

# The Evolution of Ancient Urban Defense Spaces in Northwest China During the Song–Ming Period

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## **Abstract**

Based on the historical geographic database of the cities subordinated to the Ming Great Wall defense system and the Northern Song fortress defense system built by the research team, the history of military settlements in northwest China and their urban defense structure were traced. A comparative analysis of the spatial characteristics of urban defense planning during the Song and Ming Dynasties using settlement morphology data revealed significant differences in urban defense planning in the two eras. Focusing on typical urban settlements that span two historical periods and have continued into the present time, we analyzed continuous space-time slices of ancient urban defense spaces and explored their historical causes using ancient urban maps, local chronicles, and aerial photographs. Finally, the historical evolution sequence of ancient urban defense spaces was determined.

## **Keywords**

Ancient urban defense, military architectural heritage, spatial evolution, planning history.

## **How to cite**

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## INTRODUCTION

The northwest region served as the frontier of the Central Dynasty of ancient China. During the Song Dynasty (AD 960–1279) and Ming Dynasty (AD 1368–1644), the northwest region saw the construction of two large-scale military city systems—the Northern Song fortress system and the Ming Great Wall fortress system. A large number of cities, towns, and villages in northwest China originated from these military settlements, featuring a widespread distribution of urban defense architectural heritage. Due to relentless wars and significant social transformation, it is difficult to trace accurately the history of urban planning in the region.

In the region, which has good agricultural conditions, a considerable number of military settlements span two historical periods and have continued into the present time, some being regional central cities. With the rapid urbanization of northwest China in the last three decades, the remains of such cities have disappeared. The complexity of urban development and subversion by modern urban construction hamper tracing of the historical development of urban spaces. However, in urban historical research, there is a lack of comparative analysis of urban defense planning and facilities in the Song and Ming Dynasties, and our understanding of the urban spatial characteristics of the time is relatively vague. Therefore, it is difficult to determine the period of urban texture formation between cities or within a city.

According to extant historical materials, the Song and Ming Dynasties are the most traceable and direct sources of the urban spaces of most ancient cities in northwest China. We addressed the following questions:

1. What are the forms of urban spatial planning of northwest military settlements in the Song and Ming Dynasties?
2. What roles did Song and Ming urban defense construction activities play in the evolution of urban space in Northwest China?

## METHODS AND MATERIALS

This study was based on historical and geographical textual research on military settlements in Northwest China. To ensure that the main urban spaces were formed in the Song or Ming period and avoid interference from other historical periods, we established a database of military settlements of the Ming Great Wall defense system and the Northern Song fortress defense system. The database encompasses most settlements of the two systems, together with site information, geographical textual research information, historical urban construction records, and ancient maps.

In the database we identified urban samples with ancient construction records and maps that were created or completely reconstructed in the Song and Ming Dynasties and analyzed their urban spatial structures. By conducting a case analysis, combined with historical materials and aerial films, we analyzed the inheritance and development of a typical road network and urban spatial structure.

## URBAN SPATIAL STRUCTURE IN THE SONG AND MING ERAS

During construction of frontier defense systems in the Song and Ming Dynasties, many new cities and fortresses were founded. The spatial structure and texture of these cities were unaffected by existing cities; therefore, they enable investigation of the characteristics of urban planning in the two periods. This section is focused on the comparative analysis of cities and fortresses newly constructed during the Song and Ming Dynasties.

### DEVELOPMENT BACKGROUND OF URBAN SPATIAL STRUCTURE IN THE SONG DYNASTY

Previous research on the urban spatial structure of the Song Dynasty focused on functionality and traditional cultural ideas. Hang Kan and Wang Ziqi analyzed the spatial layout of newly built cities in the Song Dynasty based on literature records and well-preserved sites. They believed that cross-streets and T-streets were popular in the Northern Plain during this period. The cross-street pattern is consistent with China's ritual culture advocating middle and square<sup>1</sup>. It also has spatial characteristics convenient for spatial planning and urban management, rendering it popular in northern cities beginning in the Sui and Tang Dynasties. The T-street became popular in the Song Dynasty, mainly for the purpose of military defense<sup>2</sup>. Su Bai believes that T-street and single-long-street patterns are the main characteristics of urban street layout after the disintegration of the Lifan unit system (里坊制) during the Song Dynasty<sup>3</sup>. However, this inference about the causes of the of cross-street and T-street pattern is not supported by sufficient research<sup>4</sup>. Whether these empirical conclusions are consistent with the situation in Northwest China needs to be verified based on a large number of cases.

### STREET STRUCTURE IN NORTHWEST MILITARY CITIES DURING THE SONG DYNASTY

Because of the lack of historical materials and archaeological information, we selected several fortresses created or reconstructed during the Northern Song Dynasty whose administrative status continued into later generations and had no record of major subversive destruction. Although the city maps (Fig. 1) were obtained from the local chronicles of the Ming and Qing Dynasties, according to the reconstruction and expansion records of previous dynasties in local chronicles, the older or inner part of the city was likely to have been constructed during the Song Dynasty. In addition, the cities, being located on a plain, are not limited by the terrain, enabling them to reflect the concept and intention of the urban planner.

Most examples had a tortuous street structure composed of T-streets with few cross-streets directly connected with city gates, which is common in ancient cities in northern China (Fig. 1).

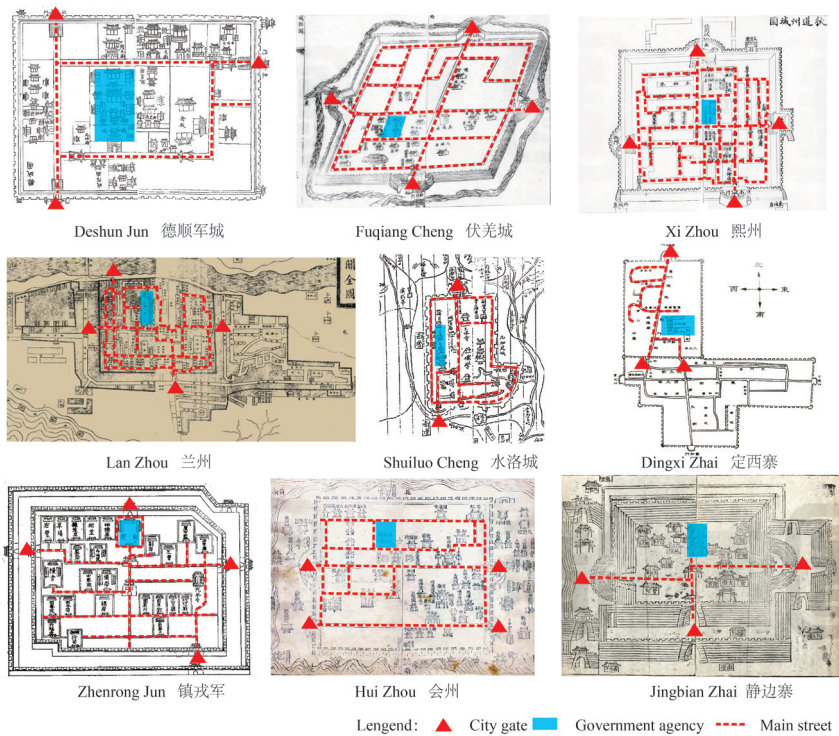


Fig. 1. Ancient maps of the spatial structure of northwest cities in the Song Dynasty.

### SPATIAL STRUCTURE OF NORTHWEST MILITARY CITIES IN THE MING DYNASTY

Li Yan investigated the internal spatial layout of the military fort in the Ming Dynasty. The main road system can be summarized into three types: single-long-street, cross-street, and fishbone<sup>5</sup>. The castle typically contains a small bell-drum tower with a cross-passage beneath, situated at the center of the main road; this tower is commonly called the central tower (中央楼). The central tower is common in large forts with a cross-street structure directly connecting three or four city gates and is in line with the planning form of an independent bell-drum tower in cities of the era after the Yuan Dynasty (generally considered to be the product of the urban curfew system in the Yuan Dynasty<sup>6</sup>). It is a major feature of the internal space of the military fort of the Ming Dynasty. In northwest China, most cities with a cross-street structure were founded as border military towns during the Ming Dynasty according to the urban construction records in the local chronicles (Fig. 2). Some scholars believe that this represents a return to the traditional ritual system<sup>7</sup>.

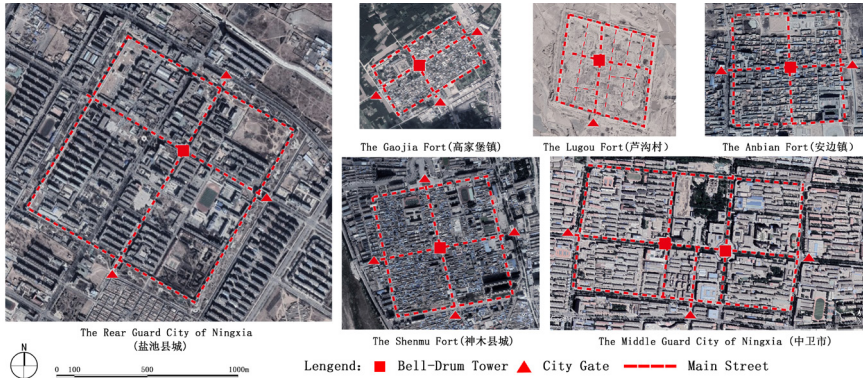


Fig. 2. Spatial structure of newly constructed cities in Northwest China in the Ming Dynasty.

## EXPANSION OF NORTHWEST MILITARY CITIES IN THE MING DYNASTY

After the foundation of the Ming Dynasty, northwest society experienced stable development for more than 200 years. The population continued to grow and peaked in the Wanli Period (万历 AD 1573–1620)<sup>8</sup>. After the Zhengtong Period (正统 AD 1436–1449), invasions by Mongolian tribes increased sharply<sup>9</sup>. The construction records of 138 cities in the chronicle of Shaanxi (陕西通志)<sup>10</sup> show that, during this period, the northwest region experienced an upsurge of urban defense development; cities at all levels constructed outer walls and passes attached to or independent of the main cities (Fig. 3). The urban defense structure became more complex and diversified, and the urban defense concept more active and flexible.

Based on the taxonomy of typology, the types of urban defense structure depicted by the city maps in the local chronicles of the northwest region in the Ming and Qing Dynasties were of the multiple-anti-line mode (multiple-defense-circle and multi-core-support types), single-city-defense mode (basic and key-strengthening types), and group-defense mode (Fig. 4). Many cities inherited from the Northern Song Dynasty experienced various forms of expansion. Therefore, the texture of many northwest cities exhibits overlapping urban spatial structures and defense facilities inherited from the Song and Ming Dynasties.

## EVOLUTION OF URBAN DEFENSE SPACE FROM SONG TO MING—LONGXI CITY

As an example, we used Longxi City in Gansu Province, which has a typical development history spanning the Song, Yuan, and Ming dynasties. We used high-altitude images of northwest China taken by aircraft in the 1960s, prior to large-scale modernization of the northwest cities, and the urban defense facilities and road network structure of the Ming and Qing Dynasties were largely retained.

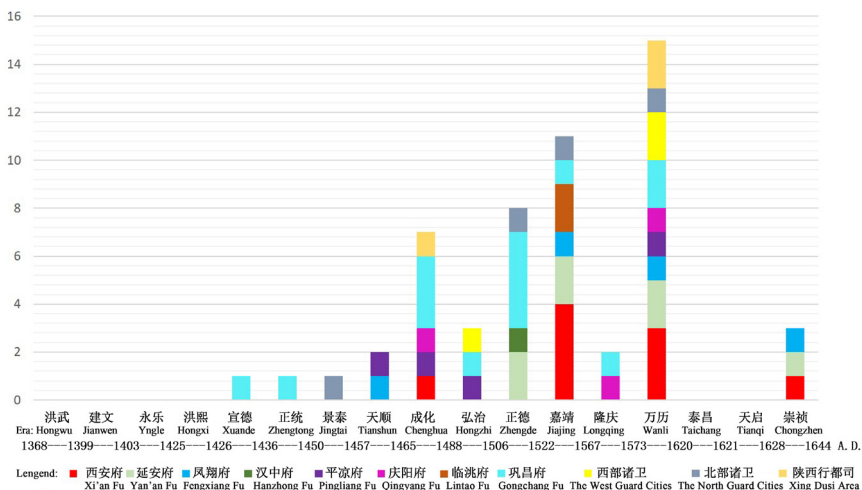


Fig. 3. Temporal and spatial distributions of outer cities in Shaanxi Province established in the Ming Dynasty.

### DEVELOPMENT OF URBAN DEFENSE IN LONGXI CITY

Longxi City was originally a frontier fortress of the Northern Song Dynasty, named Guwei Zhai (古渭寨). Due to its increasingly prominent strategic position, it has been developed to maintain its defensive capabilities by successive generations. Its urban development comprised four phases: frontier outpost, senior military administration, regional political core, and northwest national defense strategic focus. From the Northern Song Dynasty to the late Qing Dynasty, there was no record of major war or disaster damage to Longxi City<sup>12</sup>; its urban defense facilities and spatial pattern were inherited and, therefore, the spatiotemporal information is relatively complete, and the growth context is clear. According to the historical records, Longxi City experienced four construction phases:

1. Military outpost (Fig. 5a). Initially, Guwei Zhai (古渭寨) was so small and weak that it could repel only low-intensity invasions. Its primary task was to protect agriculture and border trade.
2. Eastward expansion (Fig. 5b). With the continuous expansion of the territory of the Northern Song Dynasty, Guwei Zhai became the main distribution center for soldiers and military grain in Xihe District (熙河路) and the most important border trade town<sup>13</sup>. Therefore, the city continued to expand eastward during the Yuan Dynasty, creating the scale and internal pattern of the current main city.
3. Construction of the outer city (Fig. 5c and 5d). The long-term stable development of society resulted in population spillover. The residential areas outside the city expanded, and the outward movement of urban functions such as public security, taxation, business distribution, and military garrison resulted in the formation of inner and outer cities<sup>14</sup>. However, the outer wall was low and thin, and so was far weaker than that of the main city. In this way, a multiple-layer defensive structure with the main city as the core was formed.

- Strengthening of the north outer city (Fig. 5e). With the increasingly serious threat of Mongolian tribes in Qinghai during the middle and late Ming Dynasty, the north outer city expanded to be equal in size to the main city. Finally, a zoning defense pattern in which the north and south cores were mutually supportive was formed.

### EVOLUTION OF THE URBAN DEFENSE STRATEGY

The evolution of urban space is complex. In Longxi City, which was long a frontier settlement under military pressure, the changes in urban spatial structure are closely related to the urban defense strategy adopted by planners. By comparing background historical data with historical images, we found that the Longxi urban defense strategy has passed through the following stages:

#### (1) MILITARY OUTPOST.

Guwei Zhai (古渭寨) backs onto Renshou Mountain (仁寿山) and is in a remote position on one side of a river valley, monitoring a vast planting area while not blocking the major roads in the river valley. Its location reflects the site selection principle of “avoiding important crossings” proposed by Xiang Yue (乡约):

*A strategically important crossing is usually beside a large river. It has abundant water and grass. It is the only way for nomadic cavalry to invade and retreat, so it is easy to attract the envy of the enemy. The enemy’s spies and scouts often come and go from here, so they must be able to grasp the accurate information of the stronghold. Moreover, at the beginning of the invasion, the enemy often uses the most elite military force to launch an assault on the important crossing, and when they withdraw to the grassland from the inland, they often vent their anger at the fortresses in the important crossings along the way<sup>14</sup>.*

Therefore, Guwei Zhai at that time could repel only low-intensity attacks, and its urban defense construction concept was based self-protection, with little potential for counter-attack.

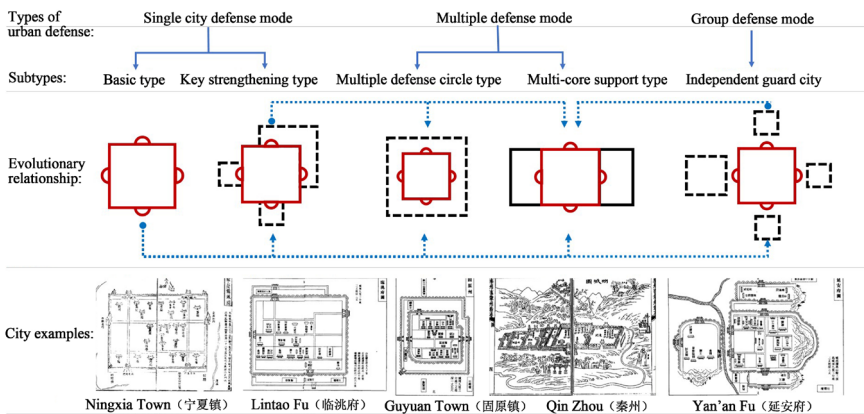


Fig. 5. Types of urban defense spatial structure of cities in Shaanxi Province in the Ming Dynasty.

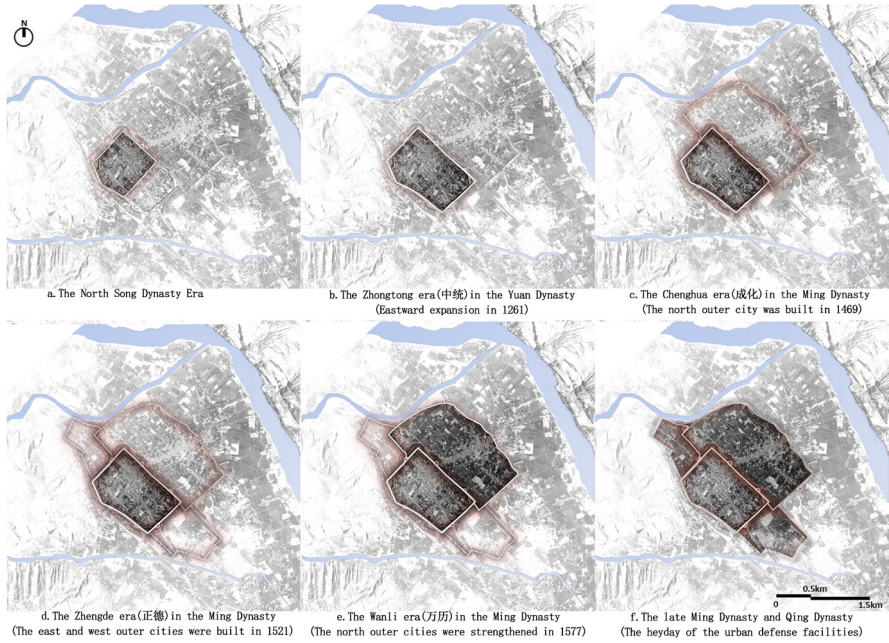


Fig. 6. Evolution of urban defense space in Longxi city According to historical aerial photos and records.



Fig. 7. Historical aerial photographs of the urban spatial structure of Longxi in the 1960s.



## (2) CONSERVATIVE AND RESTRAINED SPATIAL DEVELOPMENT OF THE MAIN CITY.

During the Song and Yuan Dynasties, Longxi city developed from a border fortress to a regional politico-military center. The narrow urban space once mainly serving the military expanded eastward to form a high-grade city protected by a single wall of circumference ~ 9 li (1 li is about 560 m), in line with the scale of Fu cities (府城) in the Ming and Qing Dynasties<sup>15</sup>.

The urban spatial structure of Longxi City differs from the cross-street structure of northern cities in the Ming Dynasty. Upon entering the main city from its west and north gates (the main defense direction), no street leads directly to the administrative center; instead, the way is blocked by T-shaped crossings and multiple spatial turns (Fig. 6), reflecting the inheritance of urban spatial characteristics from the Song Dynasty.

## (3) EXPANDING THE DEFENSE DEPTH.

Improvement of the north outer city's defense capability resulted in a change from a single-core to a dual-core urban defense system, altering the over-centralized defense pressure of the main city to a balanced regional defense structure. Thus the risk of penetration to the center is halved by doubling the core of urban defense.

## (4) BLOCKING THE VALLEY TERRAIN.

Farmland accounts for a larger proportion of the north outer city than does construction. According to the 1964 census of Longxi County, there are 6511 households in the ancient-city town (城关镇)<sup>16</sup>, which corresponds to the settlement state of the urban area reflected in aerial photographs (1962). During the Jiajing Period (嘉靖 AD 1522–1566) of the Ming Dynasty, there were only 4114 civilian households (also the total number of households in Longxi County) and 1633 military households in Longxi County<sup>17</sup>. Assuming small fluctuations of the average household population in the traditional agricultural society during the period from the Ming Dynasty to the founding of the People's Republic of China, it can be inferred that the urban population in the Ming Dynasty was lower than that in 1962. Therefore, in outer cities constructed during the Ming Dynasty, the urban defense scale far exceeded that of the residential area and the needs of the population at that time. Considerations related to military defense accounted for a large proportion of planning.

*Topographic conditions are considered in outer city planning. According to the war records of the Longxi area in the Ming and Qing Dynasties, northwest of the river valley, where Longxi City is located, is the main axis of invasions by Mongolian tribes. Therefore, the north and west outer city walls are arranged near the river channel and a cliff bank. Firearms on those walls can cover the river embankment and protect the city gate, making it difficult to launch an attack to the north or west of Longxi City, as indeed history records:*

In 1866, the peasant army turned in from the southeast corner of the main city at night. At that time, Deputy General Yu Zhengxiang's (喻正祥) army was stationed in west outer city, and Heling's (鹤龄) army was stationed in the north outer city. When they launched attacks on the peasant army, the peasant army could not go out from the main city, nor could government troops enter the main city from the outer city. The battle was deadlocked until dawn<sup>18</sup>.

The west and north outer city were the focus of urban defense at that time. The fully fortified

outer city had significant protection on the west and north, forcing an enemy to detour to the southeast gate of the main city, which had the weakest defenses, to carry out a sneak attack. Moreover, if the main city has fallen, the strength of the outer city can be leveraged to turn defeat into victory.

The outer city of Longxi City was originally used as an auxiliary defense facility to protect persons residing outside the main city and, over time, developed into the main defense space supporting the main city, expanding the terrain advantage, blocking geographical channels, and sharing the core pressure of defense. The urban fortifications thus had good defense depth and frontal scale, cutting off a streamlined offensive and dividing any besieging force.

## CONCLUSION

In northwest China, which experienced long periods of war and social unrest, pragmatic urban defense considerations affected the evolution of urban spaces. Therefore, when tracing the history of urban space development, we must fully consider the historical military security situation, urban defense concepts, the military technology background, and other factors. Tracing of the urban defense spatial structure showed that a cross-street structure directly connected with city gates is popular in military cities constructed during the Ming Dynasty, and the bell-and-drum tower is generally set in the center of the cross-street. The T-street and single-long-street structures dominated cities and castles in the Song Dynasty. The above provide a reference for evaluating the age of urban spatial texture.

The urban space of a fort originates from traditional Chinese urban planning and the standard military construction space unit, and so meets the efficiency and economic requirements of the state for large-scale military construction. Therefore, the urban space of military cities and castles is generally that of a single structure. In the middle and late Ming Dynasty, a considerable number of fortresses developed into regional central cities. Their urban defense development level initially exceeded the primary state and developed into a more complex defense structure, indicating positive urban defense planning. Understanding this historical trend will facilitate research on the development of urban spaces in northwest China.

## DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author.

## NOTES ON CONTRIBUTOR(S)

**Xiaolong Tuo** is a doctoral student majoring in architecture in the School of Architecture of Tianjin University. His current research focuses on the history of the military settlement system in northwest China and the protection and use of related urban and architectural heritage.

**Zhe Li** teaches architectural design and history in the School of Architecture of Tianjin University. He has long focused on landscape archaeological research of ancient military architectural heritage and related heritage protection.

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## IMAGE SOURCES

Fig. 1 Ancient maps from “Longde County Annals of Kangxi Edition 康熙隆德县志” (Fig. 1a), “Fuqiang County Annals of Kangxi Edition 同治伏羌县志” (Fig. 1b), “Didao Annals of Xuanton Edition 宣统狄道州志” (Fig. 1c), “New Gansu Province Annals of Xuanton Edition 宣统甘肃省新通志”(Fig. 1d), “Zhuanglang County Annals of Kangxi Edition 康熙庄浪县志” (Fig. 1e), “Dingxi County Annals of Minguo Edition 民国定西县志” (Fig. 1f), “Guyuan Annals of Jiajing Edition 嘉靖固原州志” (Fig. 1g), Jingyuan County Annals of Daoguang Edition 道光靖远县志” (Fig. 1h), and “Jingning Annals of Kangxi Edition 康熙静宁州志” (Fig. 1i).

Fig. 2 Base maps from Google Earth.

Fig. 3 Drawn by the author.

Fig. 4 Ancient maps are from Ma, Tingrui 马廷瑞 (AD ?–1542). “The Record of Shannxi 陕西通志.”

Fig. 5,6 Aerial photographs provided by the Academia Sinica, Taipei.