadel. In addition, green areas were also planned along the main roads and Ngu Ha canals to protect the microclimate of the entire citadel [118]. These artificial interventions ensured environmental sanitation, reduced emissions, purified the air, and maintained a sustainable environment inside the citadel (Figure 4.23). This helped create a balanced and unity framework of sustainability in terms of economic, social, and environmental aspects. Due to this reason, the citadels of Vietnam can be considered a form of

sustainable urban. These values are still preserved for present and future generations.

3.2 Science values

3.2.1 Military scientific value

Fortifications were the most effective human defense until high-tech firepower such as missiles or fighter planes were invented. Today, castles and fortifications no longer hold the same value as impregnable barriers compared to their origin. However, some values as defensive functions remain. Tunnels and bunkers are still used at military bases, defensive gates, and strategic islands. The linked bunker "De Lattre Line," constructed by French people [119], was used in the Sinowars of the Chinese invasion in 1979. Nowadays, the linked bunkers system still plays a crucial role in Vietnam's defense system on the northern border.

Cu Chi tunnel is also a specific case with their values. The effectiveness of this type of construction during the Vietnam War was demonstrated through wars with major military powers - especially the United States [120]. Military science institutes still continuously developed and improved the lines of anti-tank weapons, anti-tunnel, and bunker-buster. This shows the scientific value of the Vietnamese citadel in the modern era (Figure 137).

Figure 137. The Cu Chi tunnel combat model has always been studied by the US military and other countries as a basis for the development of specialized warheads against tunnels and bunkers. *(Source: dailymail.co.uk/news/article-7041391/US-posts-highest-quality-video-mother-bunker-busters.html)*

In terms of layout, the star-shaped citadel with bastions is still one that provides the best defensive power by creating flanking angles to hit the attackers' weaknesses. Today, some field bases of modern armies still apply this layout of grounds in war zones to maximize protection (Figure 138) [121]. These examples show the enduring value of Vauban citadels design thinking. Vietnam is one of very few countries in Asia that still retain the legacy of this kind of citadel.

Figure 138. A French military in 2012 base in Mali at Labbezanga (left picture) and Meneka (right picture) which still use Vauban classic fortification layout plan style
(Source: https://interestingengineering.com/french-army-revives-medieval-star-fort-patterns-in-north-africa)

3.2.2 Materials and construction techniques

In spite of the rapid technology and construction development in recent years, the number of skyscrapers increased significantly, and the monuments of the citadel with construction techniques from hundreds of years still have certain values. The techniques in ancient times are the foundation for modern construction. For example, Roman concrete creations, arches, and domes design has been studied and improved through different historical time frames. One of the great values of ancient construction is the way to achieve sustainable goals. Green and sustainable architecture prioritize limiting modern construction methods that consume a lot of energy and fossil fuels and prefer natural techniques, local resources, and landscape [122].

These values can be explained in various ways through the use of materials from antiquity to the innovation of construction techniques. The technique of building citadels with ingredients including a mixture of soil, water, and natural stabilizers (animal urine, animal blood, plant fibers such as straw, bamboo) has existed for centuries. This material was used to build great works such as the Great Wall or Co Loa citadel, and Truong Luy in Vietnam. This technique has been applied in current construction. With the main ingredients made from mud and bamboo, the application of materials science helps to significantly reduce the negative environmental impact arising from the transportation and

exploitation of other unsTable resources [123]. Construction costs are lower than conventional building materials with concrete and steel and have become a sustainable idea for affordable housing development. The Vietnam Association of Architects has also awarded for green architecture using traditional materials in recent years (Figure 139).

Figure 139. Construction methods using local materials like ancient ramparts such as mud bricks, bamboo, and rattan are increasingly favored and won many great prizes in recent years
(Source: kienviet.net)

The scientific value in building the citadel of Vietnam reflected the local identity in material selection. Materials used for Vietnamese fortification were very diverse, with many types of rocks (greenstone, laterite, cobblestone), bricks, earthworks, bamboo, and wooden fences. This showed the priority of using local materials. For example, the North center region is famous for the Ho Dynasty citadel built of stone, while the Thang Long citadel used baked brick casts surrounding the citadel. Recycling is also a scientific value. In fortifications used continuously for many generations, archeological data have demonstrated the reuse and recycling process of previous period materials for later construction. For example, in the Thang Long citadel, most of the bricks used to build the walls of Hanoi in the Nguyen Dynasty were Dong Kinh in Le dynasty bricks, including broken and burned bricks. However, the damaged parts were hidden inside so that they could just be observed from the outside [124].

| Vì Chồng rường | Vì Chồng rường – Giá chiêng | Vì Chồng rường – Kẻ truyền |
| Vì Chồng rường – Giả thủ | Vì Giao nguyên | Vì Giao nguyên – Trụ đội |

Figure 140. Vietnamese ancient wooden construction techniques are still widely applied to this day
(Source: https://www.researchgate.net/Figure/Traditional-Vietnamese-house-the-wood-structure-is-typical-with-wooden-trusses_fig1_327113584)

The materials and techniques of ancient fortification construction are considered carefully due to their sustainability and specific construction method. Dougong - an ancient construction method from China, were absorbed and improved to fit different demand on aesthetics and structure. This method consists of a wooden bracing system that supports the overhanging pagoda eaves without nails (Figure 140). The unique Kureon cafe design is an example of contemporary architects using the dougong system. Another case is Ha Noi Museum. The design extends to the outside, relying on the structural qualities of engineering to create a distinctive tiered. The principles of traditional wooden architecture, such as double roofs "Trùng Thiềm Điệp Ốc" and single roof "Thượng Thu Hạ Thách," are still applied in the current context through Tam Chuc Pagoda complex in Ha Nam - recorded as the largest pagoda in South East Asia [125].

3.3 Value of visual arts

Architectures present the power of a dynasty and a political system. Hence, their designs also focus on visual appearance with specific decorative motifs. Although fortifications are particular defensive architectures, they still have many values in fine arts. Because of influencing the layout of Chinese gatehouses, the gatehouses of the Vietnamese citadels all had a structural system of ruong houses, iron or Kien wood frames, tiled roofs, surrounded by walls or wooden planks. The ground plan is made of mallet bricks or Bat Trang bricks. The roof was the most focused on shaping with roof tiles of royal (Hoàng Lưu Ly, Thanh Lưu Ly), pipe tiles, or yin and yang tiles. The roof is decorated with motifs such as "Two dragons in war," "Two dragons adoring moons," and "Two dragons adoring sun." The wall compartments had delicate decorative motifs such as "Four Spirits" and "Dragon - Phoenix." The wall panels in both the interior and the exterior are the "Nhat Thi Nhat Hoa" (a poem within a picture) shaped space combined with ceramic mosaics. Today, these layouts, patterns, and textures still retain traditional value in Vietnamese designs.

Table 43. The art of shaping and decoration is applied in the citadel works of Vietnam

Decoratives of the Vietnamese fortifications
Typical layout and decoration of a city gate
Hue Citadel main gate *(Source: https://en.wikipedia.org/wiki/Imperial_City_of_Huế)*

City Gate: Sculptures, carvings, and decorative arts are concentrated mostly in long subjects. Material of ironwood painted with gold lacquer.	"Five Phoenix floor" of Hue Citadel Imperial City gate *(Source: mia.vn)*
The art of façade shaping with a door system of "thượng kính hạ bản" (door system with glass on the top and wood panels on the bottom) on the front and covering the wall paneling on the remaining sides.	Side gates with décor motif "Thượng Kính Hạ Bản" *(Source: mia.vn)*

Roof tiles: The roof tiles are decorated with elaborate carvings, which are 2 forms: Hoang Luu Ly (yellow tiles) and Thanh Luu Ly (blue or emerald green tiles). 	 The "Yellow titles" tiles in the middle are used to mark the gates for the king to pass through, and the "Blue or emerald green tiles" are often used for the gates of the princes and high officials. *(Source: BAZAAR Magazine)*
Yin-Yang Tile: The roof follows the Yin-Yang structure with decorative reliefs of glazed pipe bricks. The most popular image on the roof frills is "Tiger Emblem" (Tiger Emblem), which means longevity, immortality, warding off evil spirits.	
"Long Phù" (Dragon Emblem): The second most popular form after "Tiger Emblem" is "Long Phù" (Dragon Emblem), symbolizing the eternal power of the emperor.	

	Tiger Emblem in Hue Citadel and Dragon Emblem in Thang Long Citadel during Ly Dynasty *(Source: Nguyenkhanh159, 2019)*
Ceramic mosaic: From fragments of ceramics that arise in accidental manufacturing accidents or finished products that are intentionally destroyed due to unsatisfactory quality, artisans transform into a unique material to attach to surfaces. The pieces are honed so that the pieces fit together, then inlaid according to the color of the enamel and the intensity of the light. Ceramic glue is made from oyster shells, lime, leaves and honey.	 Ceramic mosain in Hue Citadel *(Source: https://www.lagunalangco.com/vi/diem-den/van-hoa-lich-su/nghe-thuat-kham-gom-su-tai-cac-kien-truc-cung-dinh-hue/)*
Breezeway blocks: The ventilation bricks used in the architecture of the Vietnamese ramparts often have Chinese patterns, flowers or royal symbols. Both decorative and effective ventilation and natural lighting.	 Breezeway blocks of Hue Citadel *(Source: https://mia.vn/cam-nang-du-lich/uy-nghi-lau-ngu-phung-bieu-tuong-ve-mot-thoi-trieu-nguyen-hung-thinh-2457)*
Bờ Nóc: The top part of the roof is built with bricks and cement and above the roof is placed and decorated with animals in the four spirits for pagodas or orcas, crocodiles... for houses. For citadels, the most commonly used image is the Dragon. The number of claws of the Dragon will represent the hierarchy, the highest is the 5-claw Dragon in the Imperial City - representing the King.	 5-claw Dragons in the top part of roof in Hue Imperial Citadel *(Source: https://kientrucvietas.com/hinh-tuong-trang-tri-trong-kien-truc-truyen-thong-hue)*

Cổ Diêm: Are decorative patterns in the space between two roofs or roof frills. Usually decorated with floral patterns, Leaves, Branches, Fruits. Material of brick, glaze, ceramic or glazed metal.

Another type of composition, "Nhất Thi Nhất Họa" (a painting following a poem) is also applied in Cổ Diêm.

Decorations in "Cổ Diêm" of Hue Imperial Citadel *(Source: https://kientrucvietas.com/hinh-tuong-trang-tri-trong-kien-truc-truyen-thong-hue)*

The Dragon images are described very vividly and as diverse as "Lưỡng Long Tranh Châu" (Dual Dragons fighting for Jewel) "Lưỡng Long Chầu Nhật" (Dual Dragons with Sun) or "Lưỡng Long Chầu Nguyệt" (Dual Dragons with Moon).

Dual Dragons fighting for Jewel *(Source: vietnamnet.vn)*

Dual Dragons with Sun *(Source: Author)*

Dual Dragons with Moon *(Source: Reds.vn)*

Some dragon images in the Vietnamese citadel, especially during Ly dynasty, also show cultural interference with the Naga snake and decorative motif of Champa.

Decorative motifs excavated from the Imperial Citadel of Thang Long in the Ly Dynasty, with inspiration from Champa visual arts *(Source: daivietcophong.com/giai-ma-hinh-tuong-rong-thoi-ly/)*

Tứ Linh (4 sacred gods): is the image of 4 great beasts in Vietnamese culture, including: Dragon, Phoenix, Lion and Turle. The animal images are used as decorative reliefs for the ramparts, steps, pillars... with the desire to symbolize authority, wisdom, strength and longevity.

Dragon and Phoenix decorative in Hue Citadel *(Source:thuathienhue.gov.vn)*

Lion and Turtle decorative in Hue Citadel *(Source: khamphahue.com.vn)*

Furniture and defending appliances

Sacrificial clothing: Not only is it a place to serve the defense function, the citadel is also a place to perform tributes to heaven and perform rituals according to royal rites. Therefore, items such as soldier uniforms, ceremonial drums, fan flags…. are also shaped to be identical with the design of the ramparts and have high artistic value.

The uniforms of the ceremonial team are designed with colors similar to the decoration of the citadel *(Source: vnexpress.net)*

The interior of the main architecture of the citadel usually is featured with gilded paint style, the decorative motifs on the columns are dragons symbolizing the kingship. *(Source: https://vnexpress.net/lau-ngu-phung-sau-8-nam-trung-tu-4221828.html)*

The items are intricately carved with sophisticated artifact patterns *(Source: https://vnexpress.net/lau-ngu-phung-sau-8-nam-trung-tu-4221828.html)*

Table 44. The art of shaping and decoration is applied in the building of Champa

Visual arts in the Champa citadel: The current Champa defenses in Vietnam have all been heavily destroyed, with only traces left through the artifacts mined at Tra Kieu citadel (Simhapura) and Vijaya city. From these artifacts, it is possible to classify the motifs of Champa art into the following forms	
Chrysanthemum-shaped motifs are shown by the Cham people in the borders around the upper part of the altar. The strips of chrysanthemums, leaves and flowers are stylized quite subtly, flowers are usually round in shape, surrounded by leaves and stems stylized in a soft, symmetrical way, in the middle of the flower there are stamens flowers and many petals clustered together, like a flower in the form of a newly opened bud.	Patterns on the My Son altar E1 (Quang Nam) *(Source: https://chammuseum.vn/view.aspx?ID=441)*
Patterns of lotus flowers are shown quite a lot in Cham sculpture and architecture, almost in almost every art style. Archaeological artifacts found in Tra Kieu citadel are proof of the presence of this shape in the Cham citadel.	The altar with lotus motifs belongs to the Binh Dinh Cham Museum *(Source: Binh Dinh Cham Museum)*

Patterns of string flowers are carved quite a lot on temples, both on bricks and on stone, as well as in large and small sculptures. The reason is called string flowers because the flowers, leaves, and stems blend together and are very difficult to distinguish. The touches are quite sharp and delicate, forming a long strip from the top of the tower to the base of the tower, or from the top down to the bottom of a doorpost. The flowers, leaves, and stems (type of vines) are stylized quite high, creating patterns with a high level of carving art.

Not only in Cham relics, but this motif is also found in the archaeological relics of the Thang Long citadel.

Patterns on a pillar of Khuong My (Quang Nam)
(Source: Cham.vn)

Patterns in the shape of water waves or flames are often found in sculptures and architecture of the Thap Mẫm art style (12th-XIV centuries). On the lintels of the temples in Thap Mẫm (Binh Dinh) often show decorative frills in the shape of flames or waves, interspersed with images of Kala masks or monkeys. In fact, this is also an image of flowers and leaves as well as a stylized tree trunk, looking like a burning flame or a rushing wave, showing strength and overflowing vitality, bold, strong character.

Flame pattern on the altar of Thap Mẫm (Bình Định)
(Source: https://chammuseum.vn/view.aspx?ID=441)

Geometric patterns: These are triangles, rhombuses, squares, rectangles, marbles (circles)... shown through the frills bordering the sculptures. Not located in the center of the works, but the geometric patterns have contributed to animate the work, highlighting the work, making the sculpture become fuller, more emphatic, forming unique and different artistic elements.	Two decorative strips of marble (circle) on Tra Kieu altar (Quang Nam) *(Source: Tra Kieu Cham Museum)*
Animal motifs: often decorated with Kala, Makara masks, funny monkeys... with such decoration, it also gives Cham sculptures rare beauty and impressions. strange in art, but the images of animals are also highly stylized.	The decorative array of animal motifs (Binh Dinh) *(Source: Chammuseum.vn)*

The above case studies have shown the value of visual arts in the citadel architecture of Vietnam. Not merely a form of purely military construction, these buildings are also a place to represent the strength of the empire and, at the same time, contain spiritual meanings. Therefore, the ramparts are also shaped by the arts of contemporary aesthetic thinking. The study to understand and shape the visual arts in the architecture of the Vietnamese ramparts will be valuable to inherit and promote in the applications of design with heritage elements of the next generation. This will be studied and clarified in chapter V of this thesis.

CHAPTER V: MULTI-LAYERS CONSERVATION STRATEGY

1.Conservation documents and regulations

1.1 Fortification heritage conservation mindset from the Charters

Conservation and restoration are a field of modern science. Western countries have studied and developed Charters and Documents as standards and foundations for conservation and restoration work. These charters help the conservation work to be effective and also create an identity for each heritage.

1.1.1 The Athens Charter for the Restoration of Historical Monuments (1931)

According to the Athens Charter for the Restoration of Historic Sites (1931), there are principles underpinning fortification conservation. Establishing a permanent and regular preservation system will ensure the effectiveness of conservation. The charter recommends that ancient art and historical works have to be respected and protected. Besides protecting the aesthetic value of the monument, we need to respect nature, the landscape and the surrounding environment of the monument. Besides technical intervention, raising awareness of the preservation of archaeological and artistic heritage is also crucial. The Charter also emphasizes the role of education in identifying the monuments and the local community's connection to the monument. In particular, the role of education in raising the awareness of heritage conservation amongst children and young people [126].

1.1.2 The Venice Charter for the Conservation and Restoration of Monuments and Sites (1964)

During the second congress in 1964, the Venice Charter was established to detail and expand the scope of the previous Charter of Athens. The main content of the Venice Charter is to maintain the monument's original source (also known as the original material). Because the original material is the decisive factor that helps the monument to retain the message from the past, the ancient traditions are considered living witnesses. Therefore, people share the

responsibility to preserve and protect these values for future generations with their full splendor.

The Venice Charter is the foundation document that provides forth principles and theories about monuments conservation and restoration methodology. The Chater shows that the key to monument preservation is to make it durable (Article 4). The Chater shows that the key to monument preservation is to make it durable (Article 4). The preservation of monuments is always facilitated by using them for society (article 5), a monument inseparable from its history, inseparable its context (article 7). As long as a traditional setting remains, it must be protected (article 6).

Conservation includes restoration. The restoration process has to be highly specialized and reveal a monument's aesthetic and historical values respecting original materials and authenticity (article 9). Following that, the replaced parts have to be harmonized with the general. At the same time, they must be distinguishable from the original part so that the new restoration does not distort the artistic or historical data (article 12). The Venice Charter is inclusive, and the guidelines for each specific case. In fortification conservation, the Venice Charter is the basis for determining authenticity. [127].

1.1.3 The Washington Charter: Charter on the Conservation of Historic Towns and Urban Areas (1987)

Conservation is the science that is towards architectural monuments and also urban areas. The charter is concerned with all urban areas, large and small areas, downtown, and historic quarters. In addition to the role of historical evidence, this is also a traditional urban culture. This document was created to support the Charter of Venice. The document defines more principles, goals, and methods. The document shows the necessity to protect the historical sites and harmonize them with modern community life. The Charter sets out the necessary steps to protect, preserve and restore historic cities and areas as well as to develop

and adapt to contemporary. The preservation of historic towns in the development that needs the participation of the community [128].

1.1.4 Burra Charter about Place's spirit in Conservation (1979)

The Burra Charter for Icomos Australia was introduced in 1979, amended and supplemented in 1999 for the protection of heritage sites of cultural value.

The peculiarity of the Burra Charter emphasizes the role of conservation planning to determine what historical and cultural factors make a site's heritage distinctive and local in conservation. The guidelines of the Charter are cultural significance, protection policies, and procedures for conducting research and reporting. The essence of the Charter is to extend the scope of application of the Venice Charter to specific conditions, considering the place of heritage as having the meaning of enriching people's lives and giving them a deep emotional relationship. Inspired by the community and the landscape, with the past and past experiences. These places store history, sentient expressions of identity, knowledge, and talent and reflect the diversity of communities over the course of irreplaceable and precious history. That is the meaning that we have to protect not only each building but an entire heritage site, we need to try our best to take care of it and make it useful, but all changes are unnecessary because they are as little as possible. The main aim is to help the site retain its cultural value as much as possible. Indicating the conservation spirit here is that protection is an organic part of the management of culturally valuable sites as a daily responsibility [129].

1.1.5 Nara Document on Authenticity (1994):

The nature of culture is the result of a process of inheritance, exchange, and acculturation throughout history, so the cultural diversity contained in each heritage is ineviTable. This feature clearly shows the nature of Eastern culture while ensuring the authenticity of cultural heritage while fully respecting all countries' cultural and social values . As a result, the Nara Document on Authenticity was born (1994), which was conceived in the spirit of the 1964 Venice Charter and, on that basis, expanded to many aspects. The concept of

tangible culture and intangible culture was born in response to the growing interest and interest in cultural heritage in our world today. Thereby showing that the spirit and principle of preservation of the document are respect for cultural diversity, must recognize the individual cultural values of all parties, and determine that the cultural heritage of each part is the cultural heritage of the whole. Responsibility for cultural heritage is that the management of that heritage rests first with the community that produced it and then with the community that looks after it. Each community when preserving its cultural heritage, in addition to needing to comply with the charters and conventions, also considers not to destroy the written value of other communities in the cultural diversity of the heritage.

The success of the Nara Document has contributed to preserving both the tangible and intangible aspects that the heritage contains. The consideration of authenticity in the protection of cultural heritage and the search for cultural identity has shed light on and rekindled the collective memory of humanity in the face of a world situation increasingly under the influence of globalization.

Thus, it can be affirmed that the Charters and Documents are the foundation for the preservation of the cultural identity of the relics-heritage to achieve the goals set for each country and monument. The flexibility and complete complementarity between the Charters and Documents show that conservation is a long process in that people always acquire experience drawn from practical activities, thereby protecting the inherent authenticity of that heritage to be passed on to future generations. [130].

1.2 ICOMOS & UNESCO preservation and restoration principles
1.2.1 Protection of Cultural Heritage sites

The themes of conservation, preservation, restoration, maintenance, heritage, architecture, landscapes, values, and vulnerability have been the subject of numerous Charters and opinions from numerous countries and renowned

scholars throughout history and the present. Some are consistent, while others are contradictory. Even UNESCO's viewpoints have adapted to the realities of the moment. Each place has a unique approach, despite the fact that promoting human life's values is a universal objective. Western perspectives and methods differ from those of the East and ASEAN due to their various origins and locales.

Article 1. *"The concept of a historic monument embraces not only the single architectural work but also the urban or rural setting in which is found the evidence of a particular civilization, a significant development or a historic event. This applies not only to great works of art but also to more modest works of the past which have acquired cultural significance with the passing of time."*

The ICOMOS Charters are acknowledged and extensively adopted by the International Council of Monuments and Sites as recommendations for the preservation and conservation of cultural heritage sites. The Charter provides comprehensive guidance on the significance of culture, protective policies, research and reporting methods, and ethical considerations applicable to the conservation of culturally significant sites.

The Venice Charter, which emphasizes the material authenticity of ancient monuments, is still an important document today. Although it permitted some restoration, it prohibited speculative restoration and emphasized that valid contributions from all building periods must be recognized. In addition, it highlighted the need for a methodical and scientific approach.

In light of this, Vietnamese fortifications should be viewed in this manner, which implies that it is not a single entity, consisting of not just urban structures but also villages, rural areas, and natural areas. Monuments continue to exist as living witnesses of their ancient tradition. People view old structures as a shared heritage. Future generations are protected by shared duty. It is our responsibility to transmit them in their complete authenticity.

According to the ICOMOS charter, the following terms apply:

"Preservation means safeguarding a structure in site at its current state

and inhibiting the degradation of the structure.

Restoration means putting an existing structure of a site back to its previous state by removing the components that add or merge the existing components that are dropped or not placed and not putting new materials.

Reconstruction brings a site back to a previously known state by introducing new material into the structure, to distinguish it from the restoration."

According to the preceding definitions, the task of promoting Vietnamese fortification's values as part of the restoration and development strategy requires clarification. The first component is restoring heritage to its former condition. Maintaining the historical significance of culture, education, and architecture is the highest importance. The key to long-term and sustainable growth is, along with the mission of restoration, the promotion of the values that should be emphasized to increase economic efficiency for local people.

It would be preferable in this context to add additional landscapes to tourism services and to promote cultural events inside the festival's cultural area. This initiative seeks to enhance the independence of relics. This is likewise an issue with numerous arguments. However, the second element is not favored and is only implemented when absolutely necessary, attempting to add only activities without diminishing the value of the original.

The ICOMOS Charter advises a careful approach to change, the way to conserve and make it useful, and another way, if possible, to protect the location from changing as little as possible.

ICOMOS's careful approach is founded on a respect for the existing structure, connections, and significance, modifying only what is necessary and as little as feasible. Modifications to the site must neither affect the evidence of the existence and other existing evidence nor be based on conjecture.

The protection and restoration must consider all aspects of the cultural values, the surrounding artifacts, and the natural beauty of the Huong River and

mountain setting. Other remnants, modifications, and structural treatments of a former site are indications of the site's history and use and may have contributed to the site's cultural significance. The protection must facilitate rather than impede comprehension of the evidence.

1.2.2 The need for an alternative strategy for Eastern nations – the spiritual and naturalistic sensibilities

The physical location, temperature, and territory of Western nations are distinct from those of Eastern nations. Hence the adaptations of each region are also distinct. In his work, Seung-Jin Chung discusses the differences between Western and Eastern perspectives on "conservation." Opinions hold that the Venice Charter is a foundational document reflecting the universal idea for protecting architectural heritage worldwide.

"It has skewed all conservation thinking towards the concept of the European monument, that emphasizes visual beauty through its material substance. Thus, some of the basic tenets of the Venice Charter seem ill-suited to East Asian architecture, which is conceived in a different spirit from its European counterpart.

The conclusion is that conservation principles in the East Asian societies are determined in relation to the spiritual and naturalistic sensibilities of East Asian culture and architecture."

Based on the original site, the approach adheres to the notion that East Asians have "spiritual and naturalistic sensibilities" and offers an alternative strategy that may be appropriate for the region.

Due to their geographical location, the unique characteristics of Vietnamese fortification monuments are virtually entirely composed of wood. By that time, the tropical monsoon climate could not support the durability of wooden construction. It differs greatly from the Western stone structures that can withstand the test of time. It is no longer possible to maintain authenticity using the original materials. For East Asia and Vietnam, a distinct strategy is required.

The spiritual message concealed inside the monument's structure is crucial. By the historical method and Feng Shui principle, the results of the collection and analysis of the materials of the citadel, heritage, and landscape of Vietnamese military landscape, and a few military architecture and cities in Italy, France, and China demonstrate that the concept of European monuments emphasizes visual beauty through its original material and authentic document, whereas the conservation principles in East Asian and Vietnamese societies are determined in relation to the spiritual message and naivety of the architecture.

1.3 Vietnamese regulations on preservation, reparation, and restoration of historic-cultural relics and scenic places

1.3.1 Vietnamese regulations and choices on the preservation, repair, and restoration of culturally significant artifacts

Vietnamese heritage acts have incorporated UNESCO and ICOMOS regulations. Important monuments and ramparts all receive protection and restoration attention from all levels of government. Can go through a few examples, such as:

+ The Complex of Hue Monuments, for instance, is governed by the 1972 Convention for the Protection of the World Cultural and Natural Heritage, the Vietnamese Heritage Law (2001, revised in 2009), and a number of provincial regulations and decisions, as well as the Hue Monuments Conservation Centre, which is directly under the Thua Thien Hue Provincial People's Committee. These guidelines pertain to the management and protection of the complex's values with regard to all issues, including zone, research, tangible and intangible heritage preservation, traditional material reproduction, visitor, as well as the planning and protection of the landscape, buffer zone, and surrounding area [131].

+ On August 12, 2015, the Prime Minister approved the master plan to preserve and promote the value of Ho Dynasty Citadel and its vicinity associated with tourism development (in Decision No. 1316/QD-TTg). This is an important legal basis for the management, investment, construction, conservation,

restoration, embellishment, and promotion of the value of the monument in accordance with the commitment to UNESCO. At the same time, it has a very important meaning in the strategy of promoting the cultural value and developing sustainable tourism of the Ho Citadel [132].

+ On April 20, 2021, the Hanoi City Party Committee issued Decision No. 948-QD/TU establishing a Steering Committee to implement the project of preserving, embellishing, and promoting the value of Thang Long Imperial Citadel and the Imperial Citadel of Vietnam. Co Loa relic consists of 20 members with the task of directing, guiding, and inspecting the implementation of the project of conservation, embellishment, and promotion of values in two special national monuments of the capital. The Thang Long - Hanoi Heritage Conservation Center was assigned by the Hanoi People's Committee to be the investor of projects in the Thang Long Imperial Citadel and Co Loa relic site [103].

1.3.2 The Ministry of Culture, Sports, and Tourism's preservation, repair, and restoration regulations for historic-cultural treasures and scenic areas

This Regulation provides guidelines for the protection, repair, and restoration of antiquities approved by the Prime Minister. The Ministry of Culture and Information (now the Ministry of Culture, Sports, and Tourism), as well as the chairman of the People's Committees of the Province and City, will determine the ranking of relics or the rating of relics submitted to the Ministry in their respective locations.

Some provisions of this rule:

- Restoration of monuments is an activity aimed at restoring ruined historical-cultural relics and landscapes based on scientific facts pertaining to such relics and landscapes.

Reparation of monuments consists of efforts designed to enhance the

usage and promotion of the monument's value while preserving the integrity and harmony of the monuments and their historical-cultural contexts.

These laws contain notions similar to those in the ICOMOS Charter. The concept of restoration and repair is comparable to the ICOMOS concept. In this way, we have focused on improving the relic site's usability in order to increase its economic potential while preserving the cultural and material significance of the relics. According to the procedure and guiding principles of the rule:

- Protecting historical-cultural artifacts and landscapes from negative environmental and social consequences.

- Preserving the authenticity and original values of the relics in terms of location, structure, materials, traditional techniques, functions, interior, exterior, and landscape, as well as other features of the monument, in order to maintain and enhance the monument's value.

- Preserving the balance between the monuments and the surrounding environment.

2. Orientations for the preservation of fortifications heritage

For an architectural heritage, it is possible that many conservation and restoration measures are applied separately or simultaneously. Practical examples show that depending on the characteristics and current status of each monument, the conservation orientation will be applied in one of the following three main directions:

2.1 Fortification heritages were maintained as a living relic

"Living relic" is a way of thinking that considers heritage as an old building that is still operating in its entirety or with a part of its original function. Instead of imposing strict limits on exploitation to minimize wear and tear on the building, keeping the site a "living monument" allows interactive activities to take place normally or within acceptable limits. At the same time, as an operating architecture, the building's functions are allowed to be transformed to suit the new use purpose without losing the value associated with the work. Physical

damage also allows for a new replacement in the spirit of the NARA document about the understanding of cultural diversity.

This method of conservation has been applied with most of the relics still intact and meeting the original functional needs. As for the citadel heritage, as described in Chapter IV, in addition to serving military purposes, the citadel is also a place where cultural activities and traditional values are kept. Therefore, a lot of heritage citadel today is used as a kind of museum or cultural center.

Advantages and disadvantages of the method of preserving living relics:

- Advantages:

    + Help the heritage receive the attention of local authorities and communities, creating a premise and motivation for the implementation of conservation work.

    + Helping the work to maintain its own capital directly for conservation and restoration.

    + Preserving cultural values, especially spiritual values such as festivals and customs associated with heritage.

- Disadvantage

    + Overexploitation, and unsustainable tourism can lead to rapid degradation of the physical elements of the heritage.

    + Aspects of economic value exploitation will easily lead to the pursuit of disguised forms, and un-authenticity for the purpose of optimally serving the tastes of tourists.

2.2 Fortification heritages to be kept in their original state as long as possible

Not all heritage sites are in an intact state and ensure the operation according to their original function, especially the citadel/military landscape heritage which was created to withstand heavy destructive elements of war. A large part of the fortifications in the world is only a part of a relic that once belonged to a whole, for example, a section of a wall, a city gate, or a building

serving the defense, command, or administration. It is not feasible to keep these types of monuments continuing to operate their functions, and it will negatively impact the monument's sustainability. In this case, the application of measures to strengthen, protect, support, and limit the exploitation of tourist attractions is necessary to keep the monument alive as long as possible, in the spirit of preserving a legacy for future generations.

Advantages and disadvantages of the original state conservation approach:

- Advantages:

+ Avoid over-exploitation or unsustainable tourism that affects the durability of the building.

+ There is no need to follow aesthetic/visual goals to attract tourists to create economic values.

- Disadvantages:

+ The restriction on tourist exploitation reduces the interest of the community, which is the source of finance and motivation for conservation and restoration.

+ Loss of the original operating function of the monument.

+ Difficulty in preserving cultural activities associated with relics.

2.3 The ruins were restored to preserve the cultural characteristics of the nation

In the history of human civilization, there are many heritages that have been completely damaged, even disappeared without a trace, leaving only information through historical data, bibliography, and pictures. As a type of construction for military purposes and territorial sovereignty, of course, there will be many cases of fortifications being completely demolished for strategic purposes or assimilation. In the course of time, mankind's memory of these legacies will soon be forgotten in just a few generations. In that situation, the

partial or complete restoration of a relic is a reasonable move to preserve cultural characteristics and heritage values for humanity.

Advantages and disadvantages of restoration:

- Advantages:

+ Give the possibility to instantly restore gaps in urban memory for heritage sites that have been severely damaged or have been completely destroyed.

- Disadvantages:

+ The finished product is created in violation of the definition of authenticity in terms of objects, according to the Venice Charter.+ Loss of the original operating function of the monument.

+ Without the correct information and archives, the restored structure will become a false entity from the original.

2.4 Multi-layer interpretation

It can be seen that the restoration of the heritage requires exact adherence to the original data to avoid distorting the perception of the following generations about the heritage's originality. This requirement is again the biggest barrier for all work related to restoration in case the original data is not sufficiently determined. On the other hand, overlapping layers of heritage is also a big challenge because it is impossible to destroy what exists to restore a legacy in the past. However, scientific and technological advances have developed in recent years with new interactive platforms such as VR (Virtual Reality) and AR (Augmented Reality). They have allowed a completely overcome form of non-physical conditions of the site and, at the same time, allowing for "predictive" restoration details that do not violate the International Charters and Conventions for Conservation. The data is digitized and interactive via a virtual platform, so it is possible to easily switch between historical timelines and changing layers of monuments just by manipulating the device without affecting originality. Moreover, AR technology even allows for more in-depth customization, such as

transforming directly into the role of a stronghold defense soldier and fighting like a real old-timer. Thus, the original function of the citadel heritage is still preserved and transmitted in the most intact way, instead of just playing the role of a museum or a cultural and historical work.

Advantages and disadvantages of multi-layer interpretation:

- Advantages:

+ Give the possibility to instantly restore the missing heritage that has been severely damaged or has been completely destroyed.

+ Does not cause physical damage to the original material and durability of the monument

+ Correction is allowed if there are new updates to the scientific data of heritages.

+ Allows multiple layers of heritage to exist at the same time in the same virtual space, delimited by the time axis.

+ Allows remote interaction, eliminating all problems of geographical distance.

- Disadvantages:

+ Requires an advanced scientific and technical background to build a multi-layer interpretation system.

+ Multi-layer interpretation with technology bases of AR and VR still needs to be improved a lot to reach asymptote with direct contact.

Thus, it can be seen that depending on the current state of architecture and the conditions of science and technology. It is necessary to choose with the right scientific basis to give a strategic conservation orientation for a monument.

3. Practical experience in the preservation of fortifications

3.1 Conservation of the Great Wall of China in the direction of sustainable tourism

The Great Wall of China is the most significant historical landmark and national emblem of China. However, natural forces and human activities have posed serious threats to the Great Wall's structure.

The Great Wall Protection Regulation was issued by the State Council on September 20, 2006, and went into force on December 1 of the same year. The regulation has effectively regulated the conduct of tourists and locals on the wall. When visiting the wall, tourists must observe their responsibilities to preserve it. The legislation has a total of 31 articles pertaining to every act of incivility that tourists or locals may engage in (Figure 141).

Threats to the Great Wall from Nature and Humans

Additionally, the expansion of tourists has harmed the Great Wall. At the base of the wall, for instance, farmhouses and other public facilities have been constructed. Instead of being conserved, several areas were altered to accommodate various usage.

Some tourists deface the Great Wall with graffiti and litter, among other destructive actions. In addition, the Great Wall was severely damaged during prior battles.

Great Wall Protection and Conservation

- Activities Regarding Natural Factors:

+ Deserts and plains should have a protective forest belt constructed in order to reduce storm damage.

+ To preserve the Great Wall from rain, the waterproof layers should be restored and a waterproofing solution should be sprayed on it.

+ The government is pushing the general public to maintain and enhance the environment in order to decrease acid rain, which poses a significant threat to the Great Wall.

+ In addition, the government has prohibited grazing and other undesirable actions on the Great Wall by enacting rules.

- Human Activity-Related Activities: The government has increased its efforts to educate neighbouring citizens about the prohibition on removing bricks and other materials from the Great Wall. It is attempting to ensure that roads and other public infrastructure are constructed along the Great Wall. According to article 18, the following actions are prohibited on the wall:

1 Remove soil, bricks, and stones, then plant crops.

2 Vandalism and graffiti are also mentioned.

3 Span or repair any establishment, fittings, or equipment unrelated to the security of the Great Wall.

4 Drive or traverse any vehicle over the wall.

5 Carry any items that could damage the wall.

6 Organize activities in places that have not yet been developed as tourist destinations.

7 Other actions prohibited by laws and rules governing the protection of cultural monuments.

The local cultural relic operational administration will issue a warning if the behaviour described in articles No. 3, No. 4, and No. 5 occurs in small cases. In addition, local cultural relic operational administration will issue a warning in minor cases to people who engage in the acts described in items 1 and 6. [133]

Figure 141. The conservation strategy of the site is to preserve the original state, combine tourism exploitation but apply protection measures with strong sanctions *(Source: http://english.scio.gov.cn/in-depth/2021-12/01/content_77904093.htm)*

3.2 Japan loosens rules to rebuild precious ancient castles

Japan is easing its stringent rules for reconstructing historical sites so that more might be renovated to attract tourists and generate revenue for local communities. The modification facilitates the reconstruction of castle keep towers and other demolished structures, even if some of their original exterior and interior designs and features are unknown. Up until now, historically significant structures in Japan could only be reconstructed on government-designated historical heritage sites if their structural elements could be established through documentation and findings such as design blueprints and excavation results. In recent years, however, some local governments desiring to reconstruct castle keep towers and other historical monuments have protested that the regulations prevent them from doing so.

To deal with this issue, there is an adoption of new guidelines by an Agency for Cultural Affairs advisory group on 17th April 2020. As a result, local authorities seeking a freer hand with history received a boost when the government changed the statute for the preservation of cultural properties to give historical places a higher priority. Local governments' efforts to aggressively utilize cultural properties to reinvigorate their economies will almost certainly be given a boost by the new reconstruction criteria.

A newly established idea called *"restorative implementation"* has been incorporated into the agency's standards, allowing for the reconstruction of historical structures even if insufficient reference materials exist. In order to expedite the construction of structures so that local communities may utilize them, it may be necessary to modify the sizes of buildings and some building materials from the original structure's design. Under the new regulations, local governments are still obligated to follow a variety of procedures, including ensuring the preservation of historical landmarks, performing expert reviews of the project, and providing detailed explanations of how the project will be executed. (Figure 142; Figure 143)

Yoshihiro Senda, a Nara University professor specializing in castle archaeology, complimented the agency for modifying the criteria, stating that it was well worth linking the people with Japan's historical assets. Senda stated, *"It is acceptable since it demonstrates care for the people who wish to utilize historical materials in their areas."* [134]

Figure 142. The current state of Takamatsu Castle (dismantled in 1884) *(Source: setouchiexplorer .com/takamatsu-castle-reconstruction/)*

Figure 143. 3D reconstruction based on historical photographic to prepare for a complete rebuild *(Source: asahi.com/ajw/articles/13315990)*

This openness in regulation is necessary because it allows the building to have the movement to adjust or renew its architectural elements. The work is still considered a heritage site, but it still retains all the power to intervene like in the old days. In other words, the building is an "alive" architectural entity, not an indistinguishable display specimen. Of course, the new modifications must still be in the spirit of preserving traditional Japanese techniques, materials, and construction methods to ensure the Venice Charter's correct provisions on authenticity.

3D reconstruction and virtual reality of Bam Citadel

Along the Silk Road, more than 1,200 kilometers south of Tehran, the medieval city of Bam formerly flourished as a producer of silk and cotton. The city is famous for its qanat water management system, mud-brick fortress, and date palms. On Friday, December 26, 2003, a quake measuring 6.3 on the Richter scale occurred and damaged many of its dwellings. The historical Bam Citadel (Arg-e-Bam) was demolished. Restoration and repair of the citadel, which is now classified as a global heritage site in jeopardy2), will be difficult, and numerous organizations and individuals are seeking to find suitable solutions (Figure 144).

Before earthquake   After earthquake

Figure 144. Damege to the Arg-e-Bam Citadel after Earthquake
(Source: https://www.researchgate.net/Figure/Photo-Mosaic-of-the-Citadel-of-Bam-and-Surrounding-Urban-Districts-a-the-Citadel_fig2_318945115/)

As part of the Digital Silk Roads project, virtual reality and three-dimensional reconstruction of the Citadel of Bam were planned. Due to the intricacy of physical reconstruction, the revival of this heritage in the virtual world is important. Any physical restoration may be constrained by technique, material, people, budget, or even site accessibility. The reconstruction in three dimensions and the display of virtual reality are components of the virtual restoration of the Citadel of Bam [135, p.]. The following factors inspired the research activity:

• A virtual reconstitution is more efficient and economical than a physical one.

• A revival in the virtual world may be the only option for reconstructing extremely challenging or unattainable environments.

• Provide a systematic knowledge base of raw materials such as photographs, maps, films, and texts, etc., to construct three-dimensional models and identify data and documentation deficiencies at the site.

• The three-dimensional models would serve as crucial references for physical rebuilding.

• Virtual reality of the fortress is viewable and distantly accessible.

After the disaster, conservators began creating a 3-D reconstruction of the devastated citadel buildings using cutting-edge computer graphics software and preparing a virtual reality display of the digitally reconstructed structures. The conservation sequence is implemented according to the following steps in Table 45.

Table 45. Post-disaster virtual revival strategy for Bam Citadel
(Source: http://dsr.nii.ac.jp/bam/virtual/index.html.en)

• Collect information connected to Bam, including photographs, maps, videos, and documents, from different and scarce sources.	
• Conduct an analytic and comparative study on this heterogeneous data, in addition to categorization and annotation, to complete the modeling's core resources.	
• Develop a three-dimensional simulation of the citadel's buildings by applying different data resources in conjunction with cutting-edge 3-D modeling techniques and technologies.	

• Through a methodical modeling procedure, add semantic information to the 3-D models.	
• Create a virtual reality display of the simulated places by loading a VRML5) file of the 3-D models into VR tools and setting up a virtual tour of the digitally rebuilt structures.	

4. Conservation strategy orientation

4.1 Statistics on the status of fortifications heritage recognition

After two wars, time, and a harsh climate in Vietnam, the fortification system has not remained in its original shape. Some citadel has been destroyed almost completely, leaving no traces, some citadel has been destroyed but still retains the basic form of a citadel, and some citadel still remains intact. Half of the fortifications have been recognized as a national architectural and historic site and by Unesco as a world heritage site, but the rest remain unrecognized as a national heritage site partly because they have been destroyed entirely or seriously degraded. (Table 46)

Table 46. Heritage recognization of Vietnamese fortifications (Source: Author summarizes)

No.	Citadels recognized as world heritages	Citadels are recognized as national heritages	Citadels have not been recognized as heritages	
			Completely or almost destroyed	Still remain intact
1	Thang Long	Óc Eo	Ninh Viễn	Nam Định
2	Tay Do (Ho Citadel)	Simhapura	Kurung	Thanh Hóa
3	Hue	Indrapura	Kandapurpura	Vinh
4		Amaravati	Virapura	Quãng Ngãi
5		Vijaya	Cổ Lũy	Biên Hòa
6		Hồ-Kauthara	Sri Banoy	Vĩnh Long
7		Cổ Loa	Sông Lũy	
8		Luy Lâu	Hóa Châu	
9		Xương Giang	Phao Sơn	
10		Mạc Citadels	Cao Bằng	
11		Bầu Citadel	Hưng Hóa	
12		Nghị Lang	Hưng Yên	
13		Bản Phủ	Hải Dương	
14		Lương Sơn	Vĩnh Điện	
15		Đoàn Thành	Bình Định	
16		Lục Niên	Bát Quái	
17		Lạng Sơn	Gia Định	
18		Sơn Tây	Trấn Định	
19		Bắc Ninh	De Lattre Line	
20		Đồng Hới		
21		Quảng Trị		
22		Điện Hải		
23		An Thổ		
24		Diên Khánh		
25		White Stone		
26		Củ Chi		

What remains compared to the vestige system of fortifications in Vietnam is that 26 citadels are recognized as national heritage, while 25 citadels are still waiting or not recognized as national heritage because they have been completely destroyed. Thereby showing that the work of preserving and promoting the vestige system of Vauban citadel in Vietnam into a valuable national heritage is still a long way to go.

Because of the necessity to preserve the meaning of the above-mentioned historical values, conservation and restoration work is in urgent need. However, conservation work in Vietnam still has many shortcomings.

The wall system is the most important part of a citadel, but most surviving citadels in Vietnam hardly have any intact surrounding wall system. The reason is that they have existed for a long time and had to go through two fierce and devastating wars, and the other part is due to the local people whose lifestyle infringes on relics. In addition to an insensitive lifestyle towards architectural monuments, it is a way of life that is not responsible for society, blatantly infringing on the area around the citadel, leading to the destruction of the wall system. The land encroachment by residents living around the fortification partly contributed to Vietnam's rapid destruction of citadels (Figure 145).

On the other hand, the moat is an integral part of the fortification system in Vietnam, but almost none of the citadels still retains its original moat. There are a few citadels, and the moats are still intact, but it is only the righteous ones. The remaining moats have no water; moss and plants are overgrown or encroached by surrounding works. More than that, the moats of some citadels automatically become garbage pits for the people living around, causing the stick polluted water and stink. That is the sad reality for the monuments of citadels in Vietnam. This image contrasts with the moats from the beginning of the citadel in terms of both functional significance and surrounding landscape architecture (Figure 146).

Figure 145. Households illegally encroached on Hue citadel for decades before relocated
(Source: bcp.cdnchinhphu.vn/Uploaded_VGP/nguyen thikimhue/20130319/1187.jpg)

Figure 146. 3D Walls base, moats... easily become places of garbage stagnation
(Source: thanhtra.com.vn/portals/0/news_images/20 17/02/ngocpho/rac_hue_1.jpg)

Currently, the fortifications system in Vietnam has not been legitimately concerned by the authorities. Only a few of the citadel intact are preserved, restored, and combined with tourism. Most of the remaining citadel is still almost untouched and is gradually disappearing over time. Some other saints have been preserved and restored but according to the new construction, some of which are not properly restored according to the scientific method, and the workers involved in the restoration have not been trained. The head of the specialized work involved in the restoration work also did not have a deep understanding of the importance of his work, especially the misconception of a large part of architectural monuments in the work of conservation and restoration to ensure long-term existence in the future.

In summary, the whole country has only 3 citadels recognized as a world cultural heritage by Unesco, 26 citadels recognized as national heritages, the remaining citadels have not been recognized as a cultural heritage, and some of these were almost completely destroyed. It shows that the work of preserving and restoring the architecture of fortifications in Vietnam has not had the necessary investment and attention to develop them as a national heritage, which is a sad situation that is happening. That is also an alarmfor the authorities at all

levels and for those who do the work of preserving and restoring the heritage of fortifications in Vietnam. Therefore, the work of conservation and restoration is a very necessary and urgent job to promote the values remain.

4.2 Physical conservation

Vietnam's ancient citadel is a special heritage, acting as a bridge between the past, present, and future in the development process of the nation. However, the historical fluctuations and the rapid development of the urbanization process caused many monuments and fortifications to be overwhelmed or even wiped out. This is an unbalanced development, disrupting the landscape and losing the precious values inherent in the citadel architectural monuments that have been left to future generations. Therefore, the sustainable development strategy in preserving and preserving the heritage of Vietnam's citadel should implement the following solutions:

- Only minimally interfere with the citadel architectural monuments but establish a regular and periodic maintenance and repair mechanism to ensure long-term stability of the monument.

- Fortification relics can be used and promoted to serve social needs according to determined scientific standards. Using and promoting the valuable aspects of the monument is also the most effective conservation measure.

- Conservation of fortification monuments must be implemented in parallel and serve the cause of domestic and foreign tourism development. Development must be combined with conservation, restoration, and promotion of the cultural values of the citadel.

- Not consider the preservation and restoration of architectural monuments and citadels as a series of an available rigid formula. In the work of conservation and restoration, there must be specific strategies; Theoretical models and principles must be applied flexibly depending on historical conditions, specific features, and typical values for each case study.

- The work of preserving the fortifications in Vietnam is not only preserving its physical shell but equally important is preserving its spiritual and cultural value. At the same time, it must be associated with the preservation of the surrounding landscape and architectural space.

In addition, promoting the image, historical and cultural values of the Vietnamese fortifications, along with raising awareness for local officials and people about the value of the Vietnamese fortification heritages, thereby raising the people's sense of responsibility in the work of conservation, restoration and preservation. Directing the community to participate in the conservation progress through propaganda and guidance for local people to understand the attractiveness of the heritage they currently have. It is a meaningful job contributing to making Vietnam's fortification and military landscapes a valuable national heritage.

4.3 Developing sustainable tourism for Vietnam's fortification system

Architectural, historical, cultural, and scientific values are the core factors that create the attractiveness and uniqueness of Vietnam's citadel, attracting visitors to learn that a unique form of military architecture has existed for thousands of years.

With the development trend of the type of tourism of each locality in the general context of the whole country towards sustainable tourism development, the development of tourism for the fortification system of Vietnam is a great significant factor. The precious values of the citadel relic system have been and continue to be exploited optimally for the purpose of serving the tourism development of the whole country in order to promote the past image of Vietnam's military architecture and history. The fortification system contributes significantly to the development of cultural tourism in particular and Vietnam tourism in general.

Propaganda combined with tourism to promote the value of citadel architectural monuments should be focused. Sightseeing and tourist activities as

sustainable tourism will be the main motivations and resources for the preservation, embellishment, and promotion of the value of the fortifications system in Vietnam.

Maximize the potential of the tourism strength of the citadel in Vietnam, thereby becoming a destination for domestic and foreign tourists, and at the same time promote the value of the architectural monuments of the Vauban citadel in Vietnam. It is highly necessary to combine tourism with the study of tangible and intangible cultural values to turn those values into specific tourism products across the country's entire tourism system.

The issue of environmental protection also needs to be focused on because tourism development is very sensitive and easily changed under the impact of tourism. Therefore, there must be specific policies to develop tourism in association with the preservation of historical and cultural values of fortification heritages in Vietnam, at the same time creating conditions for the community to actively participate in tourism activities and focus on sharing benefits with the community.

4.4 Reconstruction-oriented preservation, applying multi-layered interpretation

In Vietnam's rapid urbanization and globalization process, many traditional cultural heritages and values are being seriously threatened, especially those that have been completely destroyed or only very few remnants remain. For example, Thang Long citadel existed for 1000 years, but today its traces in Hanoi only exist very little. Instead, it is a metropolitan city with a core zone of Soviet-style planning which do not have much artistic or cultural value. Or, as the case of Ho Chi Minh City, which used to exist a unique and solid Vauban-style Bát Quai citadel - the headquarters of the first king of the Nguyen Dynasty during the struggle for kingship; but today, the vestiges of the ancient citadel have been completely wiped out. Although the historical records are still there, it is impossible to imagine the shape of an old Vauban citadel from the current urban

status of Ho Chi Minh City. The process of disappearance of this sense of place is only a few decades. At this rate, surely, the entire value of cultural heritage existing in the ancient citadels of Saigon will completely disappear from urban heritage and citizens' memory.

However, through the war and post-war era, it was impossible to find the original materials and documents of the citadel heritage in Vietnam in the spirit of the Venice Charter. Moreover, large cities with postmodern architectural forms have become integral to today's life. The large-scale zoning and clearance of a developing urban area to restore a pre-existing monument is an unrealistic way of thinking and will inevitably have serious economic and safety consequences in current social life.

In that situation, the reconstruction using the "digital heritage" method of digital modeling, combined with multi-layered interpretation transmission devices, is the optimal choice.

4.4.1 Multi-layered interpretation strategy

Most of the world's ancient cities have complex historical structures, including many overlapping and alternating layers. This comes from objective reasons of nature impacts that affect the city's morphology, such as earthquakes and the displacement of sediments. Besides, it is also due to the impact of subjective factors such as the destruction of dynasties after taking power from the previous dynasty through civil war or invasion, the introduction of new architectural elements, migration, and assimilation activities. These complexities make it impossible for conservation activities to present all the inherent values of heritage or city fully but can only choose a time in the past to carry out conservation or restoration works. Besides, as in the case of Hanoi and Ho Chi Minh City, all major cities have activities of the top layer of modernity that cannot be replaced. Therefore, the partial restoration of ancient relics mixed in the modern urban context will create additional overlaps and confusion in the sense of place of an urban area.

The multi-layered interpretation solution is understood as a method of using virtual space to fully reconstruct one or more wiped-out layers in the past of an urban area. Using AR (Augmented Reality) or VR (Virtual Reality) technology, these digitized urban layers will be simulated in a stereoscopic interactive environment and transformed in time through drivers on specialized devices. This method does not affect the urban status, allows correcting errors in restoration, and is not limited to the time or number of layers to be restored. It can be said that multi-layered interpretation is a technology solution that completely overcomes the disadvantages faced by physical conservation and restoration.

4.4.2 Multi-layered interpretation case study

The solution of digitalization conservation through a multi-layered interpretation method can be clarified through the following case study in Table 47:

Table 47. Restoring the Forbidden Citadel of Ly Dynasty with a multi-layered interpretation platform *(Source: Thang Long Imperial Citadel Research Institute)*

Multi-layered interpretation project: Thang Long Forbbiden Citadel in the Ly dynasty	
The overall ground as well as the specific architectural works of the palace system of the Ly Dynasty, have been studied and restored based on traces and archaeological artifacts found through excavations in 2002 - 2004. The excavation at the construction site of the National Assembly House in 2008 - 2009 has subsequently provided more scientific documents about the palace architecture of the Ly dynasty.	*The overall image of the palace system of the Ly dynasty through archaeological traces.*

The excavation sites at 18 Hoang Dieu are mapped out, including 5 zones A, B, C. D and E. Zone E is the current National Assembly building. Placing this diagram on the current map can better visualize the planning of the Forbidden Citadel in the Ly dynasty.	*Site map of archaeological areas*
Based on archaeological traces, the researchers reconstructed the floor plan of the Forbidden Citadel of the Ly dynasty.	*Floor plan of Ly Dynasty Palaces based on archeological archives*
The 3D graphic clarity the scale of the old Forbbiden Citadel compared to today's buildings.	*The planning of the Ly Dynasty 's Forbbiden Citadel in comparative with today's map.*

At the cultural and historical layer of the Ly dynasty, during the excavation in 2008, the foundation of the stone pillars and the stone supporting the foot of the column were found. They are evidence that the palace buildings in the Thang Long Imperial Palace were all wooden structures. These gravel pillars also show that the Ly dynasty architecture's foundation technique is unique - in which the combination of "positive columns" are the columns inside the house and "negative columns" are the porch columns around the house.

Structure diagram of positive and negative columns based on construction techniques of the Ly Dynasty architecture in the 11th-12th centuries.

Also, based on reconstruction and comparison studies, scientists have determined the system used in the royal palace. This is a type of roof-supporting structure consisting of two components, "Đấu" and "Củng" (Dou-Gong). "Đấu" acts as a support, while "Củng" resembles an elbow, acting as a support arm used to support another structure above.

Dou-Gong structure in the palace architecture of the Ly Dynasty

In addition, archaeologists have also identified large and solid wall foundations as the boundary between architectural areas. The panorama of the palace, the attic of the forbidden citadel of the Ly dynasty, was reproduced in the background of the underground archaeological sites.	 *Panoramic view of the Palace restored on 3D platform*
Research on found pieces of wood artifacts, based on documents from civilizations and study on wood carvings in other constructions along with comparative studies on wooden structures abroad (China), Korea, Japan), scientists have found similarities and unique differences of wooden architecture in Vietnam.	 *Artifacts found in excavation pits.*
In the excavation pits in the Imperial Citadel, a large number of artifacts with dragon heads, phoenix beaks, and lovebirds were found in terracotta. These are details that decorate the roofs of buildings.	 *Images of Dragons and Sacred Beasts of the Ly Dynasty from artifacts found in excavation pits* .

The extended study from "Dou-Gong" system also allows understanding more about the uses, types, fabrication, and construction methods... so that the frame – the body of wooden architecture parts can be restored.	*Diagrams and terms of decorative elements of the Ly Dynasty 's Roof Palace*
With all the archives and databases, the Thang Long Imperial Citadel Research Institute has restored 3D images of the architectural form of the Ly dynasty Forbbiden Citadel. They are 64 architectural works in the overall architectural plan of the Ly dynasty. 3D imaging technology allows seeing the Ly Dynasty palace system from many dimensions. For the first time, the image of the architecture of the palaces of the Ly dynasty after more than 1000 years is clearly reproduced.	*Similarities and unique differences in wooden architecture in Vietnam compared to China, Japan, and Korea* *Restoring 3D images of a building in Ly Dynasty Palace.*

| The research achievements of scientists have been displayed and shown at many domestic and foreign exhibitions since 2016, through modern digital technology platforms. | |

3D reconstruction data is interpreted by the AR and VR platform for visually interaction and will understanding of the architecture of the 11th-12th century Ly Dynasty.

Through the above case study, we can see that the restoration and preservation of ancient buildings - especially those that have disappeared - with AR and VR technology will be the future of conservation science. Not only because it does not cause conflicts with the existing urban layer, but also in the future, scientists can continue to digitally reconstruct the citadels and palaces of the Le, Tran, or any other dynasty. Furthermore, image database systems across the history of the same place will allow for interactive customization at any layer of the whole multi-layered cultural landscape.

4.5 Strategic orientation of conservation and restoration of Vietnam military landscape heritage:

The above orientations mentioned in this chapter will be the basis for planning a conservation strategy for the citadel in Vietnam in the new era. The criteria for guiding the conservation strategy will be:

4.5.1 Citadels are recognized by UNESCO as world cultural heritages

In Vietnam, there are 3 citadels recognized by UNESCO as world cultural heritages: Thang Long Citadel, Ho Citadel and Hue Citadel. The degree of integrity of these three citadels is very different and will therefore also lead to three different conservation strategic orientations.

+ Thang Long Citadel: Currently, Thang Long citadel has been completely destroyed under French colonial rule. The remaining vestiges of Thang Long citadel are only the gates and the newly excavated ruins at the 18 Hoang Dieu site. Today's urban area formed on the old ground of Thang Long citadel as the capital Hanoi has followed the direction of metropolitan construction in the style of a modern city. Therefore, developing heritage tourism in the direction of original relics is impossible. Instead, it is necessary to digitize the data on the Thang Long citadel's architecture and apply multi-layered interpretation technology so that an ancient Thang Long citadel through the dynasties can exist in parallel with the Hanoi capital city today.

+ Hồ Citadel: The heritage of the Ho Dynasty citadel with unique materials, techniques, and history was recognized by UNESCO as a world cultural heritage in 2011. However, since then, the Hồ Citadel still cannot implement sustainable tourism because the current architectural status is only the city gates and a section of the wall between an empty space, not attractive to tourists. Therefore, an urgent strategy in the preservation of the Ho Dynasty citadel is to immediately implement the restoration of the original state of this citadel by digital technology; take that as a basis to attract sustainable tourism types, including virtual online tourism.

+ Hue Citadel: Among the three citadel heritages recognized as UNESCO world heritage, Hue Citadel is the citadel that still retains its architectural form and tangible and intangible heritage values. Hue's tourism potential has been exploited very effectively. However, in the scale of the Forbidden City of Hue, the destroyed architectural monuments need to be restored soon with both digital and physical platforms. Existing original architectural elements also need periodic maintenance and if necessary, damaged parts can be replaced by traditional methods. The purpose is to maintain the existence of the Hue Citadel architectural monument for as long as possible, towards the spirit of preserving

the work as a living relic, exploiting cultural values and developing sustainable tourism.

This conservation orientation also applies to architecturally intact citadels.

4.5.2 The fortifications/citadels which still have vestiges:

For the fortifications/citadels that still retain part of their architectural relics, it is necessary to quickly implement excavation measures, collect current status data as soon as possible, and prevent the monument from being eroded over time leading to more serious damage. At the same time, it is necessary to have the policy to recognize the heritage and protect it from the abuse of the people causing adverse impacts on the monument. Finally, from the collected database, restore the most intact state of the citadel to serve the conservation and exploitation of tourism as digital heritage.

From a management perspective, it is necessary to loosen policies and regulations on conservation. The most important of which is to allow "guesses" in digital reconstruction. Instead of absolute adherence to the exact element of physical preservation, digital reconstruction allows for unlimited editing adjustments. Therefore, conjectural reconstructions may be allowed for rapid restoration work, with clear notes on the scale of the accuracy of the restoration.

4.5.3 The fortifications/citadels have been completely destroyed:

For these fortifications/citadels, it is necessary to investigate the construction information through conducting archaeological excavations combined with analytical research from the bibliographies. The type of work that needs to be done will then be similar to the form of fortifications with a partial vestige.

4.5.4 Statistics of strategic conservation orientations for each type of fortification in Vietnam (are proposed in Table 48)

Table 48. Statistics of strategic conservation orientations for each fortification case study in Vietnam *(Source: Author)*

Category	Fortification	Status	Conservation Strategy Proposal
Indosphere /Champa	Óc Eo	- UNESCO world heritage proposing - Trace remain - Under excavating	- Sustainable tourism - Virtual restoration
	Ninh Viễn	- Completely destroyed. - No excavating	- Start excavation campaign - Virtual restoration
	Kurung	- Completely destroyed. - No excavating	- Start excavation campaign - Virtual restoration
	Kandapurpura	- Completely destroyed. - No excavating	- Start excavation campaign - Virtual restoration
	Simhapura	- Trace remain - Under excavating - Has museum	- Preserved in original state - Virtual restoration
	Virapura	- Indefinite location	- Archives research - Location identify
	Indrapura	- Trace remain - Under excavating - Has museum	- Sustainable tourism - Virtual restoration
	Cổ Lũy	- Trace remain - No excavating	- Preserved in original state - Virtual restoration
	Aramavati	- Trace remain - No excavating	- Start excavation campaign - Virtual restoration
	Vijaya	- Trace remain - Under excavating	- Multi-layered interpretation
	Sri Banoy	- Completely destroyed. - No excavating	- Start excavation campaign - Virtual restoration
	Hồ - Kauthara	- Trace remains - Paused excavation	- Restart excavation campaign - Virtual restoration
	Sông Lũy	- Completely destroyed. - No excavating	- Start excavation campaign - Virtual restoration
	White Stone	- Trace remains - Under excavating - Under virtual restorating	- Continue
	Luy Lâu	- Trace remains - No excavating	- Sustainable tourism - Virtual restoration

Sinophere /Viet style	Cổ Loa	- UNESCO world heritage proposing - Trace remains - Under excavating - Under virtual restorating	- Sustainable tourism
	Thăng Long	- UNESCO world heritage - Trace remains - Under excavating	- Multi-layered interpretation
	Hóa Châu	- Trace remains - Under excavating	- Preserved in original state - Virtual restoration
	Hồ	- UNESCO world heritage - Trace remains - Under excavating	- Virtual restoration - Sustainable tourism
	Phao Sơn	- Trace remains - No excavating	- Preserved in original state - Virtual restoration
	Xương Giang	- Trace remains - No excavating	- Preserved in original state - Virtual restoration
	Mạc Citadels	- Trace remains - No excavating	- Preserved in original state - Virtual restoration
	Bầu Citadels	- Trace remains - No excavating	- Preserved in original state - Virtual restoration
	Nghi Lang	- Trace remains - No excavating	- Preserved in original state - Virtual restoration
	Bản Phủ	- Trace remains - No excavating	- Preserved in original state - Virtual restoration
	Lương Sơn	- Trace remains - No excavating	- Preserved in original state - Virtual restoration
	Đoàn Thành	- Trace remains - No excavating	- Preserved in original state - Virtual restoration
	Lục Niên	- Trace remains - No excavating	- Preserved in original state - Virtual restoration
	Huế	- UNESCO world heritage - Intact	- Sustainable tourism - Authenticity restoration - Virtual restoration
	Lạng Sơn	- Intact	- Preserved in original state - Virtual restoration
	Sơn Tây	- Intact	- Preserved in original state - Virtual restoration
	Bắc Ninh	- Intact	- Preserved in original state - Virtual restoration
	Đồng Hới	- Intact	- Preserved in original state

Vauban			- Virtual restoration
	Quảng Trị	- Intact	- Sustainable tourism
			- Virtual restoration
	Điện Hải	- Intact	- Sustainable tourism
			- Virtual restoration
	An Thổ	- Intact	- Preserved in original state
			- Virtual restoration
	Diên Khánh	- Intact	- Sustainable tourism
			- Virtual restoration
	Cao Bằng	- Complete destroyed	- Virtual restoration
	Hưng Hóa	- Complete destroyed	- Virtual restoration
	Hưng Yên	- Complete destroyed	- Virtual restoration
	Hải Dương	- Complete destroyed	- Virtual restoration
	Vĩnh Điện	- Complete destroyed	- Virtual restoration
	Bình Định	- Complete destroyed	- Virtual restoration
	Bát Quái	- Complete destroyed	- Multi-layered interpretation
	Gia Định	- Complete destroyed	- Multi-layered interpretation
	Trấn Định	- Complete destroyed	- Virtual restoration
Modern Warfare	De Lattre Line	- Trace remains	- Repair for military use purposes
		- No excavating	
	Củ Chi	- UNESCO world heritage proposing	- Sustainable tourism
		- Intact	- Maintenance and strengthening the structure for conservation

Within the scope of the thesis, in this chapter 5, conservation work only proposed classifying and giving general orientations. Specific conservation works and techniques with each specific case of ramparts will be carried out in further studies.

C.CONCLUSION

Over time, the Vietnamese fortifications have confirmed their value through the process of formation and transformation in scale, structure, and urban morphology. It is very important to understand the identity of the urban form and its historical value. The value of urban heritage and military landscape of the Champa, Vietnam, Vauban, and Modern Warfare style was very precious.

The thesis is the continuation of long-lasting research in the Architectural Heritage Management and Tourism Program – at Silpakorn University Bangkok, Thailand. Some of the results refer to the research and development topics from previous studies, assessment, and deepening.

The research has achieved some results

- Summarize the scientific data on the origin, the process of formations, and transformation of Vietnamese fortifications. That is an unusual combination of human, nature, and military tactics. The Indosphere-Sinosphere architecture, East-West architecture, Western military architecture meeting the ideology of Eastern philosophy and Vietnamese traditional architecture, and the diversity of fortification in Vietnam during modern warfare clarified.

- Identify the characteristics and typical case studies of fortification heritages in Vietnam belonging to 4 categories: Indosphere/Champa, Sinosphere/Viet, Vauban, and modern warfare. The information about historical data, location, and the current status is statistically based on the time axis to establish scientific synthesis analysis.

- Research data on the subject to affirm the cultural values of Vietnamese fortification in intangible values such as historical, economic, belief, education, and entertainment values. Besides evaluating the tangible values in urban/architecture, science, and visual arts. These results can be used for the proposal of the model of sustainable development in combination with heritage conservation.

- From research data, in comparison with ICOMOS, UNESCO regulations, and local management regulations, these propose the managed Policies for the application of traditional qualities in the strategy for preserving and promoting the values of the architecture of Vietnamese fortifications; proposing 3 overall conservation orientations to apply in each case, with the application of multilayered interpretation methods.

These results can be applied in research, study, and contribution to urban planning and tourism management. The thesis clearly states the ability to exploit the value of architectural heritage and cultural values in the development of Vietnam's modern cities, a new architecture with a national identity. Through the thesis, the author wants to bring out a new approach, using the values and modes of traditional spatial organization in the preservation and enhancement of Vietnamese fortifications for the strategy of sustainable development.

Some of the values from the thesis

- Maintaining scientific cooperative relationship and international student exchange program between Silpakorn University of Thailand, Hongbang International University, Tonducthang University of Vietnam, and the Polytechnic University of Marche Italy.

- Contributing the scientific data to advance undergraduate and postgraduate training in the Faculty of Architecture, Hongbang International University, and Faculty of Interior Design, Tonducthang University.

- The proposed products can be used as reference research for architectural students, urban planning consultants, and architects in Vietnam.

- Approaching a new method of preservation and enhancement from the application of the traditional values of architectural heritage and landscape.

Some other achieved results

- Providing data for the National Library of Vietnam, Inspiration Library of Tonducthang University, Center of Heritages Conservation Research.

- Proposal a small guide of managed policy for Vietnam People's Committee in urban management.

- Providing multi-dimensional information and multi-layered interpretation of tourism in the fortification heritage site of Vietnam.

Through the survey, analysis, synthesis, and evaluation of the architectural heritage and landscape value, the topic is related to the organic relationship with the components and basic elements of urban architecture. However, a more specific and deep understanding also needs the participation of the specified case studies of each fortification. The participations of other scientific disciplinary sectors are very important and useful to improve the full proposal.

In the framework of the Ph.D. thesis, the research finds the historical source and characters of Vietnamese fortifications and identifies the values and proposals for preservation strategies. Some results are used for urban planning. The thesis also orients to detailed proposals for architecture and preservation in some important fortifications which remain intact or detailed archives. Thus the next future, this research will carry on with the proposals for the detail of the fortification of civilizations that have perished. In the next steps, the topic will also study in depth to exploit the values of modern architectural composition, which orients advanced Vietnamese architecture with national identity.

D.FOOTNOTES

[1]   "Fortification," *Wikipedia*. Feb. 23, 2022. Accessed: Mar. 19, 2022. [Online].
Available: https://en.wikipedia.org/w/index.php?title=Fortification&oldid=1073520401

[2]   *Dictionary of Military and Associated Terms*. Joint Chiefs of Staff, 1984.

[3]   C. Gravett, *Castle*. New York: DK Pub, 2008.

[4]   R. Woodward, "Military landscapes: Agendas and approaches for future research,"
Progress in Human Geography, vol. 38, no. 1, pp. 40–61, Feb. 2014, doi:
10.1177/0309132513493219.

[5]   "Ancient Chinese Warfare - World History Encyclopedia."
https://www.worldhistory.org/Chinese_Warfare/ (accessed Mar. 19, 2022).

[6]   "Fortifications in Ancient Chinese Warfare," *World History Encyclopedia*.
https://www.worldhistory.org/article/1147/fortifications-in-ancient-chinese-warfare/
(accessed Mar. 19, 2022).

[7]   M. Kuilman, *Quadralectic architecture: a survey of tetradic testimonials in
architecture*. Heemstede: Falcon Press, 2011.

[8]   V. L. Garcia, "South-East Asian Fortified Stone Walls: Angkor Thom (Cambodia),
Ho Citadel (Vietnam) and Ratu Boko (Indonesia)," *Humaniora. Journal of Culture, literature
and linguistics*, vol. n. 28, pp. 238–253, Oct. 2016, doi: 10.22146/jh.v28i3.22275.

[9]   P. Wheatley, *The Pivot of the Four Quarters: A Preliminary Enquiry Into the Origins
and Character of the Ancient Chinese City*. Aldine Publishing Company, 1971.

[10]   S. M. Hom, "Consuming the View: Tourism, Rome, and the Topos of the Eternal
City," *Annali d'Italianistica*, vol. 28, pp. 91–116, 2010.

[11]   "APROXIMACIÓN A LA ICONOGRAFÍA DE ROMA AETERNA COMO VÍA
DE TRANSMISIÓN DE UN MITO," Sep. 23, 2015.
https://web.archive.org/web/20150923235403/http://www.elfuturodelpasado.com/elfuturodel
pasado/Ultimo_numero_files/023.pdf (accessed Mar. 15, 2022).

[12]   N. Fields and P. Dennis, *The walls of Rome*, 1. [print]. Oxford: Osprey, 2008.

[13]   S. A. Victor and H. W. Bird, *Liber de Caesaribus of Sextus Aurelius Victor*.
Liverpool: Liverpool University Press, 1994.

[14]   S. L. Dyson, *Rome: a living portrait of an ancient city*. Baltimore: Johns Hopkins
University Press, 2010.

[15]   G. S. Aldrete, *Daily life in the Roman city: Rome, Pompeii, and Ostia*. Westport,
Conn: Greenwood Press, 2004.

[16]   "Les premiers habitants de l'Europe d'après les écrivains de l'antiquité et ... - Henry
Arbois de Jubainville, Georges Dottin - Google Books."
https://web.archive.org/web/20160101095821/https://books.google.com/books?id=QSIDAA
AAMAAJ&pg=RA1-PA132#v=onepage&q&f=false (accessed Mar. 16, 2022).

[17]   B. Cunliffe, *Iron Age Communities in Britain: An Account of England, Scotland and
Wales from the Seventh Century BC until the Roman Conquest*. Taylor & Francis, 2004.

[18]   R. Lawrence, *Paris: [city guide]*. Singapore: Apa Publications, 2010.

[19]   "City walls of Paris," *Wikipedia*. Jul. 16, 2021. Accessed: Mar. 16, 2022. [Online].
Available:
https://en.wikipedia.org/w/index.php?title=City_walls_of_Paris&oldid=1033835855

[20]   "Amsterdam," *Wikipedia*. Mar. 16, 2022. Accessed: Mar. 16, 2022. [Online].
Available: https://en.wikipedia.org/w/index.php?title=Amsterdam&oldid=1077499193

[21]   "Walls of Amsterdam," *Wikipedia*. Aug. 16, 2021. Accessed: Mar. 16, 2022.
[Online]. Available:
https://en.wikipedia.org/w/index.php?title=Walls_of_Amsterdam&oldid=1039044564

[22]   "Storia militare di Ancona," *I Sedici Forti*.
https://www.isedicifortidiancona.com/introduzione-storica (accessed Mar. 16, 2022).

[23]   "Ancona," *Wikipedia*. Jan. 27, 2022. Accessed: Mar. 16, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Ancona&oldid=1068171406

[24]   "philologus.gr - ТО ΠΕΡΓΑΜΟΝ." https://philologus.gr/4/68-2010-01-01-01-22-30/116-2009-10-28-22-42-18 (accessed Mar. 16, 2022).

[25]   "Pergamon," *Wikipedia*. Feb. 26, 2022. Accessed: Mar. 16, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Pergamon&oldid=1074141123

[26]   U. W. H. Centre, "Pergamon and its Multi-Layered Cultural Landscape," *UNESCO World Heritage Centre*. https://whc.unesco.org/en/list/1457/ (accessed Mar. 16, 2022).

[27]   "Do We Divide The Holiest Holy City?" https://web.archive.org/web/20080603214950/http://www.momentmag.com/Exclusive/2008/2008-03/200803-Jerusalem.html (accessed Mar. 16, 2022).

[28]   "BVOM.COM - Vietnamese History," Jan. 06, 2010. https://web.archive.org/web/20100106204725/http://www.bvom.com/resource/vn_history.asp?pContent=Pre-History (accessed Mar. 31, 2022).

[29]   C. F. Higham, "FIRST FARMERS IN MAINLAND SOUTHEAST ASIA," *Journal of Indo-Pacific Archaeology*, vol. 41, no. 0, Art. no. 0, May 2017, doi: 10.7152/jipa.v41i0.15014.

[30]   "History of Vietnam," *Wikipedia*. Mar. 28, 2022. Accessed: Mar. 31, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=History_of_Vietnam&oldid=1079804433

[31]   W. R. Sharp, "Some Observations on Public Administration in Indochina," *Public Administration Review*, vol. 14, no. 1, pp. 40–51, 1954, doi: 10.2307/972967.

[32]   Dao Duy Anh, *Vietnam's historical geography*. 2016.

[33]   L. X. H. S. Lee and S. A. D.; Wiles, *Biographical dictionary of chinese women: antiquity through sui, 1600 b.c.e. - 618 c.e.* New York: Taylor & Francis, 2015.

[34]   "Vietnam under Chinese rule," *Wikipedia*. Mar. 08, 2022. Accessed: Mar. 31, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Vietnam_under_Chinese_rule&oldid=1075873491

[35]   *Historical records of the five dynasties*, Di 1 ban. Bei jing: Zhong hua shu ju, 1974.

[36]   O. Chapuis, *A history of Vietnam: from Hong Bang to Tu Duc*. Westport, Conn: Greenwood Press, 1995.

[37]   F. Mantienne, "The Transfer of Western Military Technology to Vietnam in the Late Eighteenth and Early Nineteenth Centuries: The Case of the Nguyên," *Jnl. of SE Asian Studs.*, vol. 34, no. 03, Oct. 2003, doi: 10.1017/S0022463403000468.

[38]   A. D. Hardy, M. Cucarzi, and P. Zolese, *Champa and the Archaeology of Mỹ Sơn (Vietnam)*. NUS Press, 2009.

[39]   "Japanese occupation of Vietnam," *Vietnam War*, Jun. 25, 2012. https://alphahistory.com/vietnamwar/japanese-occupation-of-vietnam/ (accessed Mar. 31, 2022).

[40]   M. Perkins, *Hanoi, adieu: a bittersweet memoir of French Indochina*. Pymble, N.S.W: HarperCollins, 2006.

[41]   "The Soviet-Vietnamese Intelligence Relationship during the Vietnam War: Cooperation and Conflict," Apr. 12, 2019. https://web.archive.org/web/20190412060039/https://www.wilsoncenter.org/sites/default/files/CWIHP_Working_Paper_73_Soviet-Vietnamese_Intelligence_Relationship_Vietnam_War_0.pdf (accessed Mar. 31, 2022).

[42]   "Proxy War in Indochina: Asian Affairs: An American Review: Vol 7, No 1." https://www.tandfonline.com/doi/abs/10.1080/00927678.1979.10553845?journalCode=vasa20 (accessed Mar. 31, 2022).

[43]   "Battle of Dien Bien Phu.pdf." Accessed: Mar. 31, 2022. [Online]. Available: https://archive.claws.in/images/journals_doc/Battle%20of%20Dien%20Bien%20Phu.pdf

[44]   "Socioeconomic Renovation in Viet Nam: The Origin, Evolution, and Impact of ... - Centre de recherches pour le développement international (Canada)., Institute of Southeast Asian studies (Singapour)., International Development Research Centre (Canada), Institute of Southeast Asian Studies - Google Books."
https://books.google.it/books?id=PXBpVdN1GW4C&redir_esc=y (accessed Mar. 31, 2022).

[45]   "KING HUNG IN THE MIND AND BEHAVIOR OF VIETNAMESE PEOPLE | UED Journal of Social Sciences, Humanities and Education."
https://jshe.ued.udn.vn/index.php/jshe/article/view/394 (accessed Mar. 31, 2022).

[46]   A. Calò, *The Distribution of Bronze Drums in Early Southeast Asia: Trade routes and cultural spheres*. BAR Publishing, 2009. doi: 10.30861/9781407303963.

[47]   N. Eiji, "HEGER I DRUMS, BRONZE HALBERDS AND RANKED SOCIETIES IN THE MEKONG BASIN," p. 4.

[48]   N. G. Hai, "ANCIENT METALLURGY IN VIETNAM: AN ETHNO-ARCHAEOLOGICAL INVESTIGATION," p. 3.

[49]   "*Zhan Guo Ce*," *Wikipedia*. Nov. 08, 2021. Accessed: Mar. 31, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Zhan_Guo_Ce&oldid=1054121125

[50]   "Records of the Warring States 戰國策."
https://digitalrepository.lib.hku.hk/catalog/jq085n414#?c=&m=&s=&cv=&xywh=-3073%2C229%2C8631%2C3253 (accessed Mar. 31, 2022).

[51]   "Sword of Goujian," *Atlas Obscura*. http://www.atlasobscura.com/places/sword-of-goujian (accessed Mar. 31, 2022).

[52]   X. FU and S. CHEN, "On the Historical Fact of the Qin Dynasty's Military Expedition on the Nanyue Kingdom Narrated by Huainanzi," *Journal of Guangzhou University (Social Science Edition)*, 2017.

[53]   "*Huainanzi*," *Wikipedia*. Dec. 08, 2021. Accessed: Mar. 31, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Huainanzi&oldid=1059273493

[54]   "Baiyue," *Wikipedia*. Mar. 14, 2022. Accessed: Mar. 31, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Baiyue&oldid=1077069963

[55]   "Phong Châu," *Wikipedia*. Dec. 29, 2021. Accessed: Mar. 31, 2022. [Online]. Available:
https://en.wikipedia.org/w/index.php?title=Phong_Ch%C3%A2u&oldid=1062573505

[56]   "Chiến tranh Tần–Việt," *Wikipedia tiếng Việt*. Feb. 23, 2022. Accessed: Mar. 31, 2022. [Online]. Available:
https://vi.wikipedia.org/w/index.php?title=Chi%E1%BA%BFn_tranh_T%E1%BA%A7n%E2%80%93Vi%E1%BB%87t&oldid=68192103

[57]   L. Hilgers, "Vietnam's First City," *Archaeology*, vol. 69, no. 4, pp. 48–53, 2016.

[58]   S. O'HARROW, "From Co-loa to the Trung Sisters' Revolt: VIET-NAM AS THE CHINESE FOUND IT," *Asian Perspectives*, vol. 22, no. 2, pp. 140–164, 1979.

[59]   "Complete Annals of Đại Việt," *Wikipedia*. Jul. 18, 2013. Accessed: Mar. 31, 2022. [Online]. Available:
https://en.wikipedia.org/w/index.php?title=Complete_Annals_of_%C4%90%E1%BA%A1i_Vi%E1%BB%87t&oldid=564719942

[60]   B. Kiernan, *Việt Nam: A History from Earliest Times to the Present*. Oxford University Press, 2017.

[61]   V. Hansen, *The Silk Road*. OUP USA, 2012.

[62]   *Confucianism in Vietnam*. Vietnam National University--Hochiminh City Publishing House, 2002.

[63]   Trần Đ. L., *Luy Lâu lịch sử và văn hóa*. Sở văn hóa - Thông tin Bắc Ninh, 2020. Accessed: Apr. 04, 2022. [Online]. Available:
http://repository.vnu.edu.vn/handle/VNU_123/84089

[64]   N. C. Kim, L. Van Toi, and T. H. Hiep, "Co Loa: an investigation of Vietnam's ancient capital," *Antiquity*, vol. 84, no. 326, pp. 1011–1027, Dec. 2010, doi: 10.1017/S0003598X00067041.

[65]   "BẮC THUỘC VÀ CHỐNG BẮC THUỘC: NHỮNG DẤU TÍCH VĂN HÓA VẬT CHẤT (GS.TS NGUYỄN QUANG NGỌC)," *KHOA LỊCH SỬ - TRƯỜNG ĐH KHOA HỌC XÃ HỘI VÀ NHÂN VĂN*, Oct. 10, 2012. https://khoalichsu.ussh.vnu.edu.vn/bc-thuc-va-chng-bc-thuc-nhng-du-tich-vn-hoa-vt-cht-gsts-nguyn-quang-ngc/ (accessed Apr. 04, 2022).

[66]   *The Cham of Vietnam: History, Society and Art*. NUS Press, 2011. doi: 10.2307/j.ctv1qv2rd.

[67]   "The Cham Towers & Ancient Citadel of Vijaya," *Focus Asia and Vietnam Travel & Leisure*. https://focusasiatravel.com/the-cham-towers-ancient-citadel-of-vijaya/ (accessed Mar. 29, 2022).

[68]   "Fourth Era of Northern Domination," *Wikipedia*. Jul. 01, 2022. Accessed: Jul. 03, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Fourth_Era_of_Northern_Domination&oldid=1095942278

[69]   "What is the influence of Chinese architecture in Korea, Vietnam, and Japan?," *Quora*. https://www.quora.com/What-is-the-influence-of-Chinese-architecture-in-Korea-Vietnam-and-Japan (accessed Jul. 03, 2022).

[70]   Đào D. T., "Hổ Trướng Khu Cơ," 1974, Accessed: Jul. 03, 2022. [Online]. Available: https://elib.thuviennguyenvanhuong.vn/handle/TVNVH/792

[71]   Trần H. Đ., *Binh Thư Yếu Lược*. Công An Nhân Dân, 2007. Accessed: Jul. 03, 2022. [Online]. Available: https://lib.hpu.edu.vn/handle/123456789/1015

[72]   *Champa - ancient kingdom, Indochina*. [Online]. Available: http://www.britannica.com/place/Champa-ancient-kingdom-Indochina

[73]   "History of Champa," *Wikipedia*. Jun. 21, 2022. Accessed: Jul. 03, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=History_of_Champa&oldid=1094271729

[74]   R. Nakamura and C. Sutherland, "Shifting the Nationalist Narrative? Representing Cham and Champa in Vietnam's Museums and Heritage Sites," p. 14.

[75]   J. Boisselier, "The Art of The Kingdom of Champa: Its Original and Diversity," *SPAFA Journal (Old series 1991-2013)*, vol. 1, no. 2, Art. no. 2, 1991.

[76]   "Champa–Đại Việt War (1367–1390)," *Wikipedia*. Jun. 13, 2022. Accessed: Jul. 03, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Champa%E2%80%93%C4%90%E1%BA%A1i_Vi%E1%BB%87t_War_(1367%E2%80%931390)&oldid=1092971507

[77]   G. Maspero, "Le royaume de Champa Chapitre I. Le Pays et ses Habitants (Suite)," *T'oung Pao*, vol. 11, no. 2, pp. 165–220, 1910.

[78]   A. Griffiths, A. Hardy, and G. Wade, *Champa: Territories and Networks of a Southeast Asian Kingdom*, vol. 31. École française d'Extrême-Orient, 2019. Accessed: Jul. 03, 2022. [Online]. Available: https://halshs.archives-ouvertes.fr/halshs-02292575

[79]   "Champa Citadels: An Archaeological and Historical Study in: Asian Review of World Histories Volume 5 Issue 2 (2017)." https://brill.com/view/journals/arwh/5/2/article-p70_70.xml?language=en (accessed Mar. 29, 2022).

[80]   N. Cooper, "Urban planning and architecture in colonial Indochina," *French Cultural Studies*, vol. 11, no. 31, pp. 075–099, Feb. 2000, doi: 10.1177/095715580001103105.

[81]   "Transformation of built cultural heritage in old Saigon (Ho Chi Minh City), Vietnam - IOPscience." https://iopscience.iop.org/article/10.1088/1757-899X/949/1/012052/meta (accessed Jul. 03, 2022).

[82]   D. C. Nobes and L. R. Wallace, "Geophysical Imaging of an Early Nineteenth Century Colonial Defensive Blockhouse: Applications of EM Directionality and Multi-parameter Imaging," in *Archaeogeophysics: State of the Art and Case Studies*, G. El-Qady

and M. Metwaly, Eds. Cham: Springer International Publishing, 2019, pp. 219–232. doi: 10.1007/978-3-319-78861-6_11.

[83]   J. Wagner, "French Blockhouses – Part 1: Indochina 1880-1945," *Mon Legionnaire*, Feb. 03, 2018. https://monlegionnaire.wordpress.com/2018/02/03/french-blockhouses-part-1-indochina-1880-1945/ (accessed Jul. 03, 2022).

[84]   J. Wagner, "French Blockhouses – Part 2: Indochina 1946-1954," *Mon Legionnaire*, Mar. 04, 2018. https://monlegionnaire.wordpress.com/2018/03/04/french-blockhouses-part-2-indochina-1946-1954/ (accessed Jul. 03, 2022).

[85]   "Trench_Warfare_-_Military_History_-_Oxford_Bibliographies-with-cover-page-v2.pdf." Accessed: Jul. 03, 2022. [Online]. Available: https://d1wqtxts1xzle7.cloudfront.net/62351644/Trench_Warfare_-_Military_History_-_Oxford_Bibliographies-with-cover-page-v2.pdf?Expires=1656863159&Signature=J8owKZrdqRdgF21THKFQeolGPfCSoN00j~PDbd 9A7XUyWwRoth9Jvs0SzoVoNNXw3aXZAHBGx7Kx62LGKC4ogrw5xlziArVA8lnmQfmj 7mn7uF2UdNbaXZjgDbHLLUlBWePJu8pI1W~oAaZxsjZ5qv3OXLHlzvUK2vV42JT0wS1J CijAIHT3dvPOKhUws4jv4Q7YxSw4hVYQ-605vKwgh4sDOC35n4mBGoxVZT7oFZnE-IxXasLYjqaE0zEpQAlDAwGQwClph8ofJBcXdT7xX8SrMrFT4p7yTwtrg32iVG0HhTfM6j TfSoocLd7lTzutF65lw~cqR9BQ9g1aP3f-dg__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA

[86]   T. Mangold, *The Tunnels of Cu Chi: A Harrowing Account of America's Tunnel Rats in the Underground Battlefields of Vietnam*. Random House Publishing Group, 2013.

[87]   J. Holmgren, *Chinese colonisation of northern Vietnam: administrative geography and political development in the Tongking Delta, first to sixth centuries A.D*. [Canberra: Australian National University, Faculty of Asian Studies] : distributed by Australian University Press, 1980.

[88]   "Structure of Thang Long Capital City and Location of Forbidden City over Historical Periods | Vietnam Social Sciences." https://vjol.info.vn/index.php/VSS/article/view/28529 (accessed Jul. 03, 2022).

[89]   "Vietnamese dragon," *Wikipedia*. Jun. 17, 2022. Accessed: Jul. 03, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=Vietnamese_dragon&oldid=1093518697

[90]   "On the Introduction of Vauban Fortification in the Nguyen Dynasty's Cities of Vietnam -Journal of the Architectural Institute of Korea Planning & Design | Korea Science." https://www.koreascience.or.kr/article/JAKO201307751441809.page (accessed Jul. 03, 2022).

[91]   "Thành Vauban ở Việt Nam." https://www.nxbxaydung.com.vn/thanh-vauban-o-viet-nam-b5413.html (accessed Jul. 03, 2022).

[92]   E. C. O'Dowd, "Ho Chi Minh and the origins of the Vietnamese doctrine of guerrilla tactics," *Small Wars & Insurgencies*, vol. 24, no. 3, pp. 561–587, Jul. 2013, doi: 10.1080/09592318.2013.802606.

[93]   U. W. H. Centre, "The Criteria for Selection," *UNESCO World Heritage Centre*. https://whc.unesco.org/en/criteria/ (accessed Jul. 03, 2022).

[94]   Tran Thi Tuyet Mai, "Preservation of Cultural Heritage in Tourism Development - an Experience from Hung Kings' Temple Festival, Phu Tho," 2017, pp. 128–134. Accessed: Jun. 24, 2022. [Online]. Available: https://elibrary.ru/item.asp?id=29154411

[95]   D. Q. Dinh, N. H. Phuong, and T. N. Anh, "Changes In The Spiritual Life Of Vietnamese People Through Traditional Festivals," *Clinical Medicine*, vol. 07, no. 07, p. 8, 2020.

[96]   "Lê Hội Lam Kinh." https://thoxuan.thanhhoa.gov.vn/web/trang-chu/tong-quan/du-lich-tho-xuan-1/le-hoi/le-hoi-lam-kinh.html (accessed Jun. 24, 2022).

[97]   T. Ky-Phuong and R. Nakamura, "The Mỹ Sơn and Pô Nagar Nha Trang Sanctuaries: On the Cosmological Dualist Cult of the Champa Kingdom in Central Vietnam as Seen from Art and Anthropology," no. 100, p. 22.

[98]   "Festival's Efficiency in Preserving the Cultural Heritages-Hue Festival Case - 학지사·교보문고 스콜라." https://scholar.kyobobook.co.kr/article/detail/4010023371113 (accessed Jun. 24, 2022).

[99]   "Angkor Wat - Alison Behnke - Google Books." https://books.google.it/books?hl=en&lr=&id=XElPGqQmC9QC&oi=fnd&pg=PA5&dq=Henri+Mouhot+angkor&ots=91vVvqLmYQ&sig=4-YgZXlQi6CXW3msrBgrvkJrtUM&redir_esc=y#v=onepage&q=Henri%20Mouhot%20angkor&f=false (accessed Jul. 03, 2022).

[100]   S. H. Allen, *Finding the Walls of Troy: Frank Calvert and Heinrich Schliemann at Hisarlik*. University of California Press, 1999.

[101]   J. K. Whitmore, "TRANSFORMATIONS OF THĂNG LONG: SPACE AND TIME, POWER AND BELIEF," *International Journal of Asian Studies*, vol. 10, no. 1, pp. 1–24, Jan. 2013, doi: 10.1017/S1479591412000216.

[102]   <p>Wuzheng Zhao and B. X. Tung </p>, "Archaeological Work in the Central Area of Imperial Citadel of Thang Long-Hanoi, Vietnam," *Academic Journal of Humanities & Social Sciences*, vol. 4, no. 9, Nov. 2021, doi: 10.25236/AJHSS.2021.040918.

[103]   "Central Sector of the Imperial Citadel of Thang Long - Hanoi - UNESCO World Heritage Centre." https://whc.unesco.org/en/list/1328/ (accessed Jul. 03, 2022).

[104]   G. Schlegel, "On the Invention and Use of Fire-Arms and Gunpowder in China, Prior to the Arrival of Europeans," *T'oung Pao*, vol. 3, no. 1, pp. 1–11, 1902.

[105]   "Vauban and the French Military Under Louis XIV: An Illustrated History of ... - Jean-Denis G.G. Lepage - Google Books." https://books.google.it/books?hl=en&lr=&id=Fzp3MWRNPFAC&oi=fnd&pg=PP1&dq=Vauban+fortifications&ots=8t5hFN33SD&sig=ZXYEb2EjpMMEw846na5YDGXpoqw&redir_esc=y#v=onepage&q=Vauban%20fortifications&f=false (accessed Jul. 03, 2022).

[106]   Y. Tomatsuri, "The Meeting of Western and Oriental Cultures: Military Architecture in the 19th Century, Southwestern Hokkaido, Japan," p. 20.

[107]   "Champa and the Archaeology of Mỹ Sơn (Vietnam) - Google Books." https://books.google.it/books?hl=en&lr=&id=fj8l8v_yP5oC&oi=fnd&pg=PR11&dq=Champa+Unesco&ots=7rdkSobn0W&sig=DjXIjdixZwPVaAa_Lgq6UpIYv8I&redir_esc=y#v=onepage&q=Champa%20Unesco&f=false (accessed Jul. 03, 2022).

[108]   V. Q. Nguyễn, "Các di tích đền - tháp, thành - lũy Champa ở Quảng Bình, Quảng Trị, Thừa Thiên Huế : Luận án TS. Nhân văn khác: 622203," Thesis, 2018. Accessed: Jun. 25, 2022. [Online]. Available: http://repository.vnu.edu.vn/handle/VNU_123/65547

[109]   *Hue (Vietnam)*. Routledge, 2012, pp. 382–385. doi: 10.4324/9780203059173-89.

[110]   A. O. Zakharov, "The Inscriptions of Campa at the Museum of Cham Sculpture in Danang/Van Khac Champa Tai Bao Tang Dieu Khac Cham--Da Nang," *Journal of Southeast Asian Studies*, vol. 45, no. 2, pp. 309–313, Jun. 2014.

[111]   N. Minh Hung, General Director, Institute of Cultural Heritage and Development Studies, Van Lang University, Ho Chi Minh City, Vietnam, W. B. Noseworthy, Department of History, McNeese State University, 4205 Ryan St, Lake Charles, LA 70605, USA, Q. Van Son, and Institute of Cultural Heritage and Development Studies, Văn Lang University, Ho Chi Minh City, Vietnam, "Discovery & Perceptions of Champa: the Đồng Dương Complex of Quảng Nam Province, Vietnam," *JHSSR*, vol. 3, no. 1, pp. 141–154, Jun. 2021, doi: 10.37534/bp.jhssr.2021.v3.n1.id1101.p141.

[112]   N. A. Thu, "Research on Champa pottery in ten centuries AD using the socio-archaeological and techno-archaeological approaches," p. 11.

[113] "List of World Heritage Sites in Vietnam," *Wikipedia*. Mar. 02, 2022. Accessed: Jul. 03, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=List_of_World_Heritage_Sites_in_Vietnam&oldid=1074891986

[114] "Studying Urban Expansion and Landscape Surrounding Monuments for Conservation the World Cultural Heritage in Hue City—View from GIS and Remote Sensing | SpringerLink." https://link.springer.com/chapter/10.1007/978-981-15-5608-1_25 (accessed Jul. 03, 2022).

[115] "Figure 6. Land use plan and functional areas plan 2030 according to Hue...," *ResearchGate*. https://www.researchgate.net/figure/Land-use-plan-and-functional-areas-plan-2030-according-to-Hue-Citys-masterplan-KOICA_fig4_344771256 (accessed Jul. 03, 2022).

[116] H. Kaur, S. Gupta, S. Parkash, and R. Thapa, "Past is the key to the future: Landslide Inventory," 2019, pp. 17–21.

[117] "Hygiene in the Middle Ages - PMC." https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7945524/ (accessed Jul. 03, 2022).

[118] C.-H. T. Nguyen and V. Nitivattananon, "APPLICATION OF PROCESS BENCHMARKING FOR URBAN WATER SUPPLY SYSTEM: CASE OF HUE CITY, VIETNAM," in *Proceedings: International Conference on Sustainable Urban Environmental Practices*, p. 3.

[119] "De Lattre Line," *Wikipedia*. Sep. 16, 2021. Accessed: Jul. 03, 2022. [Online]. Available: https://en.wikipedia.org/w/index.php?title=De_Lattre_Line&oldid=1044634995

[120] "A Historical Analysis of Tunnel Warfare and the Contemporary Perspective." https://apps.dtic.mil/sti/citations/ADA339626 (accessed Jul. 03, 2022).

[121] K. Mizokami, "Medieval Star Forts Are Surprisingly Alive and Well in North Africa," *Popular Mechanics*, Dec. 31, 2020. https://www.popularmechanics.com/military/weapons/a35084150/vauban-fortification-star-forts-french-army-north-africa/ (accessed Jul. 03, 2022).

[122] F. Pacheco-Torgal and S. Jalali, "Earth construction: Lessons from the past for future eco-efficient construction," *Construction and Building Materials*, vol. 29, pp. 512–519, Apr. 2012, doi: 10.1016/j.conbuildmat.2011.10.054.

[123] N. T. Lang, "Cultural and Social Elements in the Development of Green Architecture in Vietnam," *Procedia - Social and Behavioral Sciences*, vol. 85, pp. 16–26, Sep. 2013, doi: 10.1016/j.sbspro.2013.08.333.

[124] "Decoration On Bricks And Tiles (15th- 18th Century) In Ancient Royal Architecture In Northern Vietnam | SPAFA Journal." https://www.spafajournal.org/index.php/spafajournal/article/view/177 (accessed Jul. 03, 2022).

[125] "Nhận diện các loại hình kiến trúc gỗ Việt Nam qua bố cục không gian, tổ chức mặt bằng, cấu trúc mái và kết cấu khung gỗ - Tạp chí Kiến Trúc." https://www.tapchikientruc.com.vn/chuyen-muc/nhan-dien-cac-loai-hinh-kien-truc-go-viet-nam-qua-bo-cuc-khong-gian-to-chuc-mat-bang-cau-truc-mai-va-ket-cau-khung-go.html (accessed Jul. 03, 2022).

[126] "The Athens Charter for the Restoration of Historic Monuments - 1931 - International Council on Monuments and Sites." https://www.icomos.org/en/167-the-athens-charter-for-the-restoration-of-historic-monuments (accessed Jul. 03, 2022).

[127] "venice_e.pdf." Accessed: Jul. 03, 2022. [Online]. Available: https://www.icomos.org/charters/venice_e.pdf

[128] "The Washington Charter: Charter on the Conservation of Historic Towns and Urban Areas (1987) – Dr. Zhiwen Hu." http://orcp.hustoj.com/washington-charter-1987/ (accessed Jul. 03, 2022).

[129] "Burra Charter & Practice Notes | Australia ICOMOS."
https://australia.icomos.org/publications/burra-charter-practice-notes/ (accessed Jul. 03,
2022).
[130] "nara-e.pdf." Accessed: Jul. 03, 2022. [Online]. Available:
https://www.icomos.org/charters/nara-e.pdf
[131] U. W. H. Centre, "Complex of Hué Monuments," *UNESCO World Heritage
Centre*. https://whc.unesco.org/en/list/678/ (accessed Jul. 03, 2022).
[132] U. W. H. Centre, "Citadel of the Ho Dynasty," *UNESCO World Heritage Centre*.
https://whc.unesco.org/en/list/1358/ (accessed Jul. 03, 2022).
[133] "Great Wall Threat and Protection."
https://www.chinahighlights.com/greatwall/fact/protection.htm (accessed Jul. 03, 2022).
[134] "Japan loosens rules to rebuild precious historic sites lost to time | The Asahi
Shimbun: Breaking News, Japan News and Analysis," *The Asahi Shimbun*.
https://www.asahi.com/ajw/articles/13315990 (accessed Jul. 03, 2022).
[135] M. Ghafory-Ashtiany and M. Hosseini, "Post-Bam earthquake: recovery and
reconstruction," *Nat Hazards*, vol. 44, no. 2, pp. 229–241, Feb. 2008, doi: 10.1007/s11069-
007-9108-3.

E.BILIOGRAPHY

Aldrete, Gregory S. 2004. *Daily Life in the Roman City: Rome, Pompeii, and Ostia*. The
Greenwood Press "Daily Life through History" Series. Westport, Conn: Greenwood Press.

Allen, Susan Heuck. 1999. *Finding the Walls of Troy: Frank Calvert and Heinrich
Schliemann at Hisarlik*. University of California Press.

Boisselier, Jean. 1991. "The Art of The Kingdom of Champa: Its Original and Diversity."
SPAFA Journal (Old Series 1991-2013) 1 (2): 2–10.

"Burra Charter & Practice Notes | Australia ICOMOS." n.d. Accessed July 4, 2022.
https://australia.icomos.org/publications/burra-charter-practice-notes/.

"BVOM.COM - Vietnamese History." 2010. January 6, 2010.
https://web.archive.org/web/20100106204725/http://www.bvom.com/resource/vn_history.asp
?pContent=Pre-History.

Calò, Ambra. 2009. *The Distribution of Bronze Drums in Early Southeast Asia: Trade Routes
and Cultural Spheres*. BAR Publishing. https://doi.org/10.30861/9781407303963.

Chapuis, Oscar. 1995. *A History of Vietnam: From Hong Bang to Tu Duc*. Contributions in
Asian Studies, no. 5. Westport, Conn: Greenwood Press.

Cooper, Nicola. 2000. "Urban Planning and Architecture in Colonial Indochina." *French
Cultural Studies* 11 (31): 075–099. https://doi.org/10.1177/095715580001103105.

Cunliffe, Barry. 2004. *Iron Age Communities in Britain: An Account of England, Scotland
and Wales from the Seventh Century BC until the Roman Conquest*. Taylor & Francis.

Dao Duy Anh. 2016. *Vietnam's historical geography*.

Đào Duy Từ. 1974. "Hổ Trướng Khu Cơ."
https://elib.thuviennguyenvanhuong.vn/handle/TVNVH/792.

Joint Chiefs of Staff. 1984. *Dictionary of Military and Associated Terms*.

Dinh, Dang Quang, Nguyen Hoang Phuong, and Than Ngoc Anh. 2020. "Changes In The Spiritual Life Of Vietnamese People Through Traditional Festivals." *Clinical Medicine* 07 (07): 8.

Dyson, Stephen L. 2010. *Rome: A Living Portrait of an Ancient City*. Ancient Society and History. Baltimore: Johns Hopkins University Press.

Eiji, Nitta. n.d. "HEGER I DRUMS, BRONZE HALBERDS AND RANKED SOCIETIES IN THE MEKONG BASIN," 4.

FU, Xiangxi, and Shuting CHEN. 2017. "On the Historical Fact of the Qin Dynasty's Military Expedition on the Nanyue Kingdom Narrated by Huainanzi." *Journal of Guangzhou University (Social Science Edition)*.

Garcia, Víctor Lluís. 2016. "South-East Asian Fortified Stone Walls: Angkor Thom (Cambodia), Ho Citadel (Vietnam) and Ratu Boko (Indonesia)." *Humaniora. Journal of Culture, Literature and Linguistics* n. 28 (October): 238–53.
https://doi.org/10.22146/jh.v28i3.22275.

Ghafory-Ashtiany, Mohsen, and Mahmood Hosseini. 2008. "Post-Bam Earthquake: Recovery and Reconstruction." *Natural Hazards* 44 (2): 229–41. https://doi.org/10.1007/s11069-007-9108-3.

Gravett, Christopher. 2008. *Castle*. DK Eyewitness Books. New York: DK Pub.

Griffiths, Arlo, Andrew Hardy, and Geoff Wade. 2019. *Champa: Territories and Networks of a Southeast Asian Kingdom*. Vol. 31. École française d'Extrême-Orient.
https://halshs.archives-ouvertes.fr/halshs-02292575.

Hai, Nguyen Giang. n.d. "ANCIENT METALLURGY IN VIETNAM: AN ETHNO-ARCHAEOLOGICAL INVESTIGATION," 3.

Hansen, Valerie. 2012. *The Silk Road*. OUP USA.

Hardy, Andrew David, Mauro Cucarzi, and Patrizia Zolese. 2009. *Champa and the Archaeology of Mỹ Sơn (Vietnam)*. NUS Press.

Hernandez, Marco. n.d. "The Origins of Beijing's Forbidden City." South China Morning Post. Accessed March 24, 2022. https://multimedia.scmp.com/culture/article/forbidden-city/architecture/chapter_01.html.

Higham, Charles Franklin. 2017. "FIRST FARMERS IN MAINLAND SOUTHEAST ASIA." *Journal of Indo-Pacific Archaeology* 41 (0): 13–21. https://doi.org/10.7152/jipa.v41i0.15014.

Hilgers, Lauren. 2016. "Vietnam's First City." *Archaeology* 69 (4): 48–53.

Di ban. 1974. *Historical records of the five dynasties*. Bei jing: Zhong hua shu ju.

Holmgren, Jennifer. 1980. *Chinese Colonisation of Northern Vietnam: Administrative Geography and Political Development in the Tongking Delta, First to Sixth Centuries A.D.* Oriental Monograph Series, no. 27. [Canberra: Australian National University, Faculty of Asian Studies] : distributed by Australian University Press.

Hom, Stephanie Malia. 2010. "Consuming the View: Tourism, Rome, and the Topos of the Eternal City." *Annali d'Italianistica* 28: 91–116.

Kaur, Harjeet, Srimanta Gupta, Surya Parkash, and Raju Thapa. 2019. "Past Is the Key to the Future: Landslide Inventory." In , 17–21.

Kelly, Tamara. 2017. "THE IMPACT OF INTANGIBLE FACTORS IN SHAPING THE IDENTITY OF ANCIENT CITIES AND ARCHITECTURE OF CHINA," 10.

Kiernan, Ben. 2017. *Việt Nam: A History from Earliest Times to the Present*. Oxford University Press.

Kim, Nam C., Lai Van Toi, and Trinh Hoang Hiep. 2010. "Co Loa: An Investigation of Vietnam's Ancient Capital." *Antiquity* 84 (326): 1011–27. https://doi.org/10.1017/S0003598X00067041.

"KING HUNG IN THE MIND AND BEHAVIOR OF VIETNAMESE PEOPLE | UED Journal of Social Sciences, Humanities and Education." n.d. Accessed April 1, 2022. https://jshe.ued.udn.vn/index.php/jshe/article/view/394.

Kuilman, Marten. 2011. *Quadralectic Architecture: A Survey of Tetradic Testimonials in Architecture*. Heemstede: Falcon Press.

Ky-Phuong, Tran, and Rie Nakamura. n.d. "The Mỹ Sơn and Pô Nagar Nha Trang Sanctuaries: On the Cosmological Dualist Cult of the Champa Kingdom in Central Vietnam as Seen from Art and Anthropology," no. 100: 22.

Lang, Nguyen To. 2013. "Cultural and Social Elements in the Development of Green Architecture in Vietnam." *Procedia - Social and Behavioral Sciences*, AcE-Bs 2013 Hanoi (ASEAN Conference on Environment-Behaviour Studies), Hanoi Architectural University, Hanoi, Vietnam, 18-21 March 2013., 85 (September): 16–26. https://doi.org/10.1016/j.sbspro.2013.08.333.

Lawrence, Rachel. 2010. *Paris: [City Guide]*. Singapore: Apa Publications.

Lee, Lily Xiao Hong; Stefanowska, and Sue A. D.; Wiles. 2015. *Biographical Dictionary of Chinese Women: Antiquity through Sui, 1600 b.c.e. - 618 c.e.* New York: Taylor & Francis.

Mangold, Tom. 2013. *The Tunnels of Cu Chi: A Harrowing Account of America's Tunnel Rats in the Underground Battlefields of Vietnam*. Random House Publishing Group.

Mantienne, Frédéric. 2003. "The Transfer of Western Military Technology to Vietnam in the Late Eighteenth and Early Nineteenth Centuries: The Case of the Nguyên." *Journal of Southeast Asian Studies* 34 (03). https://doi.org/10.1017/S0022463403000468.

Maspero, Georges. 1910. "Le Royaume de Champa Chapitre I. Le Pays et Ses Habitants (Suite)." *T'oung Pao* 11 (2): 165–220.

Mezzetti, Carlo, and Fausto Pugnaloni. 1984. *Dell'architettura militare: l'epoca dei Sangallo e la Cittadella di Ancona*. Errebi.

Minh Hung, Ngo, General Director, Institute of Cultural Heritage and Development Studies, Van Lang University, Ho Chi Minh City, Vietnam, William B. Noseworthy, Department of History, McNeese State University, 4205 Ryan St, Lake Charles, LA 70605, USA, Quang Van Son, and Institute of Cultural Heritage and Development Studies, Văn Lang University, Ho Chi Minh City, Vietnam. 2021. "Discovery & Perceptions of Champa: The Đồng Dương Complex of Quảng Nam Province, Vietnam." *Journal of Humanities and Social Sciences Research* 3 (1): 141–54. https://doi.org/10.37534/bp.jhssr.2021.v3.n1.id1101.p141.

Mizokami, Kyle. 2020. "Medieval Star Forts Are Surprisingly Alive and Well in North Africa." Popular Mechanics. December 31, 2020. https://www.popularmechanics.com/military/weapons/a35084150/vauban-fortification-star-forts-french-army-north-africa/.

Nakamura, Rie, and Claire Sutherland. n.d. "Shifting the Nationalist Narrative? Representing Cham and Champa in Vietnam's Museums and Heritage Sites," 14.

Ngo, Si Lien. n.d. *Dai Viet Su Ky Toan Thu*. Vietnamese Books.

Nguyen, Chau-Huyen T., and Vilas Nitivattananon. n.d. "APPLICATION OF PROCESS BENCHMARKING FOR URBAN WATER SUPPLY SYSTEM: CASE OF HUE CITY, VIETNAM." In *Proceedings: International Conference on Sustainable Urban Environmental Practices*, 3.

Nguyễn, Văn Quảng. 2018. "Các di tích đền - tháp, thành - lũy Champa ở Quảng Bình, Quảng Trị, Thừa Thiên Huế : Luận án TS. Nhân văn khác: 622203." Thesis. http://repository.vnu.edu.vn/handle/VNU_123/65547.

Nobes, David C., and Lynda R. Wallace. 2019. "Geophysical Imaging of an Early Nineteenth Century Colonial Defensive Blockhouse: Applications of EM Directionality and Multi-Parameter Imaging." In *Archaeogeophysics: State of the Art and Case Studies*, edited by Gad El-Qady and Mohamed Metwaly, 219–32. Natural Science in Archaeology. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-78861-6_11.

Noriko, Nishino. 2017. "An Introduction to Dr. Nishimura Masanari's Research on the Lung Khe Citadel." *Asian Review of World Histories* 5 (2): 11–27. https://doi.org/10.1163/22879811-12340003.

O'Dowd, Edward C. 2013. "Ho Chi Minh and the Origins of the Vietnamese Doctrine of Guerrilla Tactics." *Small Wars & Insurgencies* 24 (3): 561–87. https://doi.org/10.1080/09592318.2013.802606.

O'HARROW, STEPHEN. 1979. "From Co-Loa to the Trung Sisters' Revolt: VIET-NAM AS THE CHINESE FOUND IT." *Asian Perspectives* 22 (2): 140–64.

Pacheco-Torgal, F., and Said Jalali. 2012. "Earth Construction: Lessons from the Past for Future Eco-Efficient Construction." *Construction and Building Materials* 29 (April): 512–19. https://doi.org/10.1016/j.conbuildmat.2011.10.054.

Perkins, Mandaley. 2006. *Hanoi, Adieu: A Bittersweet Memoir of French Indochina*. Pymble, N.S.W: HarperCollins.

Po Dharma. 1986. "Le Panduranga (Campa) : Ses Rapports Socio-Politiques Avec Le Vietnam, 1802-1835." These de doctorat, Paris 3. http://www.theses.fr/1986PA030108.

Reece, Allen D. 1997. "A Historical Analysis of Tunnel Warfare and the Contemporary Perspective:" Fort Belvoir, VA: Defense Technical Information Center. https://doi.org/10.21236/ADA339626.

Schlegel, G. 1902. "On the Invention and Use of Fire-Arms and Gunpowder in China, Prior to the Arrival of Europeans." *T'oung Pao* 3 (1): 1–11.

Sharp, Walter R. 1954. "Some Observations on Public Administration in Indochina." *Public Administration Review* 14 (1): 40–51. https://doi.org/10.2307/972967.

Thomas, Carol G., and Craig Conant. 2009. *Citadel to City-State: The Transformation of Greece, 1200-700 B.C.E.* Indiana University Press.

Thu, Nguyen Anh. n.d. "Research on Champa Pottery in Ten Centuries AD Using the Socio-Archaeological and Techno-Archaeological Approaches," 11.

Tomatsuri, Yumio. n.d. "The Meeting of Western and Oriental Cultures: Military Architecture in the 19th Century, Southwestern Hokkaido, Japan," 20.

Tötösy de Zepetnek, Steven, Jennifer W. Jay, and University of Alberta, eds. 1997. *East Asian Cultural and Historical Perspectives: Histories and Society--Culture and Literatures*. Edmonton: Research Institute for Comparative Literature and Cross-Cultural Studies, University of Alberta.

Trần Đình Luyện. 2020. *Luy Lâu lịch sử và văn hóa*. Sở văn hóa - Thông tin Bắc Ninh. http://repository.vnu.edu.vn/handle/VNU_123/84089.

Trần Hưng Đạo. 2007. *Binh Thư Yếu Lược*. Công An Nhân Dân. https://lib.hpu.edu.vn/handle/123456789/1015.

Trần Thị Thư. 2012. "Các di tích Chămpa với việc phát triển du lịch ở Bình Định." Thesis, Trường Đại học Sư phạm, Đại học Đà Nẵng. http://thuvien.ued.udn.vn/handle/TVDHSPDN_123456789/676.

Tran Thi Tuyet Mai. 2017. "Preservation of Cultural Heritage in Tourism Development - an Experience from Hung Kings' Temple Festival, Phu Tho." In , 128–34. Белгородский государственный институт искусств и культуры. https://elibrary.ru/item.asp?id=29154411.

Victor, Sextus Aurelius, and H. W. Bird. 1994. *Liber de Caesaribus of Sextus Aurelius Victor*. Translated Texts for Historians, v. 17. Liverpool: Liverpool University Press.

Wagner, Jack. 2018a. "French Blockhouses – Part 1: Indochina 1880-1945." *Mon Legionnaire* (blog). February 3, 2018. https://monlegionnaire.wordpress.com/2018/02/03/french-blockhouses-part-1-indochina-1880-1945/.

Wheatley, Paul. 1971. *The Pivot of the Four Quarters: A Preliminary Enquiry Into the Origins and Character of the Ancient Chinese City*. Aldine Publishing Company.

Whitmore, John K. 2013. "TRANSFORMATIONS OF THĂNG LONG: SPACE AND TIME, POWER AND BELIEF." *International Journal of Asian Studies* 10 (1): 1–24. https://doi.org/10.1017/S1479591412000216.

Woodward, Rachel. 2014. "Military Landscapes: Agendas and Approaches for Future Research." *Progress in Human Geography* 38 (1): 40–61. https://doi.org/10.1177/0309132513493219.

XuanTruongJSCDotCom. n.d. "Dấu Xua Thành Cổ Hóa Châu - Tạp Chí Sông Hương." Accessed April 7, 2022. http://tapchisonghuong.com.vn/tin-tuc/p2/c14/n11350/Dau-xua-thanh-co-Hoa-Chau.html.

Zakharov, Anton O. 2014. "The Inscriptions of Campa at the Museum of Cham Sculpture in Danang/Van Khac Champa Tai Bao Tang Dieu Khac Cham--Da Nang." *Journal of Southeast Asian Studies* 45 (2): 309–13.

"*Zhan Guo Ce*." 2021. In *Wikipedia*. https://en.wikipedia.org/w/index.php?title=Zhan_Guo_Ce&oldid=1054121125.

Zhao, <p>Wuzheng, and Bui Xuan Tung </p>. 2021. "Archaeological Work in the Central Area of Imperial Citadel of Thang Long-Hanoi, Vietnam." *Academic Journal of Humanities & Social Sciences* 4 (9). https://doi.org/10.25236/AJHSS.2021.040918.

"东亚西南中南半岛水稻圈 新石器青铜中南半岛东亚西南岭南一体 滇青铜南方铜鼓斯基泰 壮侗语黎族最古老." n.d. 知乎专栏. Accessed April 3, 2022. https://zhuanlan.zhihu.com/p/30550687.

"戰國策 - 维基文库，自由的图书馆." n.d. Accessed April 1, 2022. https://zh.wikisource.org/wiki/%E6%88%B0%E5%9C%8B%E7%AD%96.

"書目明細." n.d. Accessed July 3, 2022.
http://buddhism.lib.ntu.edu.tw/BDLM/toModule.do?prefix=/search&page=/search_detail.jsp?seq=145504.

N.d. Accessed March 17, 2022. https://whc.unesco.org/en/list/1457/.

REFERENCES

[1]   (Feb. 23, 2022, Mar. 19, 2022). *Fortification*.

[2]   J. C. o. Staff, Dictionary of Military and Associated Term: Print, 1984. [Online]. Available.

[3]   C. Gravett, *Castle* (DK Eyewitness Books). New York: DK Pub, 2008.

[4]   R. Woodward, "Military Landscapes: Agendas and Approaches for Future Research," *Progress in Human Geography* vol. 38, no. 1, pp. 40-61, 2014.

[5]   "Ancient Chinese Warfare - World History Encyclopedia."

[6]   (Mar. 19, 2022). *Fortifications in Ancient Chinese Warfare*. Available: https://www.worldhistory.org/article/1147/fortifications-in-ancient-chinese-warfare/

[7]   M. Kuilman, *Quadralectic Architecture: A Survey of Tetradic Testimonials in Architecture. Heemstede*. Falcon Press, 2011.

[8]   V. L. Garcia, "South-East Asian Fortified Stone Walls: Angkor Thom (Cambodia), Ho Citadel (Vietnam) and Ratu Boko (Indonesia)," *Humaniora. Journal of Culture , Literature and Linguistics* vol. n.28, no. October, pp. 238–253, 2016.

[9]   P. Wheatley, *The Pivot of the Four Quarters: A Preliminary Enquiry Into the Origins and Character of the Ancient Chinese City*. Aldine Publishing Company, 1971.

[10]   S. M. Hom, "Consuming the View: Tourism, Rome, and the Topos of the Eternal City," *Annali d'Italianistica* no. 28, pp. 91-116, 2010.

[11]   (Sep. 23, 2015). *APROXIMACIÓN A LA ICONOGRAFÍA DE ROMA AETERNA COMO VÍA DE TRANSMISIÓN DE UN MITO*. Available: https://web.archive.org/web/20150923235403/http://www.elfuturodelpasado.com/elfuturodelpasado/Ultimo_numero_files/023.pdf

[12]   N. Fields and a. P. Dennis, *The walls of Rome*, 1 ed. Oxford: Osprey, 2018.

[13]   S. A. Victor and a. H. W. Bird, *Liber de Caesaribus of Sextus Aurelius Victor* (Translated Texts for Historians,). Liverpool: Liverpool University Press, 1994.

[14]   S. L. Dyson, *Rome: A Living Portrait of an Ancient City. Ancient Society and History*. Baltimore: Johns Hopkins University Press, 2010.

[15]   G. S. Aldrete, *Daily Life in the Roman City: Rome, Pompeii, and Ostia* (Daily Life through History). Westport, Conn: Greenwood Press, 2004.

[16]   (Mar. 16, 2022). *Les premiers habitants de l'Europe d'après les écrivains de l'antiquité et ... - Henry Arbois de Jubainville, Georges Dottin - Google Books*. Available: https://web.archive.org/web/20160101095821/https://books.google.com/books?id=QSIDAAAAMAAJ&pg=RA1-PA132#v=onepage&q&f=false

[17]   B. Cunliffe, Iron Age Communities in Britain: An Account of England, Scotland and Wales from the Seventh Century BC until the Roman Conquest, London: Routledge, 2005. [Online]. Available: https://www.taylorfrancis.com/books/mono/10.4324/9780203326053/iron-age-communities-britain-barry-cunliffe.

[18]   R. Lawrence, *Paris: [City Guide]*. Singapore: Apa Publications, 2010.

[19]   (Jul. 16, 2021, Mar. 16, 2022). *City walls of Paris*. Available:
https://en.wikipedia.org/w/index.php?title=City_walls_of_Paris&oldid=1033835
855

[20]   (Mar. 16, 2022, Mar. 16, 2022). *Amsterdam*. Available:
https://en.wikipedia.org/w/index.php?title=Amsterdam&oldid=1077499193

[21]   Wikipedia. (Aug. 16, 2021). *Walls of Amsterdam*. Available:
https://en.wikipedia.org/w/index.php?title=Walls_of_Amsterdam&oldid=10390
44564

[22]   I. S. F. I. S. Forti. (Mar. 16, 2022). *Storia militare di Ancona*. Available:
https://www.isedicifortidiancona.com/introduzione-storica

[23]   Wikipedia. (Jan. 27, 2022, Mar. 16, 2022). *Ancona*. Available:
https://en.wikipedia.org/w/index.php?title=Ancona&oldid=1068171406

[24]   (Mar. 16, 2022)). *philologus.gr - ΤΟ ΠΕΡΓΑΜΟΝ*. Available:
https://philologus.gr/4/68-2010-01-01-01-22-30/116-2009-10-28-22-42-18

[25]   Wikipedia. (Feb. 26, 2022, Mar. 16, 2022). *Pergamon*. Available:
https://en.wikipedia.org/w/index.php?title=Pergamon&oldid=1074141123

VITA

NAME   NGUYEN MINH HIEU

DATE OF BIRTH   12 July 1989

PLACE OF BIRTH   Nha Trang -Vietnam

INSTITUTIONS   Hochiminh University of Architecture
ATTENDED
HOME ADDRESS   155A Bui Vien - District 1 - Hochiminh city - Vietnam

PUBLICATION   Application of Virtual Reality to enhance the interpretation of Museums in Hochiminh City
AWARD RECEIVED NHG Best Teacher Award 2019