

Chapter 5

The *Tu Giac* Prototype Applications and Conclusions

5.1 An Example of Applying *Tu Giac* Conservation Prototype on Similar Buildings in Similar Climate: A Case Study of Wat-Ket houses, Chiang Mai, Thailand

5.1.1 The historical background of the Wat-Ket area

Chiang Mai is the most important city in Northern Thailand. It is the seat of Lanna culture which was founded in the end of 13th century under the reign of King Mengrai, the ruler of the Lanna kingdom. From the initial time until the Burmese conquest in the 16th century, Chiang Mai flourished as the capital of Lanna kingdom and be known as the political, commercial, and cultural center of Northern Thailand. After the liberation in the 18th century, Chiang Mai has become the major city of the North and proceeded to prosperity of today. Chiang Mai is famous for many temples constructed in the Lanna style with multiple-tiered roofs, gracefully curved eaves, and a portico. Besides, the architectural addition of the old towns like Wat-Ket has enhanced the diversity of various architectural styles in Chiang Mai.

Historically, the first trading place in Chiang Mai was initiated at Wat-Ket area beside the Ping River in the late 18th century. At that time, many Chinese people immigrated into Chiang Mai, settled, and traded at Wat-Ket due to the convenient river-transportation on the Ping River. Goods and commodities transported from outside Chiang Mai by boats or ships were stopped at Wat-Ket and stored in the shop-houses here before being distributed to inner markets of Chiang Mai. There are 3 major architectural styles in this area: Chinese style, Colonial style, and Northern Thailand style with the contribution of nearly 30 historical houses.

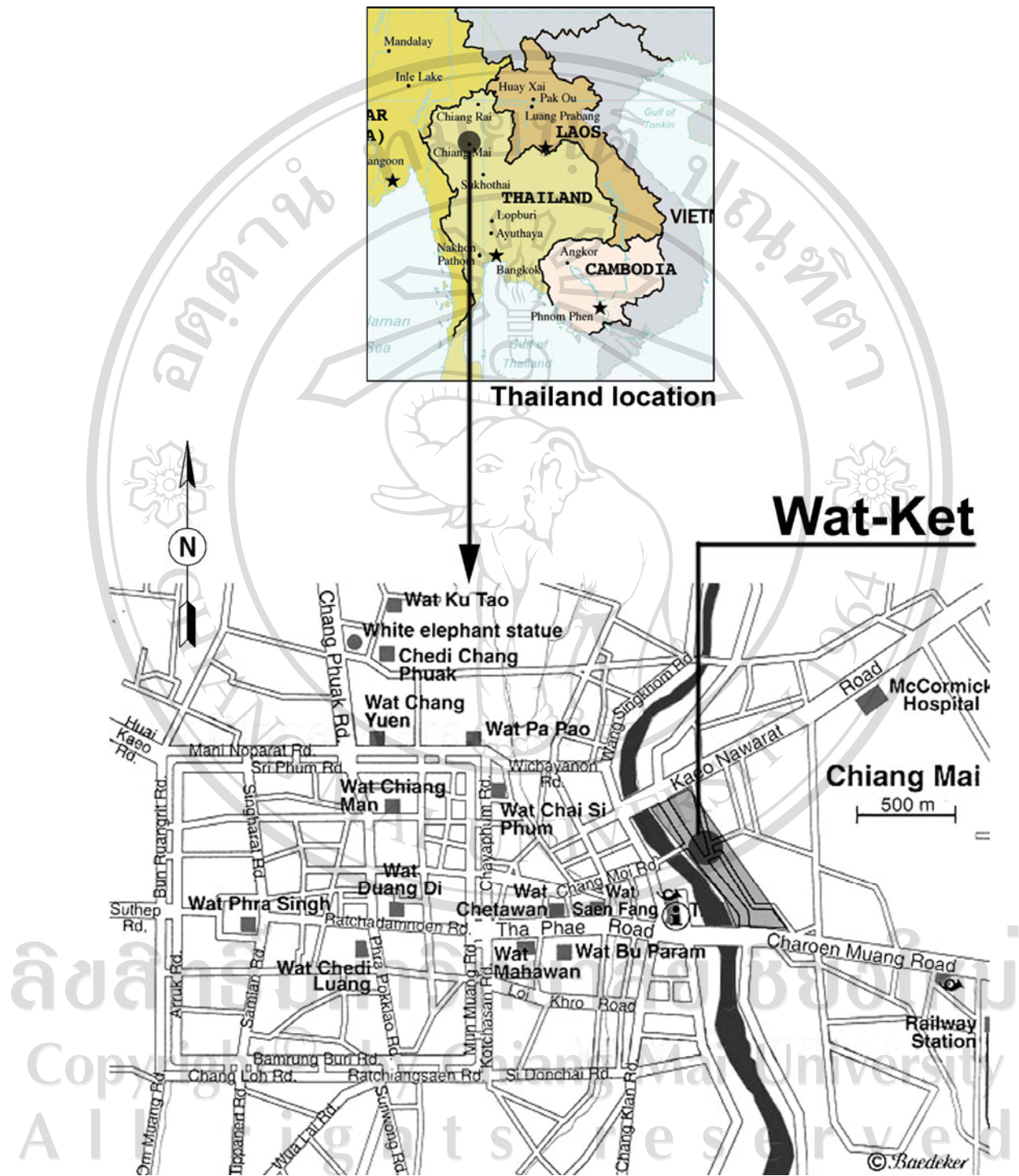


Fig.5.1 The location of Wat-Ket addressing the historic houses for applications.

5.1.2 The selected Historical Houses to promote the *Tu Giac* Conservation Prototype Applications

In Wat-Ket area, there are two outstanding types of historic houses: the one-storey and the two-storey houses located along the Charoen Raj Road near the Ping River. The study has selected one house in each type which has several similar architectural characteristics of *Tu Giac* houses for applying of the conservation techniques.

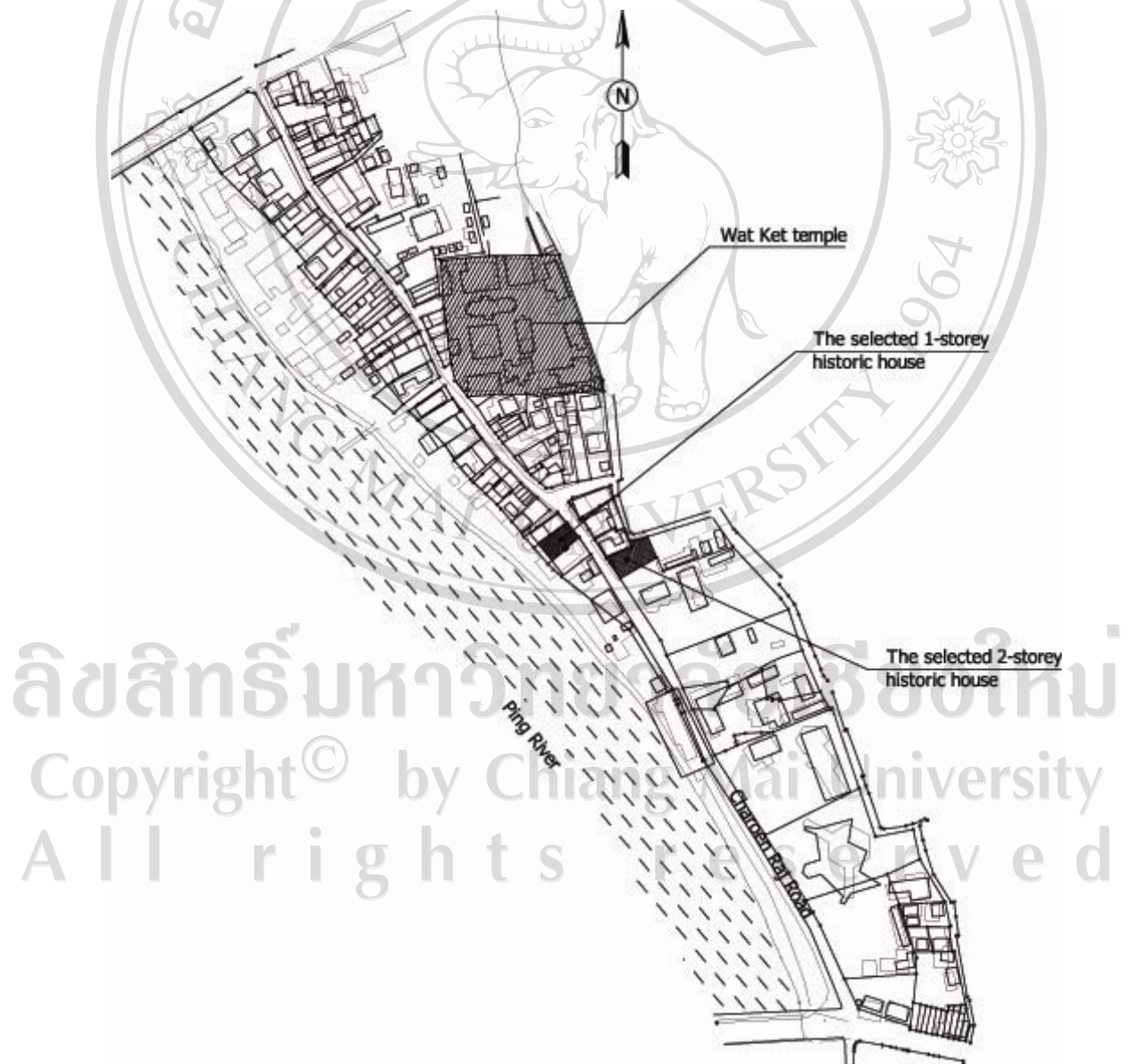


Fig.5.2 The site map showing the location of two selected historic houses for applications.



5.1.2.1 The 2-Storey Historic House




The selected house, called Villa Cini, located on the west side of the Charoen Raj Road was built in Chinese style almost 140 years ago. It has two stories from the beginning: shop downstairs and living upstairs. Similar to *Tu Giac* houses, its roof with 2 sloping roofs and its timber floor on the 2nd level are supported by the load bearing walls surrounding, and the type of shutter window was applied at the front wall.



Fig.5.3 The selected 2-storey historic house in Wat Ket: **VILLA CINI** for applications.

Fig.5.4 The *Tu Giac* Conservation Methods applicable for the VILLA CINI house in Wat-Ket area, Chiang Mai, Thailand.

Destructions and Applicable conservation techniques	Photos
<p>Decayed plaster:</p> <ul style="list-style-type: none"> ▪ The flakiness of decayed plaster makes the bricks inside exposed to environment. <p>Conservation methods for application:</p> <ul style="list-style-type: none"> – P1 – P2 	
<p>Decays of timbers contacting masonry walls:</p> <ul style="list-style-type: none"> ▪ Rots of timbers caused by high moisture content from masonry walls and the fungi-attacks. <p>Conservation methods for application:</p> <ul style="list-style-type: none"> – T3 	

<p>Cracks of the load bearing walls:</p> <ul style="list-style-type: none"> ▪ Appear above the doors due to the overload of the wall above and the weakness of wooden door-frame beneath. <p>Conservation methods for application:</p> <ul style="list-style-type: none"> – C2 	
<p>Cracks on timber beams and pillars:</p> <ul style="list-style-type: none"> ▪ The thermal movement of wood materials due to changes of temperature and moisture content. <p>Conservation methods for application:</p> <ul style="list-style-type: none"> – T1 – T2 	
<p>Fungi attacks on timber elements:</p> <ul style="list-style-type: none"> ▪ Rots appear due to the high moisture content accompanied by the lack of fungal-resistant cover on wood surface. <p>Conservation methods for application:</p> <ul style="list-style-type: none"> – DP 	

<p>Decays of the endpoints of the timber planks on the 2nd floor which contact masonry walls:</p> <ul style="list-style-type: none"> ▪ Rots and cracks appear at the endpoints due to the high moisture content and fungi attacks from masonry walls. <p>Conservation methods for application:</p> <p>– T3</p>	
<p>Cracks on the timber planks of the 2nd floor:</p> <ul style="list-style-type: none"> ▪ Cracks appear due to thermal movement of wood material caused by the change of temperature and moisture content. <p>Conservation methods for application:</p> <p>– T2</p>	
<p>Decays of the timber shutter windows at front caused by fungi and the aging process of wood</p> <p>Conservation methods for application:</p> <p>– W</p>	

* Possible Conservation Techniques for Application: See TGCP-AP (the set of drawings) later.

5.1.2.2 The 1-Storey Historic House

The house (*address: 25-27-29 Charoen Raj Road*) lies on the land-strip between the street and the river, facing the street frontward and the river backward which has the same geographical situation of *Tu Giac* houses. The house currently housing the Gallery was built in 1892 by the grandfather of the owner, one of Chinese immigrants in Chiang Mai at that time. The house is divided into two parts separated by a courtyard: the front building was constructed in traditional Chinese style in stucco with molded motifs and 2 sloping roofs along the length of the building, and the rear structure was built of teakwood following the Northern style of Thailand. The front building which contains some similar characteristics of *Tu Giac* houses like the load bearing walls and the timber floors or doors has been chosen for application.







Fig.5.5 The selected 1-storey historic house in Wat-Ket: The Gallery for applications.




Fig.5.6 The interior of the selected 1-storey historic house.

Fig.5.7 The Tu Giac Conservation Methods applicable for the The Gallery house in Wat-Ket area, Chiang Mai, Thailand.

Destructions and Applicable conservation techniques	Photos
<p>Decayed plaster:</p> <ul style="list-style-type: none"> ▪ The flakiness of decayed plaster which was made from stucco and solid bricks. ▪ The incorrect ways of repairing by plastering new mortar unfitting the old one. <p>Conservation methods for application:</p> <ul style="list-style-type: none"> – P1 – P2 	

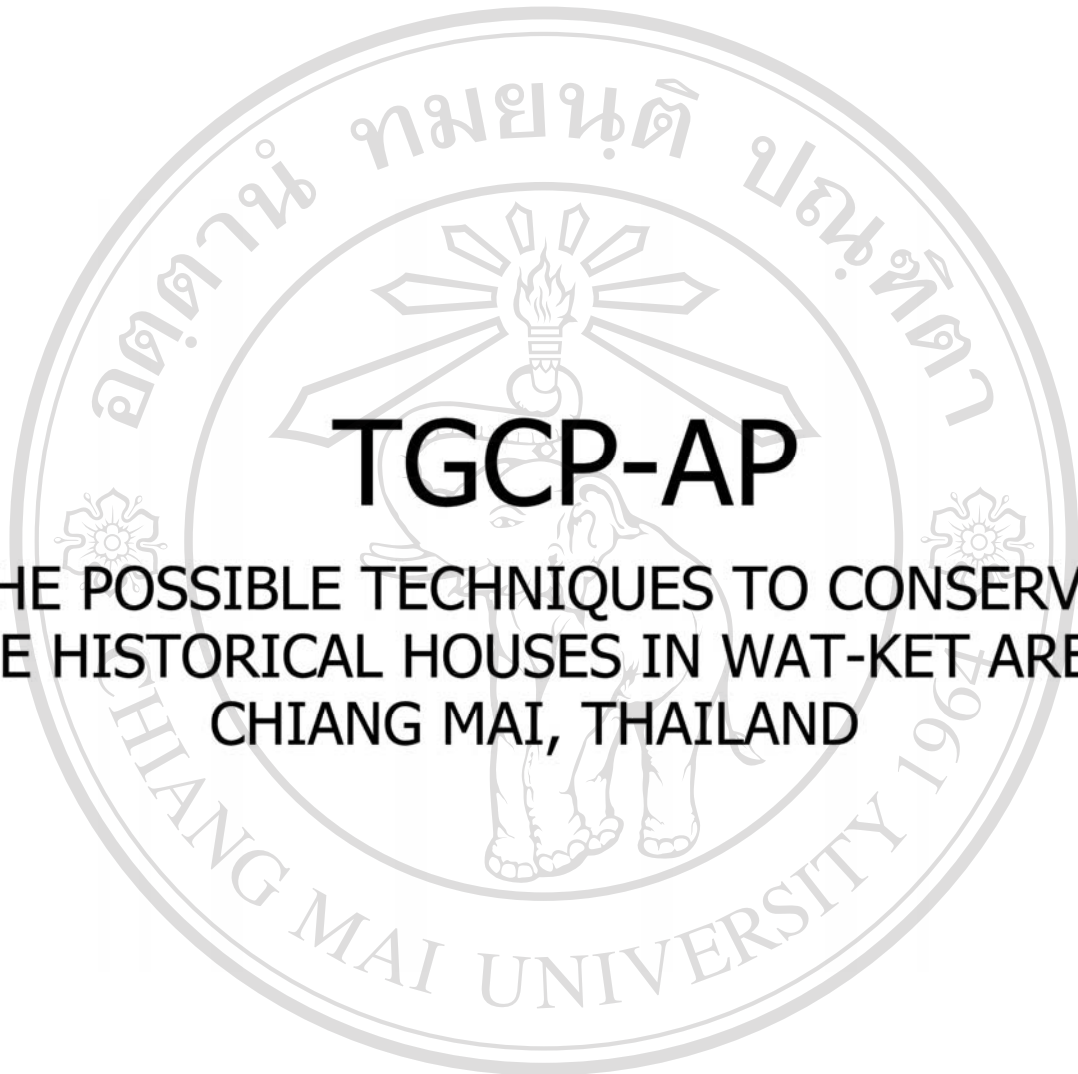
<p>Decays of timbers contacting masonry walls:</p> <ul style="list-style-type: none"> ▪ Rots caused by high moisture content from masonry walls and the fungi- attacks. <p>Conservation methods for application:</p> <p>– T3</p>	
<p>Cracks of the load bearing walls:</p> <ul style="list-style-type: none"> ▪ Cracks appear in the plaster under the endpoints of timber beams of the roof where roof-load is transferred downward. <p>Conservation methods for application:</p> <p>– C2</p>	
<p>Cracks on timber beams:</p> <ul style="list-style-type: none"> ▪ The overload of the roof causes cracks on the timber beams. ▪ The incorrect way of using the steel beams for consolidation makes the structure heavier and leads to the reduction of authenticity. <p>Conservation methods for application:</p> <p>– T1</p> <p>– T2</p>	

<p>Cracks on timber planks of the floor:</p> <ul style="list-style-type: none"> ▪ Cracks appear due to thermal movement of wood material caused by the change of temperature and moisture content. <p>Conservation methods for application:</p> <p>– T2</p>	
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5.1.3 The *Tu Giac* Conservation Prototype – Application: **TGCP-AP**

(See the drawings on the next pages)

-THE APPLICATION-



TGCP-AP

THE POSSIBLE TECHNIQUES TO CONSERVE
THE HISTORICAL HOUSES IN WAT-KET AREA,
CHIANG MAI, THAILAND

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APPLICATION ON THE 2-STOREY HISTORICAL
HOUSE: **VILLA CINI**

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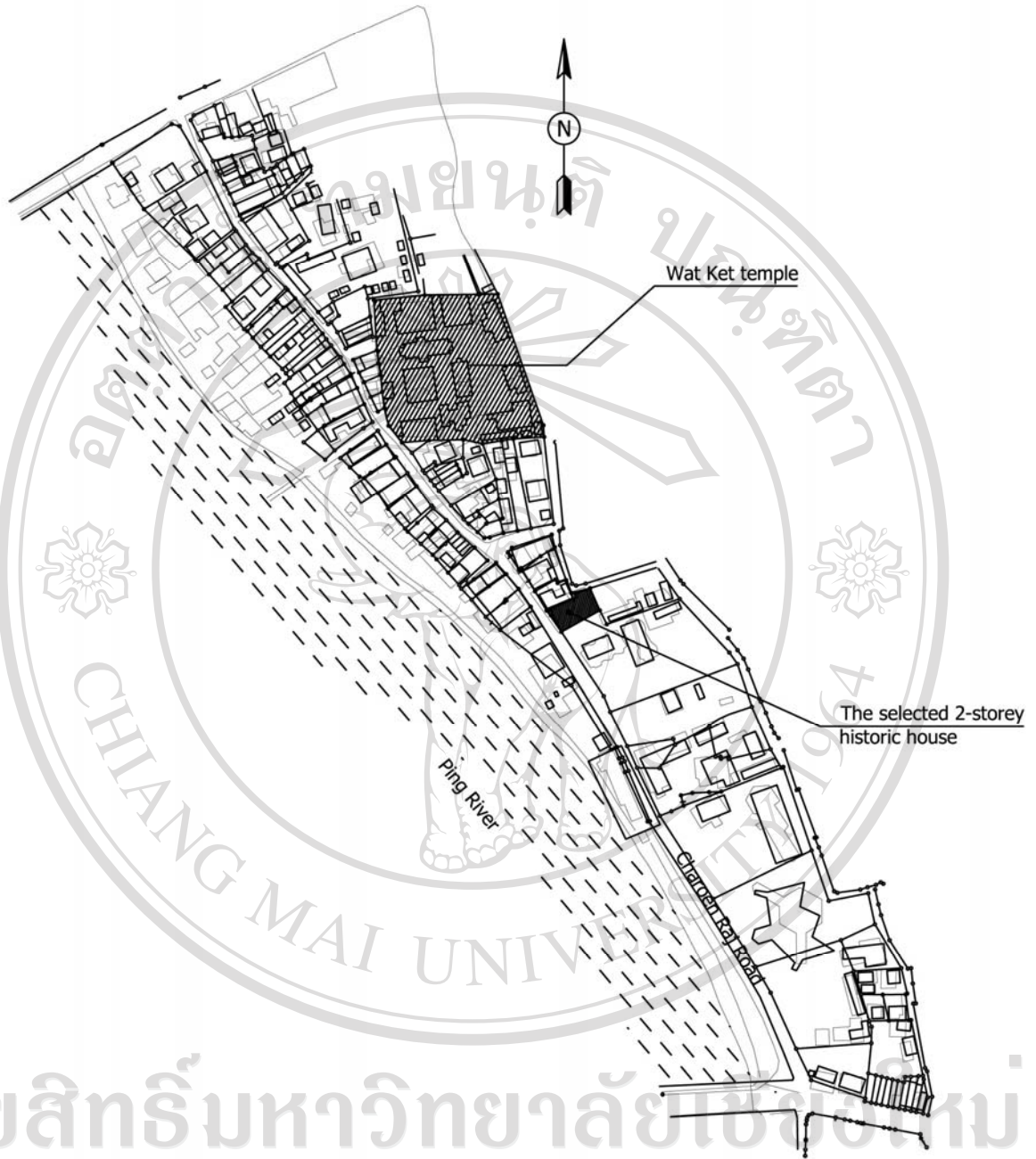
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Fig.5.8 11 techniques out of 15 *Tu Giac* conservation techniques are applicable for Wat Ket - VILLA CINI in Chiang Mai, Thailand.

ARCHITECTURAL PARTS	CONSERVATION TECHNIQUES
THE LOAD BEARING WALLS	C2, P1, P2
THE TIMBER STAIR	T2
THE TIMBER FLOOR ON 2ND LEVEL	T1, T2, T3
THE TWO-SLOPING ROOF	R2, R3
THE TIMBER DOORS	T3
THE SHUTTER WINDOWS	W

Notes:

In order to conserve the 2-storey historic house in Wat-Ket, the VILLA CINI, 11 in all 15 techniques from the *Tu Giac* Housing Conservation Prototype are possibly applied. It has utilized 73.3% of the *Tu Giac* Housing Conservation Prototype for achieving the conservation and repairation due to its different architectural style and materials from the *Tu Giac* houses.

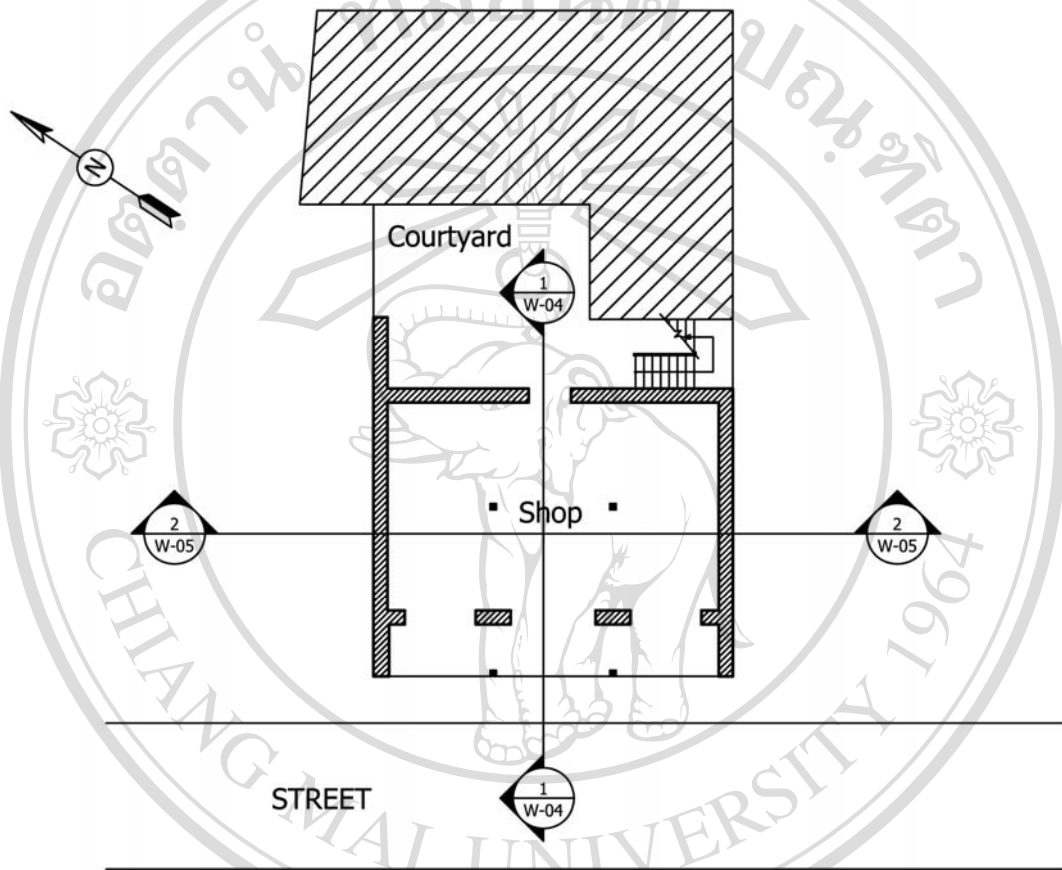


1

SITE PLAN OF THE HOUSE

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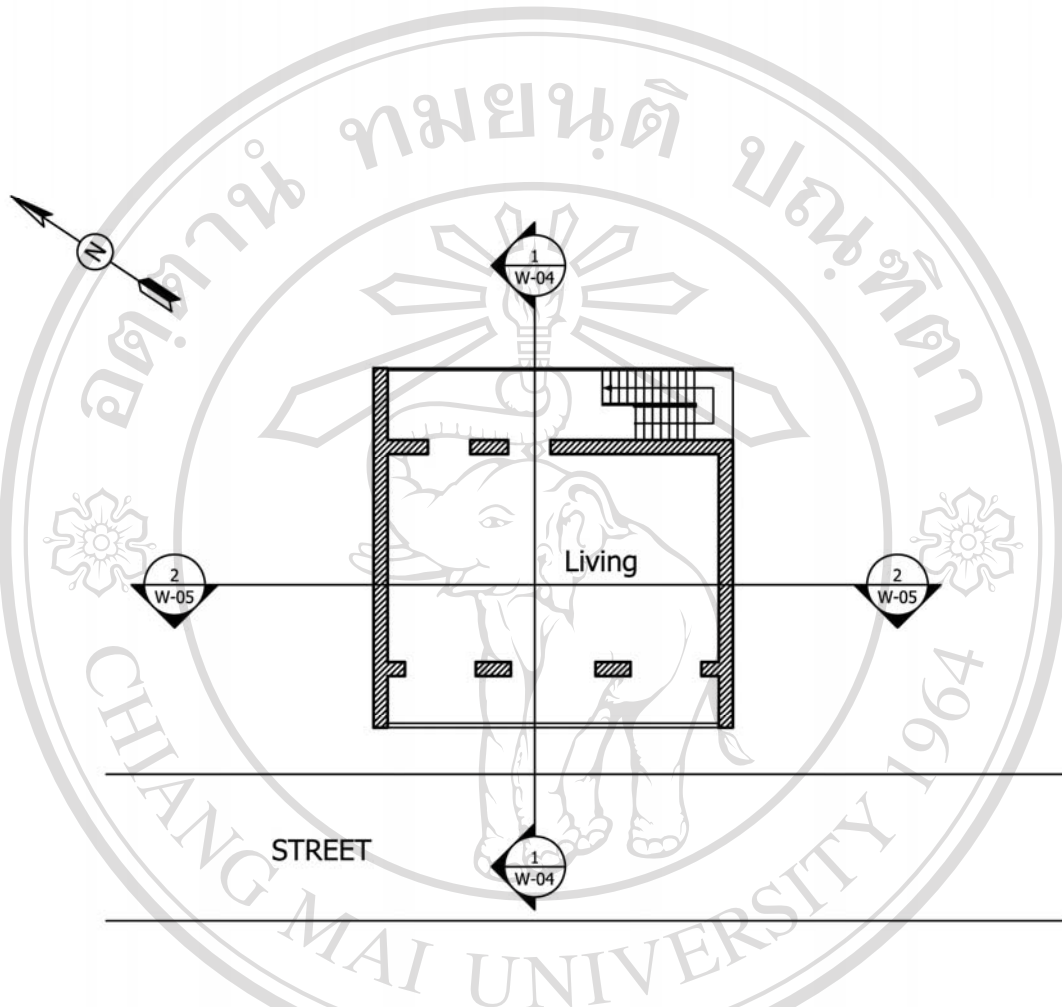
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2 GROUND FLOOR PLAN
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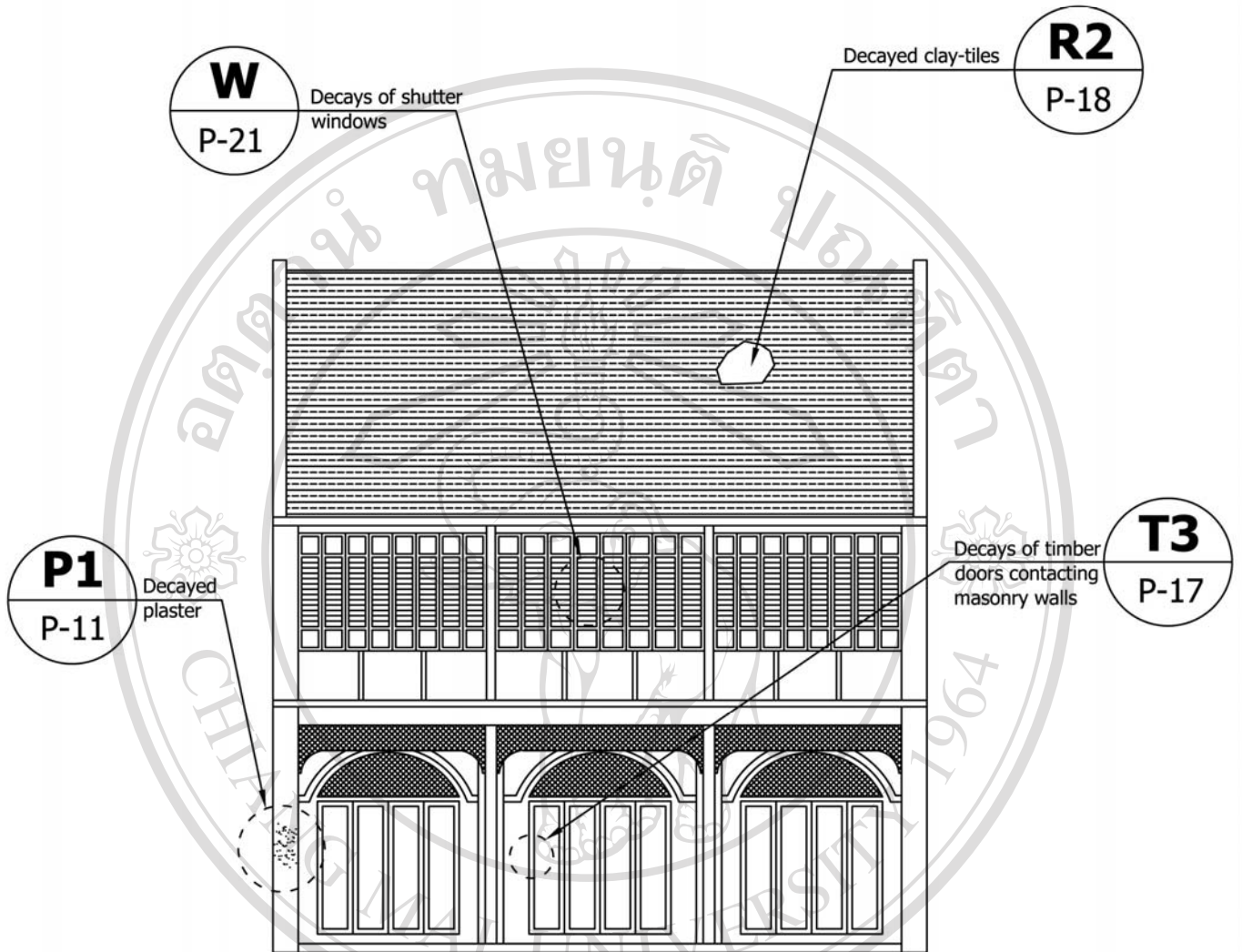
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3 SECOND FLOOR PLAN
Scale: 1:200

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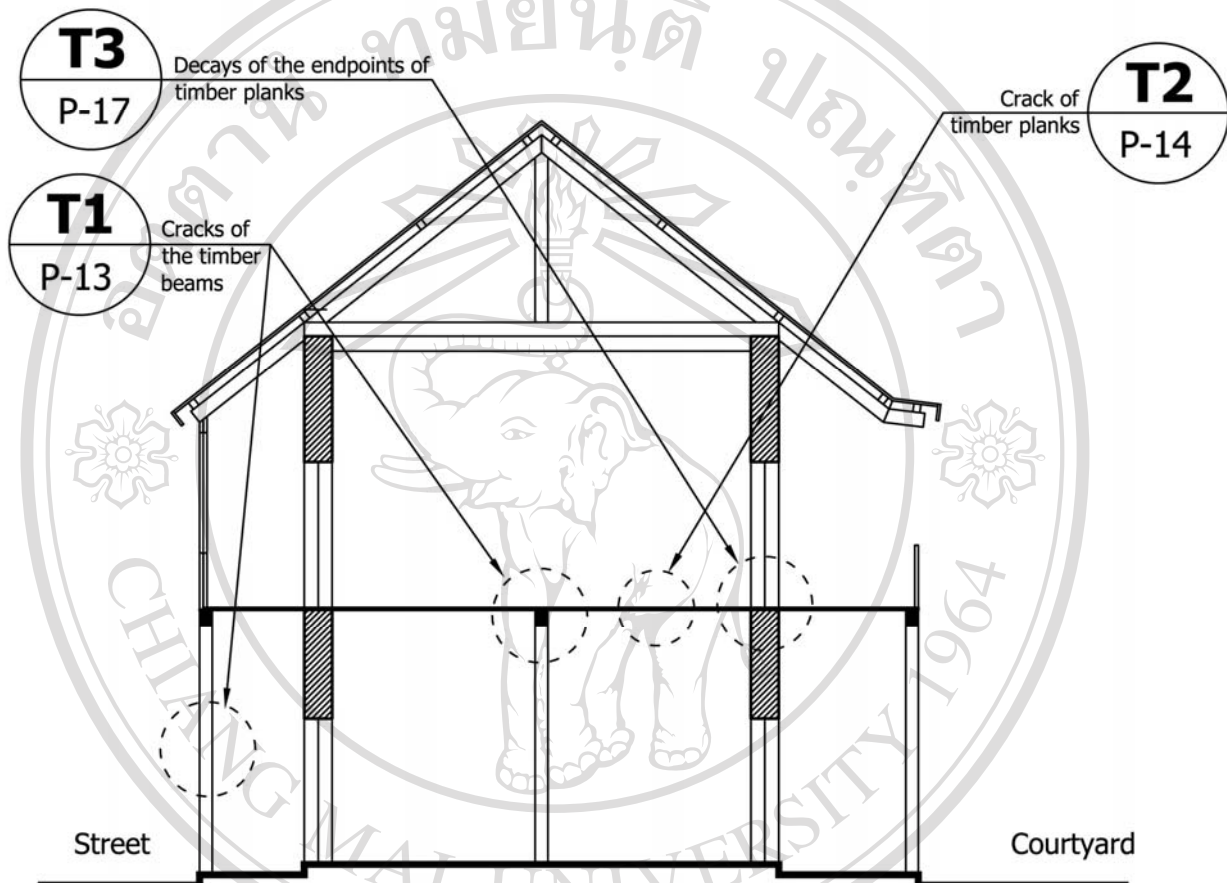


4 FRONT ELEVATION

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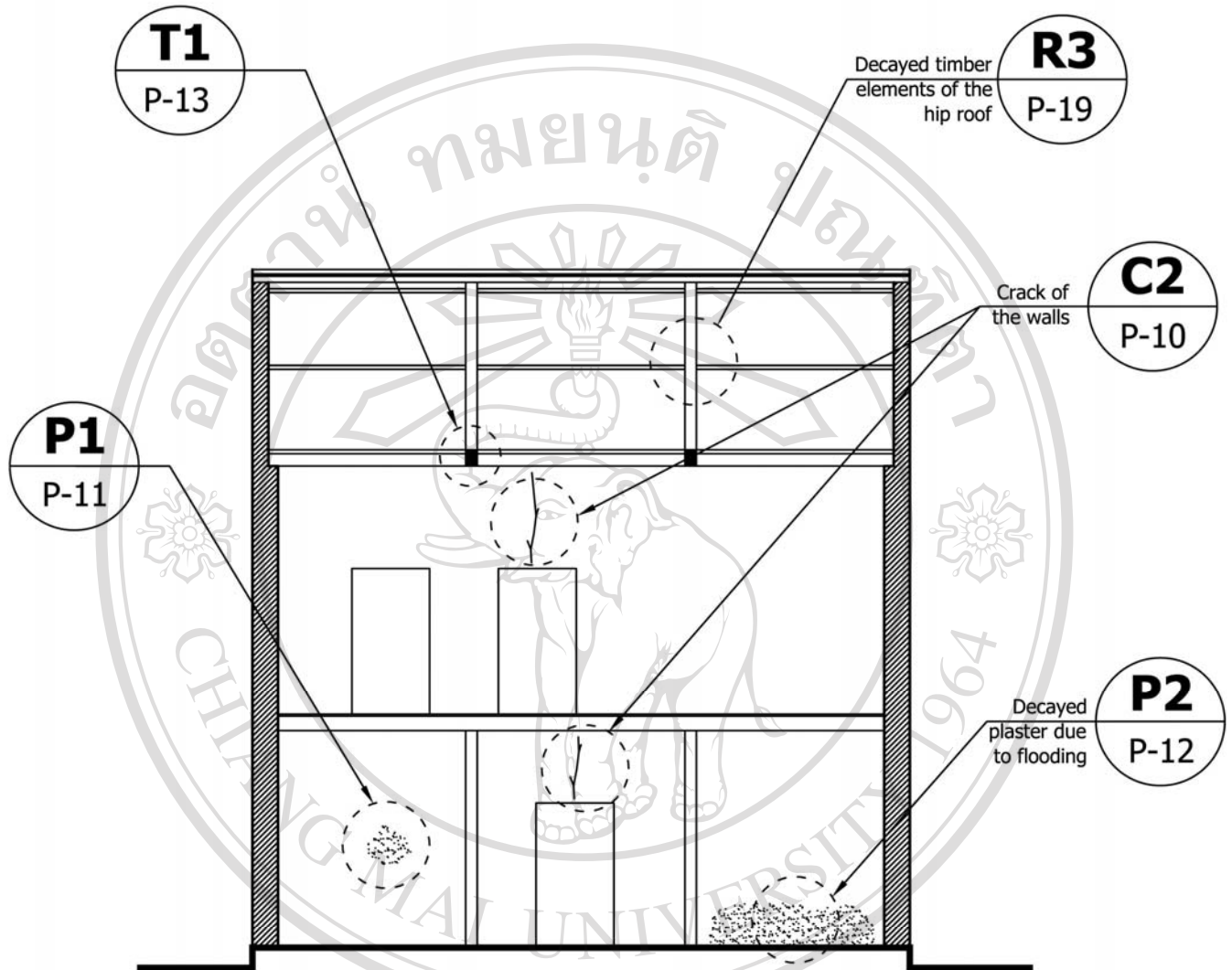
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6

SECTION 2-2

Scale: 1:100

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APPLICATION ON THE 1-STOREY HISTORICAL
HOUSE: **THE GALLERY**

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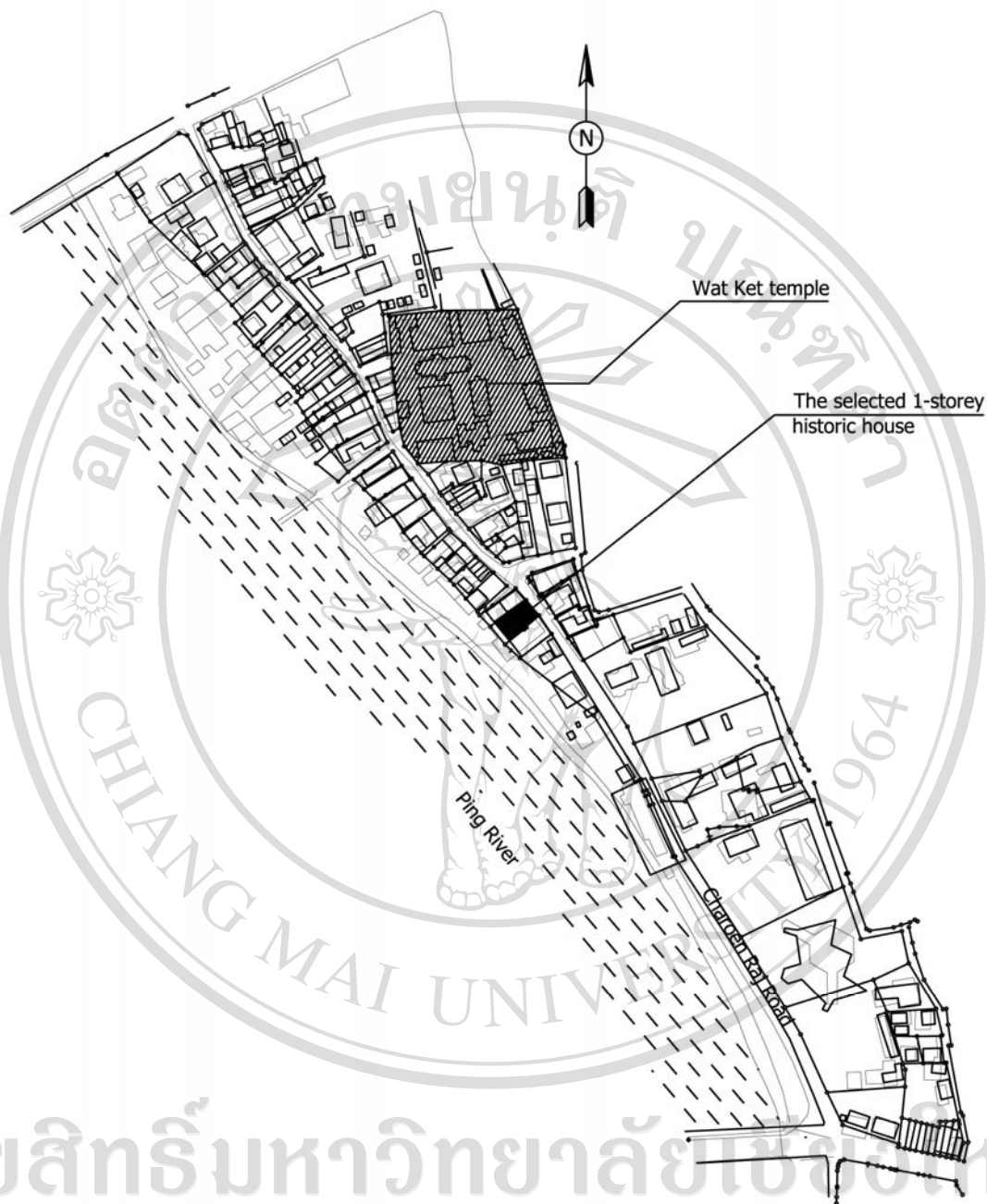
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Fig.5.9 9 techniques out of 15 *Tu Giac* conservation techniques are applicable for Wat Ket - The Gallery in Chiang Mai, Thailand.

ARCHITECTURAL PARTS	CONSERVATION TECHNIQUES
THE LOAD BEARING WALLS	C2, P1, P2
 THE TIMBER FLOOR	T2, T3 
THE ENTRANCE TIMBER DOORS	T3
THE TIMBER BEAMS SUPPORTING THE ROOF	T1, T2
THE ROOF COVER	R2

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Notes:
 In order to conserve the 1-storey historic house in Wat-Ket, The Gallery, 9 in all 15 techniques from the *Tu Giac* Housing Conservation Prototype are possibly applied. It has utilized 60% of the *Tu Giac* Housing Conservation Prototype for achieving the conservation and reparation due to its different architectural style and materials from the *Tu Giac* houses.

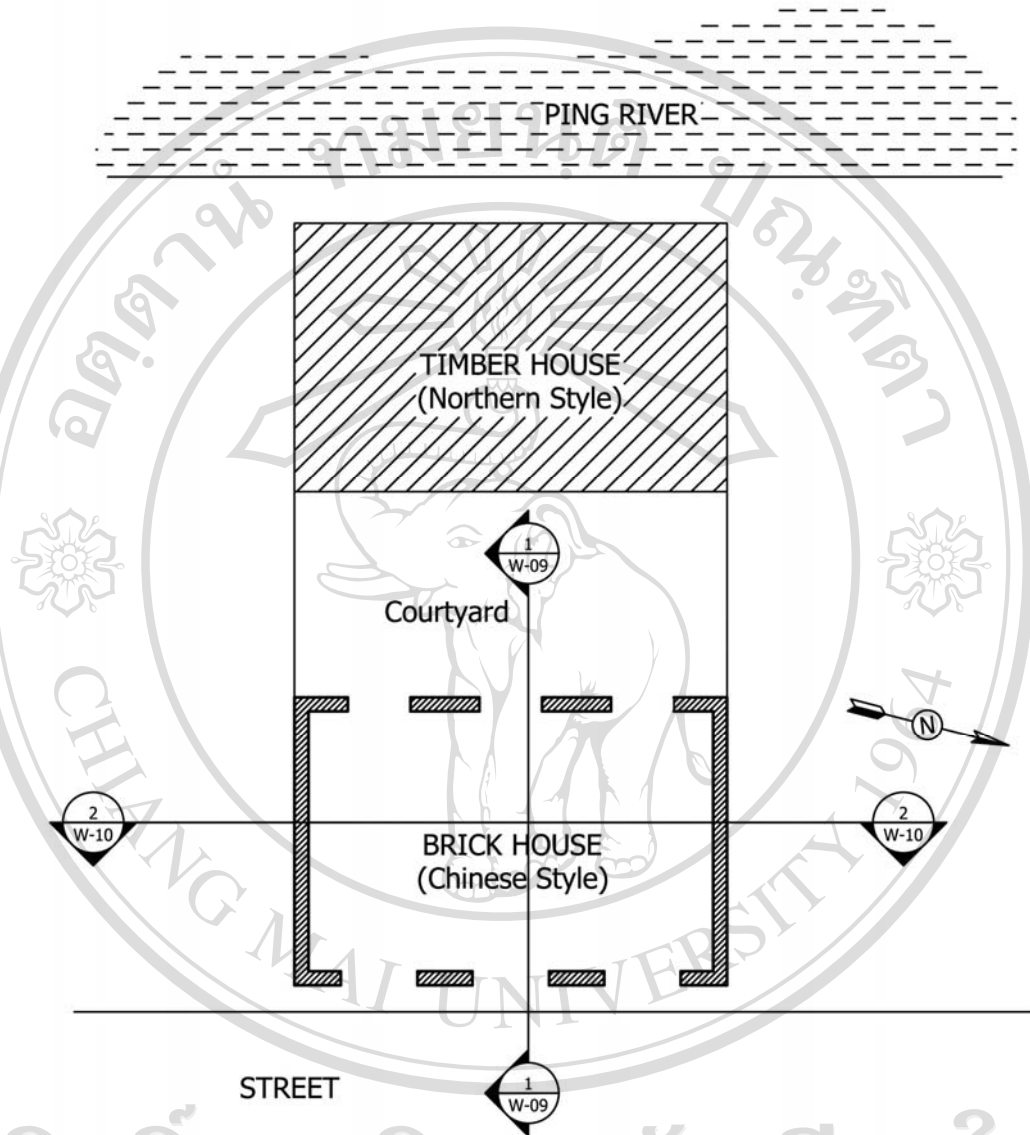


1

SITE PLAN OF THE HOUSE

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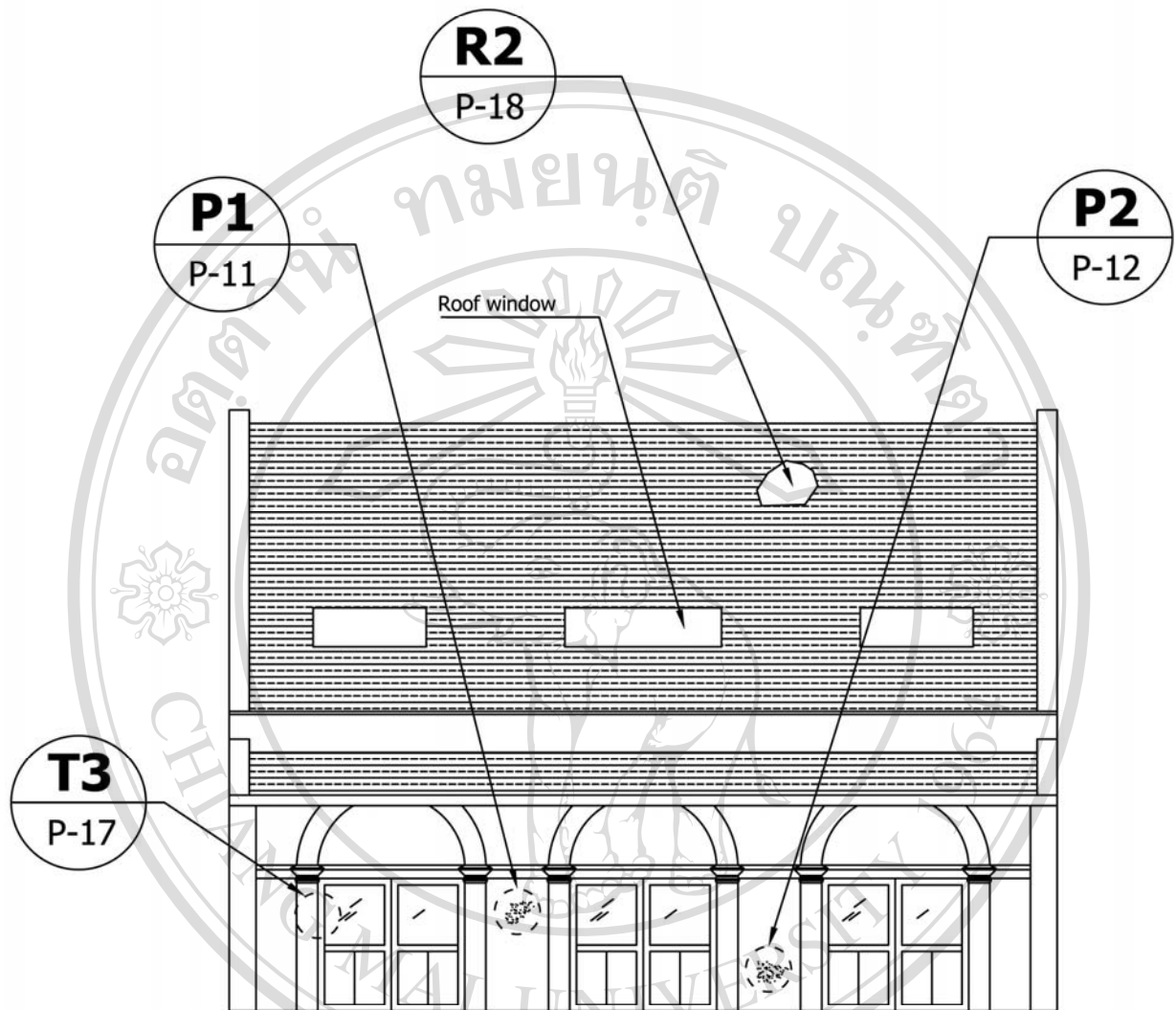
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2 GROUND PLAN
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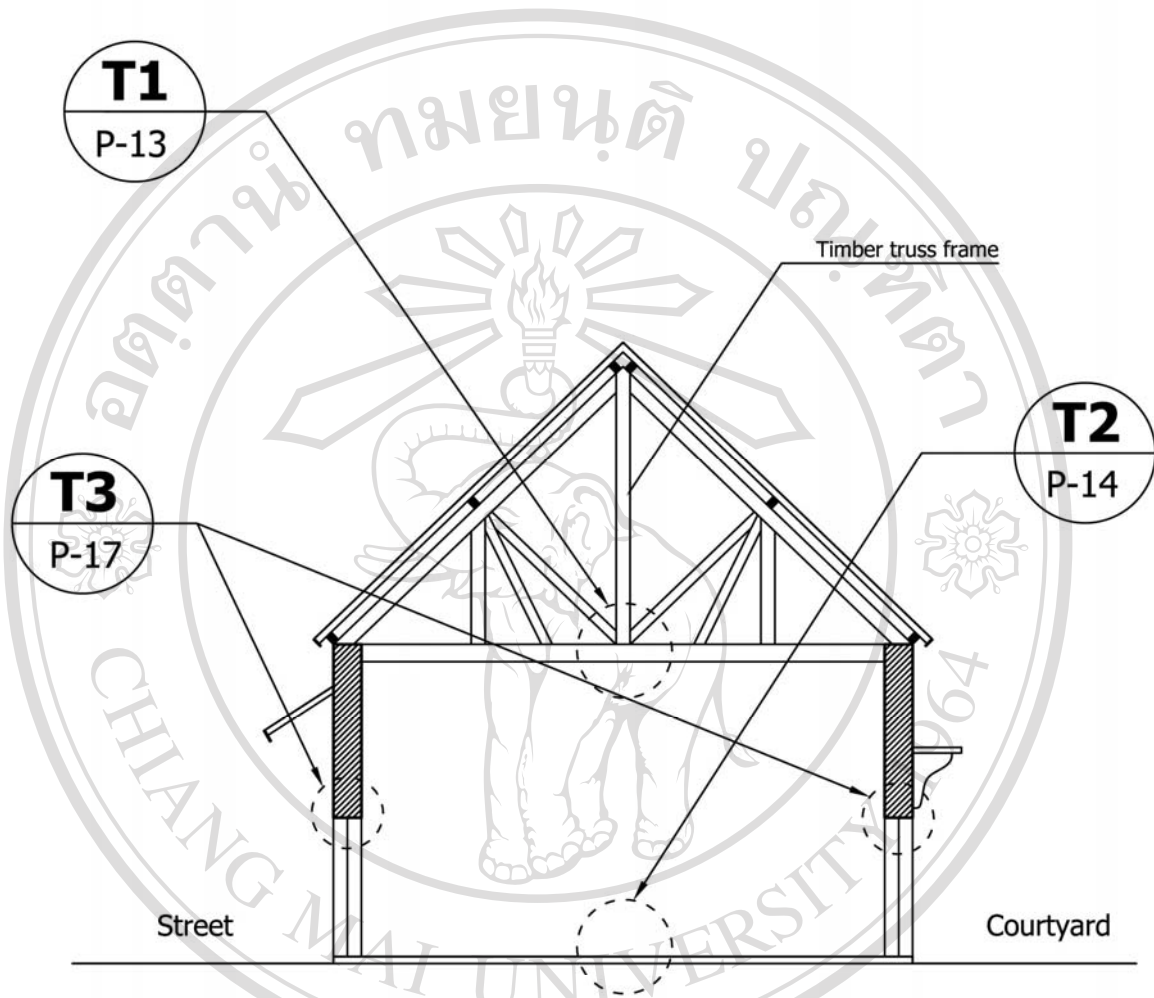
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3 FRONT ELEVATION
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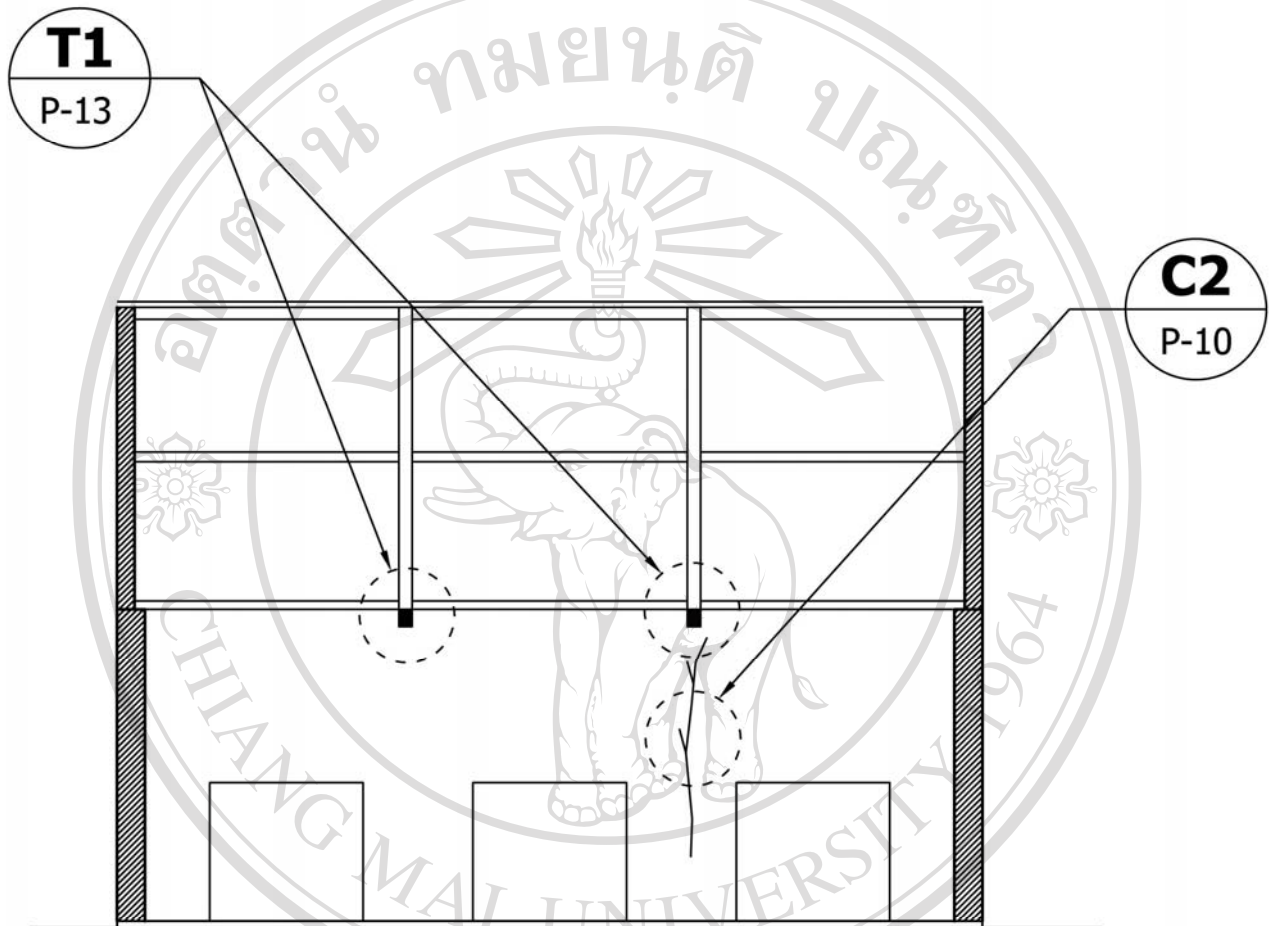
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4 SECTION 1-1
Scale: 1:100

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5

SECTION 2-2

Scale: 1:100

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Drawing name		SECTION 2-2		Sheet No.
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5.2 Conclusions of Chapter 5

Within the similar climatic zone of South-East Asia, the construction systems are similar between the *Tu Giac* house and buildings in Wat Ket area in Chiang Mai, Thailand. Attempt is made to apply the usefulness of the *Tu Giac* Conservation Prototype – to 2 housing in Wat-Ket area.

Two buildings in Wat Ket area were selected:

- 1) the 2-storey historical house VILLA CINI
- 2) the 1-storey historical house The Gallery.

The age of the VILLA CINI and The Gallery are about the same as the *Tu Giac* houses. The study found a number of cracks, decays, deteriorations in these two houses similar to those of *Tu Giac* houses. Therefore the *Tu Giac* Conservation Methods of C2, P1, P2, R2, R3, T1, T2, T3, and W are applicable for the conservation of VILLA CINI building (Fig.5.8 and Drawing W-00 through W-05). The *Tu Giac* Conservation Techniques C2, P1, P2, R2, T1, T2, and T3 are applicable for The Gallery (Fig.5.6, Drawing W-06 through W-10). It depends on the skill of construction workers which varies from place to place and the construction techniques may be slightly different, as well as the availability of slightly different construction materials.

5.3 Conclusions

The content of this “Applied Research” is intended to search for a solution to preserve the *Tu Giac* house located in Bao Vinh Village, north of the Citadel – the last feudalism of the entire Vietnamese Dynasty in Hue City, Vietnam. Bao Vinh Village had become the important Trading-Port after Thanh Ha Port had been closed down due to the rising of unexpected submerged rocks in the Perfume River and *Tu Giac* houses were built storage houses along the west side of the river. Attempt is made to collect possible Vietnamese construction techniques, especially techniques from the *Ruong* house which is the most common housing type in Hue City to apply to build a “practical” and “reliable” construction prototype to conserve the rare and valuable *Tu Giac* houses. 9 *Tu Giac* houses were built with the French influence during 1858-1954 to be 2-storey storage houses for goods and commodities imported to – or exported from – the Citadel. The 2-storey French-influenced houses made *Tu Giac* a distinctive architectural characteristic from those 1-storey *Ruong* house. Although, one *Tu Giac* house has been demolished in 2007, the rest 8 houses are still in good shape but unfortunately, they are structurally extended in all directions for commercial usage on the ground level leaving the original 2nd storey hip-roofing expressing themselves in Bao Vinh Village. Observatory and measuring research has been conducted and conclusion was drawn for 6 outstanding architectural characteristics findings for the *Tu Giac* houses as follow:

- 1) the unique 3-sided load bearing walls constructed with the old traditional oversized *Vo Brick*,

- 2) the rare 2-storey buildings made *Tu Giac* houses the highest construction in Bao Vinh Village,
- 3) the extremely-steep wood-ladder to allow more storage spaces for goods and commodities on both levels,
- 4) the genuine *Kien Kien* timber floor of the second level,
- 5) the old traditional Liet-tile, with multiple layers on the unique French-influenced hip-roof, a true contrast to the gable roof of the *Ruong* houses,
- 6) the traditional wood-panel door and the French-influenced wood-slat window

The Venice Charter is used to determine the authenticity and the historical values of the *Tu Giac* houses. The ICOMOS Principles are employed as the criteria of how to repair the deteriorate elements of the *Tu Giac* houses altogether with many Vietnamese conservation regulations, i.e. Law on Cultural Heritage of Vietnam, and *Ruong* House Conservation Principles, etc. Finally, a set of drawings to conserve those 6 outstanding architectural characteristics is completed to be the construction prototype for the *Tu Giac* houses. The validity of the prototype relies on the validity of the *Ruong* houses which has been officially approved by the Hue People Committee. It is expected that this research report will be submitted to the Hue People Committee to support the importance of historical *Tu Giac* houses. Hopefully, *Tu Giac* houses will be declared historical architecture soon, and some budget could be allocated to initiate the conservation them for the younger generations to see and appreciate the evidence of a unique and strange Vietnamese-French architecture.

Two similar characteristic houses in Wat-Ket area in Chiang Mai, Thailand has been explored, and theoretically applied with the *Tu Giac* conservation method to express the possible application of the *Tu Giac* conservation prototype.

5.4 Recommendations

Once the 8 *Tu Giac* houses are known as the architectural heritages of Hue city, Vietnam, the keeping of all historical original elements of the houses is required and, of course, the additional parts for the expansive living spaces are the obstacles. Besides in the interviews in 2008, most of them wanted to have a new accommodation with bigger spaces and more stable structures, and they are willing to collaborate with authorities or related organizations to protect the *Tu Giac* houses. With the number of only 8 households in 8 *Tu Giac* houses currently, the research suggests the authorities of Hue city to offer new accommodations for all of them. It helps to remove the present unexpected extensions of the *Tu Giac* houses easily and contribute to the retention of only the historical original fabrics of the *Tu Giac* houses. The house then might be used for other functions like shops or exhibition houses.

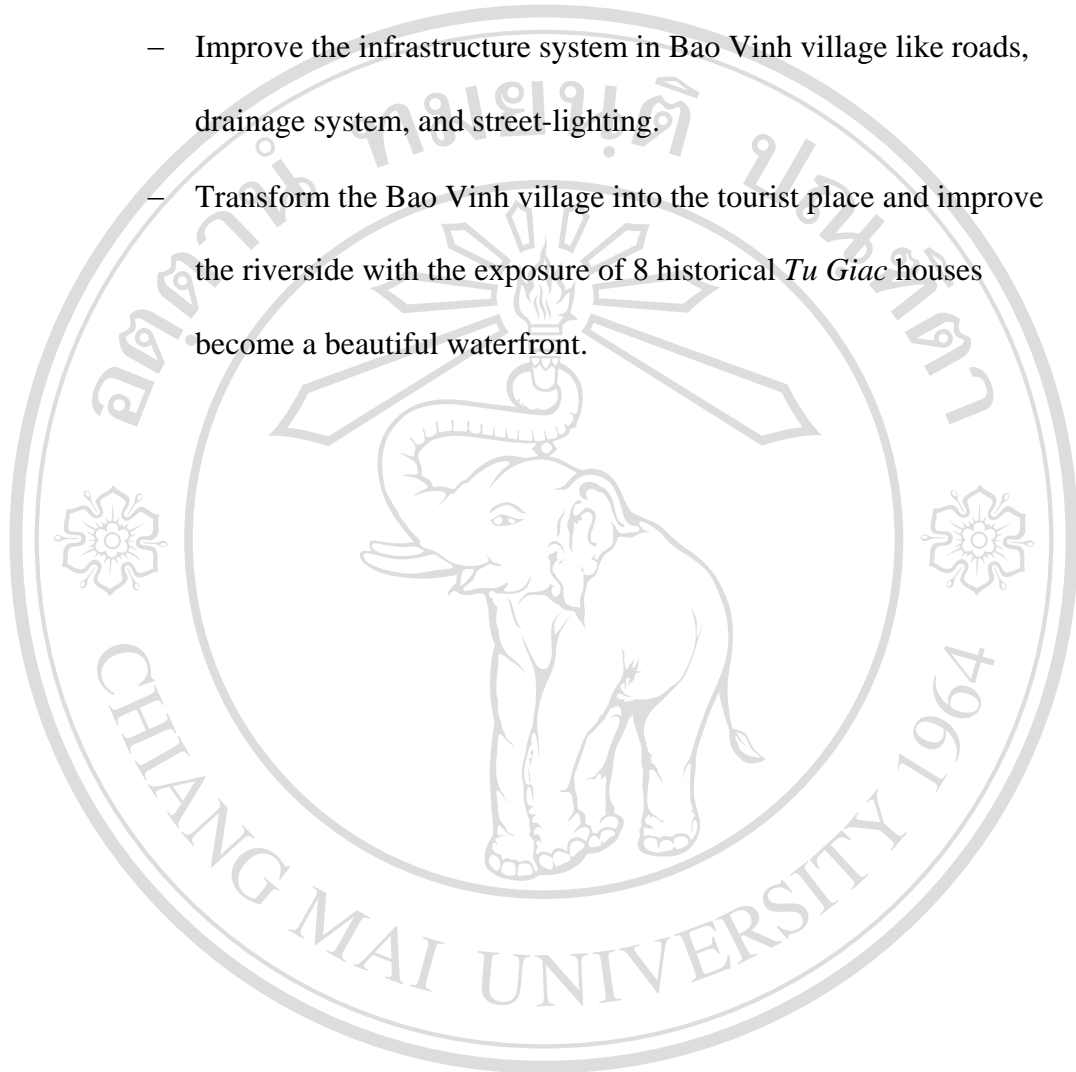
At the same time, the site-planning of Bao Vinh Village, especially on the riverside where all 8 *Tu Giac* houses were located, should be focused in following

points:

- Remove the new buildings which are hiding or covering the *Tu Giac* houses.
- Give the solution to prevent the flood-coming in the whole area of the village, such as, by heightening the ground-level or

constructing the surrounding bank higher than the flood level to protect the village.

- Improve the infrastructure system in Bao Vinh village like roads, drainage system, and street-lighting.
- Transform the Bao Vinh village into the tourist place and improve the riverside with the exposure of 8 historical *Tu Giac* houses become a beautiful waterfront.



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