



# An Analysis of the Characteristics of Spatiotemporal Change to the Benma Walls of Tibetan Buddhist Architecture Under the Influence of Politics, Technology, and Regional Culture

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## Abstract

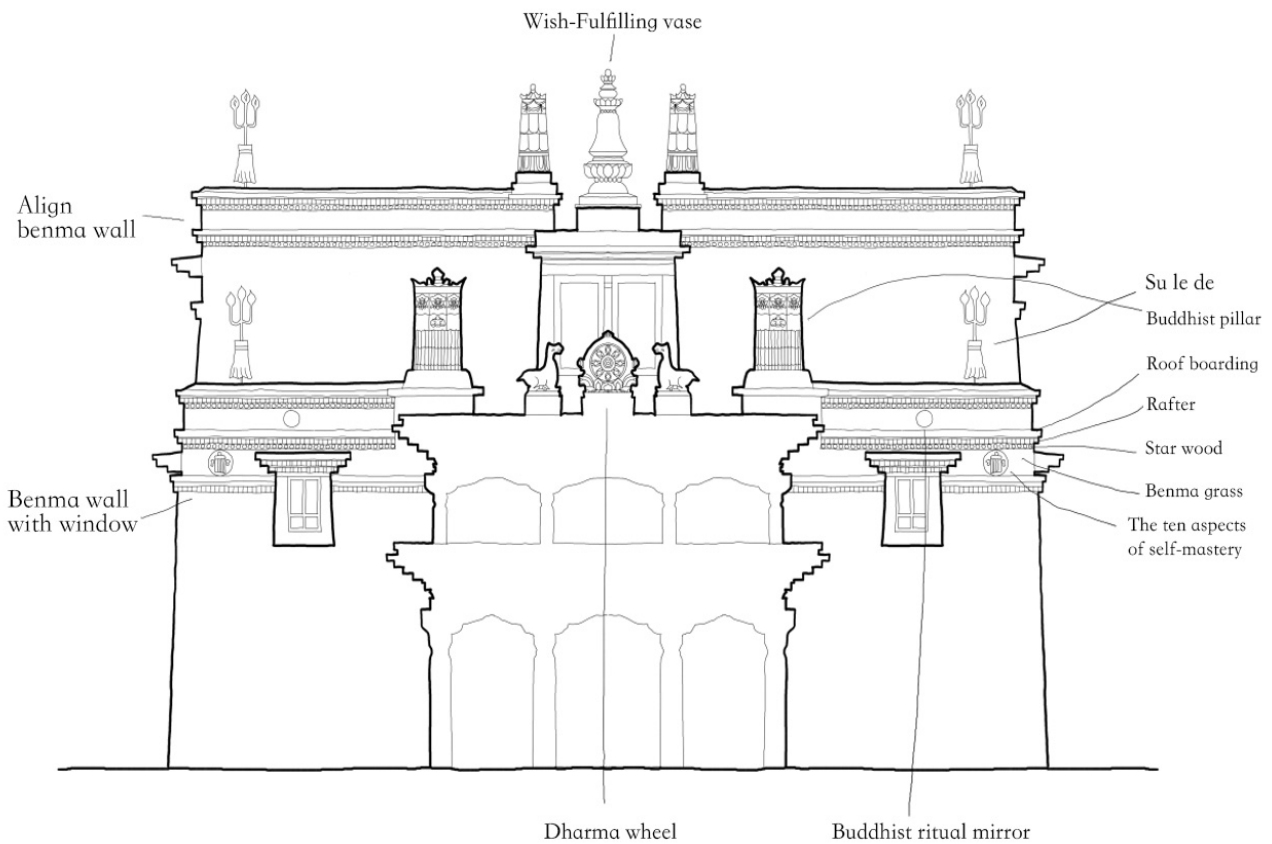
This paper presents an architectural and archaeological study of Benma walls, a distinctive type of Tibetan wall structure found in China. Our objective is to explore the development and evolution of Benma walls across various spatial and temporal contexts, revealing the historical, political, and artistic influences that have shaped them. We employ both empirical and archaeological research methods, drawing on a substantial body of archival materials. This approach allows us to initially identify and examine the characteristics of the three distinct periods of development and evolution of Benma walls, as well as to differentiate the representative styles across various categories, forms, and influences from multiple cultures. Additionally, we aim to reconstruct the significant historical contexts that have impacted the development and evolution of Benma walls.

## Keywords

Tibetan Buddhist architecture; Benma walls; architectural structures

## 1. Introduction

The Benma wall is an iconic type of wall structure and a symbolic type of decorative art belonging to Chinese Tibetan architecture. This style was widely used in the early days for the roofs of Tibetan dwellings, manors, and castle buildings (see Figure 1), serving the roles of being moisture-proof, burglar-proof, and providing heat insulation. After the 13th century, early Benma walls (in the broad sense) were borrowed, integrated, and adapted from the architectural techniques of the Central Plains, Central Asia, and South Asia, creating the variety of decorative styles of the Benma walls (in the narrow sense) we are familiar with today. Especially after the 5th Dalai Lama came to power in the 17th century, Benma walls became a standard accessory for some high-ranking monasteries that wanted to show their wealth, religious power, and rank. After the 20th century, many Buddhist temples began to break away from the original religious hierarchy of their systems of architectural construction and turned to more ornate forms of decoration, using a diverse range of materials to construct Benma walls. The Benma wall even became the main way of decorating the roofs of temple buildings. Moreover, as an important architectural structure and cornice, the Benma wall serves the same multiple purposes as decorative cornices in other parts of the world: to delineate rank and status; increase the volume of the building; convey auspicious symbolism, and; render the atmosphere of a scene. Examples include the roofs of official buildings in the Central Plains of China, the gable roof cornices of Buddhist rock-cut architecture in South Asia, the roof gable cornices of mosques in Central Asia, the cornices of temples in ancient Greece and Rome in Europe, amongst many others.



**Figure 1. Benma Wall (Image Source: Drawn by the author himself).**

In recent years, the contemporary Benma wall has been one of the most overlooked parts of the study of Tibetan Buddhist architecture in China. The majority of the books and papers on the subject often deal with the production, structure, materials, and decoration of Benma walls, and although the research contents are different from study to study, the research results are largely similar. These include “The Archaeology of Tibetan Buddhist Temples” (Bai Su), “An Introduction to Traditional Tibetan Architecture” (Zongwei Xu), “The History and Culture of Tibetan Architecture” (Jiaming Yang. etc.), “The Architecture of the Tibetan People in China” (Yaodong Chen), “A General Overview of Tibetan Architecture in Tibet” (Awangluodidan), “Tibetan Dwellings” (Qujijiancai • Muya), “A Study of the Culture of Tibetan Buddhist Temple Architecture” (Longzhuduojie), the “Himalayan Urban and Architectural Cultural Heritage” series, “Tibetan Buddhist Architecture in Inner Mongolia” (Pengju Zhang), “The History of Tibetan Buddhist Architecture in Tibet” (Yongping Wang. etc.), amongst many other important works. The problem behind this phenomenon is probably due to the simplicity of the structure, production process, and materials of Benma walls, which do not require much planning space or detailed discussion. However, this phenomenon does not mean that Benma walls do not have the potential to be studied in depth. Induced through both summary and analysis, we firmly believe that the Benma wall, as an integral part of Tibetan Buddhist architecture, may not be as simple as we sometimes think. In other words, its role as an important symbol of Tibetan Buddhist architectural hierarchy precisely reflects and implies some important connotations and may involve various social, ethnic, historical, and political factors of a period in time.

Based on the above, this paper is divided into four subsections that analyse the origin of the Benma wall, reveal its developmental trajectory, and analyse the cascading information and spatiotemporal clues hidden behind it. Using empirical research and archaeological perspectives, we compare pictures, archives, research results, and archaeological reports. Based on the comparative approach of the classifications of category, form, and style, we also trace the influence of culture, politics, technology, and aesthetics on the creation of Benma walls in different regions, and reconstruct the relationships of coexistence between Benma walls and history (see Figure 2).

Function and value of Banma grass	
Ecological value	<ul style="list-style-type: none"> <li>● It has the characteristics of cold resistance, high-temperature resistance, drought resistance, salt and alkali resistance, barren resistance, wind erosion resistance and pest resistance.</li> <li>● It can be used as an important afforestation tree species for a windbreak, sand fixation and improvement of saline-alkali land.</li> <li>● It can even be planted in river channels to integrate with sediment and prevent the flood.</li> </ul>
Agricultural value	<ul style="list-style-type: none"> <li>● Its branches are hard and burn for a long time.</li> <li>● It can be used as an important fuel for people in desert areas. Its thick branches can be used as the handle of farm tools.</li> <li>● They are often dried by the people in the Tibetan area and stacked on the roof for emergency needs.</li> </ul>
Feeding value	<ul style="list-style-type: none"> <li>● Its twigs are fodder for sheep, camels and donkeys.</li> </ul>
Medicinal value	<ul style="list-style-type: none"> <li>● Its twig properties: Gan, Xin and Ping. It has the medicinal functions of penetrating rash, relieving exterior, relieving wind, relieving cough, clearing heat and detoxifying.</li> </ul>
Economic value	<ul style="list-style-type: none"> <li>● It can reduce the weight of the wall and stack the roof, which can keep it warm, heat insulated, rainproof, and defend against the enemy and theft.</li> </ul>

Figure 2. Function and value of Benma grass (Image Source: Drawn by the author himself).

## 2. Related studies on Benma walls

In a book on Tibetan archaeology published by Sichuan University, it is stated that the “Benma grass”<sup>1</sup> (sben-ma) used in Benma walls was already being used approximately 2000 years ago as a moisture barrier by the Tibetans in the ancient tomb complexes of Nang County, Nyingchi, Tibet, where it was piled up at the bottom of tombs. In addition, in “The Book of Han”<sup>2</sup> and in “The New Book of Tang”<sup>3</sup> (Yunwang wang.etc), the plant is also recorded in the descriptions of the ancient Loulan Kingdom, where it is collectively referred to as the “Chengliu” plant (also known as *Tamarix Chinensis*). These clues probably indicate that the ancient minorities in the Qinghai-Tibet Plateau and Lop Nur regions were already familiar with the plant’s material properties and used the plant as an important building material. Thanks to the plant’s tenacious vitality and its various practical values (see Figure 3), the Tibetans even affectionately called it the “Guanyin willow” and “Bodhi willow”. Early Benma walls made with “Benma grass” became the main means of heat preservation, anti-theft proofing, heat insulation, and waterproofing for the roofs of Tibetan houses, temples, and palaces in ancient Tibet and during the Tibetan Empire.

<sup>1</sup> Benma grass, Tamaricaceae family, Tamarix genus, the plant is about seven or eight feet tall, with thin wispy branches like vines, a well-developed root system, strong sprouting power, resistant to cold, high temperatures, drought, salinity, infertile soil, wind erosion, disease and insects. Originally a shrub with ecological, agricultural, foraging, medicinal, economic and other values. Tenacious vitality; it can grow anywhere, whether in the Gobi, deserts, sand or saline, river land. It is easy to collect, use and stack. This is done mostly in Tibet, Qinghai, Xinjiang, Gansu and other arid and barren plateaus and desert areas. Its name also varies from place to place; the Central Plains region calling it the “West River Willow”, “Guanyin Willow”, “Three Spring Willow”, “Yin Willow”, “Three Sleeps Willow”, “Longevity Immortal Willow”, while the Northwest regions call it “Golden Dewberry”, “Silver Dewberry”. In the northwest, it is called “Golden Dewberry”, “Silver Dewberry”, “Red Willow Branch”. In Tibetan areas, it is mostly called “Benma Grass”, “Bianma Grass”, “Baima Grass” and “Bianma Grass”.

<sup>2</sup> Loulan is mentioned in “The Book of Han”: ... The land is sandy and saltybriny, with few fields or agricultural land, causing people to leave for neighbouring countries, and the country beside the Yang Valley of the Sending Field. The country produces jade, and is full of reeds, chengliu (tamarix)sk, hutong (populus euphratica), and white grass.

<sup>3</sup> It is also recorded in the “New Book of Tang” that “the Zang (Tibetan) River flows 100 miles *li* to the south of the Zhangsha Luosuo River. Southwest of the river, the land is like the mainstay, the wilderness is fertile, and the river is full of chengliu (tamarix) plantssk. Mountains have many are cypress, with slopes are mound tombs, next to these are houses, red painted red, with painted, painted white tigers painted on them... ”.

The form and style of Benma walls as we know them today actually belong to a style that has evolved through many technological changes and changes to external morphology. For example, Deng Chuanli and Chen Qingying argue that the form of the Benma Wall originated from the military defensive castle architecture of the early Tibetan Empire (Chuanli Deng, etc). where the harvested “Benma grass” was neatly stacked on and around the outer walls, the walls then surrounded by swords and guns. This was not only to prevent surprise attacks, but also to improve the defensive nature of the castle, and to serve the role described in the phrase “borrowing arrows with thatched boats” (see Figure 4). Chen Yaodong and Chen Yi, in their writings and papers, argue that the Benma wall originates from Tibetan nomads’ “Hei zhangfang” (see Figure 5). The main feature of this sort of structure being its low wall of earth and stone underneath it, with the top of the low wall being made from bundles of Benma grass so as to defend against wild animals and loan structural support. They argue that this was later transplanted to Tibetan architecture after a long period of development. In the book “Tibetan Dwellings”, Minyag Choekyi Gyaltzan argues that Benma walls first appeared in the 11th-12th centuries in the dynastic kingdom of Guge and in the northern temple of Sa skya dGon, which shows that the structure and style of Benma walls were already very mature and could have already been in use in temple buildings in the Later Hong period. Awangluodan Ciduozi in the book *A General Overview of Tibetan Architecture in Tibet* argues that the early Benma wall originated from the practice of stacking benma grass on the roofs of peasant houses to save space in the courtyard and to defend against theft. Zhang Yasha and Longzhu Duojie, in their respective monographs, argue that the style of Benma wall we see today was added to existing temples after the Ming dynasty, that is, during the Ganden Phodrang regime (see Figure 6). Of course, some foreign scholars—Carolyn Patricia Shields and Anne Chayet—argue that the current Benma wall style was influenced by the defensive architecture of Central Asia and South Asia as well as by the style of Chinese city walls. In particular, the transformation of Tibetan architectural structures by Sogdian architects, Nehwal (Nepalese) architects, and Chinese craftsmen, led to the transplantation of the function and form of the wall to the roofs of later Tibetan Buddhist buildings. All the above-mentioned studies have discussed Benma walls in detail, with reference to different periods, and have affirmed the important role and legacy of Benma walls within the actual processes of construction in Tibet.



**Figure 3. A protective wall of Nainingqude Temple (Image Source: Old house).**



**Figure 4. Benma grass stacked on the roof (Image Source: Old house).**



Figure 5. Black Tent (Image Source: Old house).



Figure 6. Tibetan Yongbrakon (Image Source: Old house).

### 3. Benma wall source tracing studies

“...The houses have flat roofs, for which masonry is used, they are covered with earth and stone, they are called “diaofang”; they have between two or three to six or seven floors, the people who live in the countryside mostly live on hillsides.” “...People living in the high mountains moved to the plains of the river valleys, where various houses were built with local materials. This included castles and palaces, for which stones were used as flat roofs...” From these quotations, we can see that most of the buildings in the early Tibetan region were towers, earthen forts, and other flat-roofed buildings of a defensive nature.

Although Benma walls were already being used in early Tibetan roofs, this does not mean that the Benma wall style we see today dates from the period of the Tibetan Empire. For example, the early “Jokhang Temple”, “Ramoche Temple” and “Shi'er Zhenbian Temple” were originally built with their forms and spaces modelled on the Chaityas of India, having small spacial scales; their only statues being those of the Buddha (for worship), as well as stupas. In addition, the influence of the fight between the Buddhists and the Bons also led to a general lack of monks and patrons within temples. Therefore, the architecture of early temples is very different from the current ornate temples in terms of scale, form, and status, and cannot even be considered temple buildings in the strict sense promulgated by Buddhism, Dharma, and monks. In other words, present-day ornate Benma walls may not have been built in the “early Hong period”, at least as evidenced by the fact that there are almost no surviving early Tibetan Buddhist temples.

Through an analysis of documentary materials, we find that Benma walls in current Tibetan Buddhist temple architecture—that exist in China—are the result of several renovations and additions made during the Caiba, Sakya, Phagmodrupa, and Gelug periods. Even the features of the temple buildings such as their circumambulation paths, golden roofs, eaves, courtyards, porticos, and so on, were repaired and added during these periods. For example, the golden roof and decorations of Tibet's earliest temple building—“Yum Bu bLa sGang”<sup>4</sup>— were added at later dates. Although we can see traces of the use and remains of Benma walls towards the end of the 10th century in the ruins of the Buddhist Hall of the Guge Dynastic City at Zanda, they [existing examples] all date from the 15th-17th centuries and do not prove that the present-day style of Benma wall was present in the “early Hong period”.

<sup>4</sup> Yum Bu bLa sGang: legend has it that this was the first palace built by the first king of Tibet, Nyatri Tsenpo, the chief of the Yarlung dynasty, in 127 B.C. It is located on the hill of Zhaxiciri, about 5 kilometers southeast of Nedong County in the Shannan region and in the territory of Tradruk town.

The earliest record of Benma walls appears in the Ming Dynasty in the “Collection of Sino-Tibetan History”: “...thereafter he was succeeded by Dpon-chen Ajialunzhaxi. During his tenure as Dpon-chen, he built the parapet of the Sakya Hall with *chengliu* (tamarix) and, in accordance with the wishes and commands of his master, Zangpo Pal, built a great enclosure outside the Sakya Hall in the year of the *yinmu* sheep (*yiwei* 1295), as well as the gold and jade roofs of the stupa commemorating the leaders Drogön Chogyal Phagpa and Dharmapala-rakshita...” This account seems to be consistent with the reasoning of Zhang Yasha and Longzhu Duoje. In other words, we could perhaps say that Benma walls have been around since before the Ming Dynasty in China and have become a standard feature of the architectural structure of Tibetan Buddhist temples.

In addition, the current ornate style of Benma walls was probably formed around the 13th century, in the context of Tibet’s “unity of politics and religion” in which “religious power” overrode “local power”. During this time, the Benma wall gradually became one of the main symbols of religious architectural hierarchy and status (Sopher). For example, in the residences of the nobility such as those of Pandatsang, Shédra, Pingkang, and Sampo amongst others, in addition to the height of the building not being able to exceed the height of Jokhang Temple, even the Benma walls, the colour of the walls, use of gold and copper components as well as other decorations were not allowed to be used, even amongst the residences of the general nobility and in temples. Benma walls could only be erected if high-ranking residences or Tibetan-style residences enshrined the complete collection of the 103 books of Kangyur and the 225 books of the Tengyur. Few people at the time had the resources to do so.

Through a process of reasoning, this paper finds that all documents and extant examples prove that the current diversity of standardised Benma walls probably took shape around the 13th century. At this time, Tibet was in a period of “unity of politics and religion” and was ruled by the Caiba, Sakya, Phagmodrupa, and Gelug. With the support of religious leaders, many of the early temples borrowed their functions and structures from Central Asia, East Asia, South Asia, and other regions, and added to them by renovating their buildings several times. This included the Benma walls and gold roofs. Of course, this shows that the current standardised and diversified form of Benma wall is not only the inheritance and innovation of the Benma wall structures of the early residential and defence buildings but also the inevitable result of the integration and progress of Tibetan techniques of construction.

#### 4. The transformation of the functions of Benma wall structures

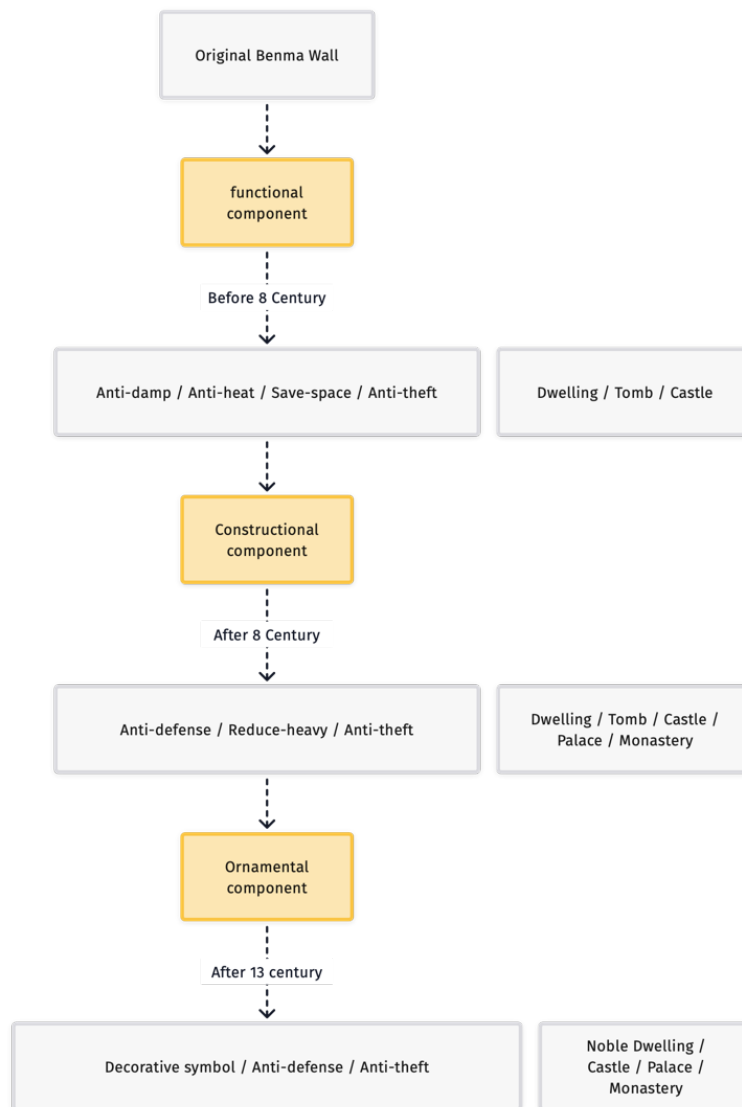
After the 13th century, Tibetan Buddhist architecture began to take root in Inner Mongolia, Beijing, Shenyang, and other regions of China. Temple architecture underwent great changes in the types of materials used, techniques, and construction procedures. This was all so that temple structures could better adapt to the various local traditional cultures and building cultures, as well as to fulfil the faith-based needs of the nobility and common people. Benma walls, as an integral part of Tibetan Buddhist monastic architecture, also began to combine different regional cultures and construction techniques, taking on many forms and styles, thus forming the initial standardised version of the Benma wall. The Benma wall was gradually transformed into something decorative, whilst also providing the functional characteristics of weight reduction, defence, anti-theft, and heat insulation (see Figure 7).

For example, in Tibet, Qinghai, and Gansu, where resources, technology, and financial resources were relatively scarce, the roofs of early Tibetan Buddhist buildings were mostly made with traditional Benma wall “sben-ma” masonry, decorated with short rafters, wooden panels, gilt-bronze carved animals, and pagodas. There were also a considerable number of monasteries that resembled Luolong Shuodu Zhacang, in that they used rammed earth and stones which were then painted with red lacquer to simulate a Benma wall. Only a few high-ranking monasteries further demonstrated their noble status by adding more complex overhanging structures, stacked structures, or windows (where structures allowed), even building Benma walls beyond the specifications. This was especially the case for the practice of layer stacking of Benma walls, with more layers indicating a higher rank of temple building.

This was in contrast to the Central Plains, where natural resources were abundant and construction techniques well developed. A large number of monasteries were no longer bound by religious doctrines and regulations and used “flower bricks”, “green bricks”, “slate tiles”, and “concrete” in original ways to replace and simulate the Benma grass used in Benma walls. For example, in the central ornaments of the Benma wall roofs of the buildings in Xilamurenzhao<sup>5</sup> and Meilijianzhao in Inner Mongolia, “mouse stealing grapes patterned”, “peacock peony patterned”, “curled grass patterned” and “plum, orchid, bamboo, chrysanthemum patterned” carved bricks were used. For example, the Benma wall of the Great Sutra Hall at Xilitu Zhao, Inner Mongolia, uses “green” glazed bricks and golden flower

<sup>5</sup> The word “Zhao” means “temple” in Tibetan.

bricks instead of Benma grass. Another example is that of the combination of brick walls and glazed tiles that imitate Benma walls in the eight outer temples of Chengde, Putuo Zongcheng, and the Xumi Lingjing of Beijing, where the walls are not decorated in any way but only show symbols of rank. All these examples show the development of technology of the masonry of Benma walls and demonstrate their transformation from function to decoration. These examples also illustrate the increasing diversification and ornamentation of the form and structure of the Benma wall. In addition to the innovations in wall construction materials and exterior styles of Benma walls, some super-standard structural styles and decorations are more commonly found on the roofs of Tibetan Buddhist monastery buildings in various regions of China.



**Figure 7. Transformation of architectural functions (Image Source: Drawn by the author himself).**

We believe that the Benma wall was, to a certain extent, reduced to a religious symbol sought after by monasteries in various places to demonstrate wealth, power, and status (Figure 8). The functional transformation and extravagance of the Benma wall therefore directly echoes the struggle for power and extreme corruption of the Tibetan ruling class from the 18th century onwards, as well as the difficulty of maintaining religious institutions and precepts. Looking at this from another perspective, the driving force behind the emergence of a large number of luxurious monastical buildings was the political ideology of the Ming and Qing dynasties, encapsulated in the political ideas of “rule of

feudalism and custom,<sup>6</sup>” and “raising the yellow religion so as to secure the Mongols<sup>7</sup>” that concerned the ruling of the borderlands. Of course, the change in the functionality of Benma walls was also one of the key elements in the development of monastical architecture.

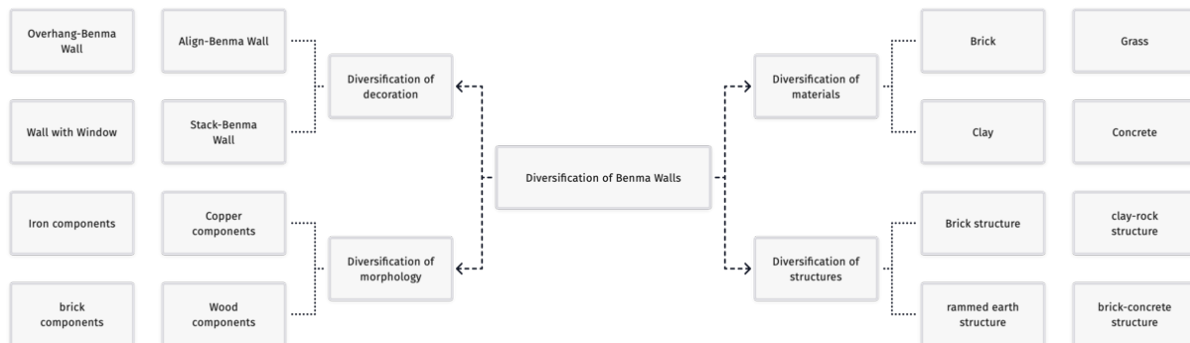


Figure 8. Diversified expression of the Benma wall (Image Source: Drawn by the author himself).

## 5. Types and characteristics of Benma walls

After the 13th century, the Benma wall started to undergo various spatio-temporal changes. Through the classification and comparison of examples of monastic architecture in Shenyang, Beijing, Inner Mongolia, Gansu, Qinghai, Tibet, Sichuan, Yunnan, Xinjiang, and other regions, the contemporary Benma wall can be divided into “category”, “form” and “style”<sup>8</sup>, with “aligned”, “stacked”, “overhanging”, and “with window” being four important standard form types (Figure 9). Also, we have listed some hybrid cases in which Benma walls are found, such as “aligned + stacked”, “overhanging + stacked”, “aligned + with window” and so on. The following descriptive descriptions and analytical reasonings are carried out for each of the following four base types:

The early Benma wall (form A) is the earliest style of Benma wall in Tibet, which is commonly found on the roofs of all kinds of residential houses and towers, and has been continued to this day. Therefore, form A is different from form B, C, D, or E of the Benma wall in that it is mainly made by placing bundles and unprocessed piles of Benma grass on the roofs of buildings, thus belonging to the “category” of not having a standard mode.

The “aligned” form of Benma wall (form B) is the most common type of monastic architecture from the 13th century onwards, its appearance proving the start of the standardisation of Benma walls. The structure of form B is based on the arrangement of short rafters that run aligned with the wall from bottom to top<sup>9</sup>, wooden planks, long rafters<sup>10</sup>, Benma grass (wall section ratio of 2/3 to 1/2), stone masonry (wall section ratio of 1/3 to 1/2), capstones, capstone rubble, and clay. With the advancement of techniques of brick masonry, rammed earth, and stone masonry, the B-form Benma wall evolved into the diverse “styles” of Bi-style, Bii-style, Biii-style, Biv-style, and Bv-style, and was the most widely used form in Tibetan Buddhist monastical architecture in different regions and periods.

The “stacked” benma wall (form C), commonly found in the sutra halls of the highest-ranking monasteries, is a multi-layered Benma wall structure superimposed on top of the original form B Benma wall; it further emphasises the noble status and prestige of the building. This form of Benma wall is commonly found on the roofs of Tibetan Buddhist buildings from the 15th century onwards, and has evolved into Ci, Cii, Ciii, and Civ styles. For example, the roof of the Tibetan Potala Palace and the sutra hall of Jokhang Temple are stacked with up to three layers of Benma walls, with the colours of the tops and bottoms of the walls divided into red and white.

<sup>6</sup> The policy of the Ming Dynasty on governing Tibet was often summarised by contemporary Chinese scholars as “rule of feudalism and custom”; a mode of administration adapted to local conditions.

<sup>7</sup> “The Lama’s Sayings” clarifies the fundamental purpose of “promoting the Yellow Sect so as to secure the Mongolian people”, and states that this is the major policy of “securing the Tibetan people and setting up a permanent basis for national peace”.

<sup>8</sup> In the late 1950s, the method of dividing artefacts into categories, forms, and styles and judging periods and dates based on groups of relics and monuments was first used by Su Bingqi. Category: Typical artefacts, which refer to the most common artefacts in an archaeological culture or cultural remains of the same period and form a basic combination of such. The basic conditions are number of excavations; perishable artefacts; rapid change; change amplitude. Form: similar artefacts with parallel development. Style: inheritance and development within similar artefacts.

<sup>9</sup> “Short rafters” may also be called square rafters, baibu, basuo, chuanmu rafters, tiaomu, and flying rafters.

<sup>10</sup> The “long rafters” may also be called yueliang fang, kaxing, star wood, and cross rafters.




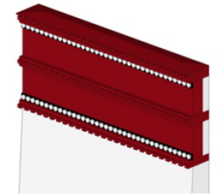
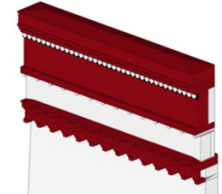

Classification of the Benma Wall			
Category	Form	Style	Cases
Category-1 Non-standard mode	A Form: Put the Benma grass on the roof	The Benma grass is stacked on the roof or placed on the roof after processing or is fixed on the roof by boards.	<ul style="list-style-type: none"> <li>● Tibetan dwellings</li> <li>● Tibetan blockhouse</li> <li>● Tibetan Castle</li> </ul>
Category-2 standard mode	B Form: align Benma wall 	<p><b>Bi Style:</b> Benma grass is replaced by the brick wall</p> <p><b>Bii Style:</b> Benma grass is replaced by tiles</p> <p><b>Biii Style:</b> Benma grass is replaced by concrete</p> <p><b>Biv Style:</b> Benma grass is replaced by bricks and other plants</p> <p><b>Bv Style:</b> use traditional Benma grass</p>	<ul style="list-style-type: none"> <li>● Jiangke Temple, Gansu</li> <li>● Xumi Lingjing Temple, Beijing</li> <li>● Wushenzhao, Inner Mongolia</li> <li>● Labulung Temple, Inner Mongolia</li> <li>● Xila Muren Temple, Inner Mongolia</li> <li>● Putuo Zongcheng, Chengde</li> </ul>
	C Form: stack Benma wall 	<p><b>Ci Style:</b> Benma grass is replaced by the brick wall/stack 2~3 layers</p> <p><b>Cii Style:</b> Benma grass is replaced by concrete/stack 2~3 layers</p> <p><b>Ciii Style:</b> Benma grass is replaced by bricks or other plants/stack 2~3 layers</p> <p><b>Civ Style:</b> use traditional Benma grass/stack 2~3 layers</p>	<ul style="list-style-type: none"> <li>● Potala Palace, Tibet</li> <li>● Labrang Temple, Gansu</li> <li>● Jokhang Temple, Tibet</li> <li>● Wudangzhao, Inner Mongolia</li> <li>● Tashilhunpo Temple, Tibet</li> </ul>
	D Form : overhang- Benma Wall 	<p><b>Di Style:</b> Benma grass is replaced by bricks or other plants/cornice</p> <p><b>Dii Style:</b> use traditional Benma grass/cornice</p>	<ul style="list-style-type: none"> <li>● Sakya Temple, Qinghai</li> <li>● Baiju Temple, Gyangze</li> <li>● Guge Temple, Tibet</li> <li>● Zhashilunbu Temple, Tibet</li> <li>● Kejia Temple, Tibet</li> <li>● Wala Temple, Qinghai</li> <li>● Wuqi Temple, Tibet</li> </ul>
	E Form: wall with window 	<p><b>Ei Style:</b> Benma grass is replaced by the brick wall/Set windows or floating windows</p> <p><b>Eii Style:</b> Benma grass is replaced by concrete/Set windows or floating windows</p> <p><b>Eiii Style:</b> Benma grass is replaced by bricks or other plants/Set windows or floating windows</p> <p><b>Eiv Style:</b> use traditional Benma grass/Set windows or floating windows</p>	<ul style="list-style-type: none"> <li>● Potala Palace</li> <li>● Niangma Temple, Gansu</li> <li>● Yamen Temple, Inner Mongolia</li> <li>● Dianbusige Temple, Inner Mongolia</li> <li>● Dongbao Laqin Temple, Qinghai</li> </ul>

Figure 9. The classification of the benma wall(Image Source: Drawn by the author himself).

The “overhanging” Benma wall (form D), unlike forms B and C, is more decorative and has better waterproofing and defensive properties than forms B and C. In the case of wall structures that project out into the outer rammed earth walls, many monastery buildings also have decorative objects such as outwardly-projecting *dougong*, arches, bargeboards, pearl pendants, and bronze bells around their gables. From the records of the Tibetan kings’ courtiers and the records of the restoration of the Sakya monastery in the “Collection of Sino-Tibetan History”, it is known that form D may have been formed as early as the 13th century or before, with this certainly being the earliest Chinese record of Benma walls. In addition, although Form D is likely to have appeared in defensive citadel architecture during the period of the Tibetan Empire, there are no current documents or extant examples to verify such a claim. By classifying and summarising representative monastic buildings, we find that form D appears in only a small number of early monastic buildings before the 18th century and is rarely used in later monasteries. Far more monasteries have preferred form C of the Benma wall.

The “with window” Benma wall (Form E) mostly appeared after the 15th century. Benefiting from the perfection and maturity of masonry techniques of monastery-building, form E is based on the B and C forms, and has added (bay) windows in the middle of the Benma wall, so as to increase its air permeability and aesthetic effect. It also represents the highest technical level of Tibetan Benma wall masonry technology. Its styles are Ei, Eii, Eiii, and Eiv.

### 5.1 Spatial variation in the development of Benma walls

Combining the classification and characterisation studies as presented above, this paper finds that Benma walls have had a tendency to evolve from Western to Eastern localisation. That is, whilst their practical functionality and structural nature gradually diminished, their symbolic and decorative nature gradually strengthened. The occurrence of Benma walls of forms D and E decreased gradually. On the other hand, forms B and C of the Benma wall gradually increased. This reflects the fact that the temporal and spatial evolution of Benma walls is mainly influenced by the political, technological, and regional cultures of different regions.

In Beijing, Shanxi, and Chengde, for example, Tibetan Buddhist monastical architecture spans the Yuan, Ming and Qing dynasties. The design concept of their monastical architecture is oriented towards “imitation”, with the layouts of building plans focussing on the interpretation of the Buddhist spatial iconography of “Mandalas” and “Mount Meru”. The architectural forms of the buildings largely reflect the orthodox culture of the Central Plains, in which the King’s power was centralised, all laws were unified, and all were unified with the universe. As is stated in Zhaolian’s “Xiao Ting Miscellaneous Records”, “The state favours and believes in the Yellow Sect, not because it worships its teachings or through it prays for blessings, but because the Mongolian tribes have respected and believed in the Yellow Sect for a long time, so they set up the religion as the Way of the Gods, so as to make them sincerely attached to them, and to block any such barriers.” This thinking also influenced the structure of the Benma wall. This paper finds that the simple form B of the Benma wall in these areas was mostly copied in a rough manner, usually using brick and stone instead of Benma grass, and then painted with red and white plaster, topped with green and yellow glazed tiles, with the middle part either being without any decoration at all or containing an additional Buddhist altar—along with “false windows” to create atmosphere.

For example, in Inner and Outer Mongolia, the majority of Tibetan Buddhist monasteries built during the Ming and Qing dynasties were built using a combination of Chinese and Tibetan styles. Due to this large geographical span, these types constitute the largest number of buildings currently in existence. The multi-ethnic culture of the region is mixed and diverse. Tibetan, Sino-Tibetan, and Chinese monastical architecture varies from west to east. Therefore, the forms of Benma wall in the area are also relatively diverse, with most belonging to forms B and C, with only a few higher-ranking monasteries using the Biv and Bv styles. At the same time, due to the differences in climate and vegetation growth between east to west, the Benma grass sections of many Benma walls were replaced with materials such as bricks, *setaria viridis*, brushed cement, rammed earth, and so on. This is one of the main reasons that caused the diversity of Benma wall types. Of course, all of this is also due to the Qing Dynasty’s policy of “multiple feudalisms”, during which monasteries were used as “gifts” and “barriers” in order to draw in and maintain social stability and ethnic harmony. As described in “Qianlong on the Lama’s Sayings”: “The Yellow Sect, both at home and abroad, is headed by this Person. All Mongolian tribes return to him with one heart. To promote the Yellow Sect, that is, to secure the Mongolian people is no small task, so we must protect it, not like the Qubi of the Yuan Dynasty who flattered the monks.”

For example, in Qinghai and Gansu, where most Tibetan Buddhist monasteries were built in the Ming and Qing dynasties, the types and styles of Benma walls are comparable to those of Inner Mongolia. Forms B, C, D, and E

Benma walls were made using traditional Benma grass and gradually increased. Styles Bii, Biv, Bv, Ci, Ciii, Civ, Dii, and Eiii have also begun to appear more frequently. There are even some Benma walls in monastery buildings that use brick and stone elements to express wooden elements, such as those of Tuwa Temple, Xiangta Temple, Keque Temple and so on in Qinghai. There are also some temple buildings that incorporate Benma walls into the structure of Han-style temple buildings, such as at Xaqiong, Xialu, and Xiongqian Temples in Qinghai, where the buildings are built with Chinese Han-style heavy hip-and-gable roofs, while the walls between the eaves and columns are built to include E form or B form Benma walls. This is a technique that softens the excellent building techniques of both elements and greatly enhances the performance of the building in its weight reduction, moisture resistance, corrosion resistance, and rain resistance. The Sino-Tibetan style of architecture in Tibetan Buddhist monasteries appeared in large numbers during the Ming Dynasty and after. The driving force behind this was the Ming Dynasty's ruling policy of "establishing religion by virtue of custom" and "ruling by virtue of custom". In this regard, Ming Wanli said: "Our ancestors lived on the western frontier, and established religions based on customs, which benefited the Qiang, so they built Buddhist temples and bestowed special edicts on them." Therefore, by building and restoring a large number of Tibetan Buddhist monasteries in a combined Han Chinese and Tibetan style, the exchange and union of the two religious forces of Mongolia and Tibet was blocked from the perspective of cultural subjectivity and ideology. In addition, the Qing Dynasty's building and granting of royal temples such as the Summer Resort, the Lama Temple, and the Eight Outer Temples of Chengde also served this purpose.

For example, monastery buildings have existed in the Tibetan region from the 11th century to modern times. Influenced by the climate and resources of Tibet, monastery buildings are more geared towards architectural performance, so forms B, E, and D of Benma walls are more common compared to other regions, and styles such as Aiii, Bv, Civ, Dii, and Eiv also exist in large numbers, such as Gongtang Temple, Gongdelin, Sakya Temple, Baiju Pagoda, Phutshog Ling Temple, Lazi Qude Temple, Zadong Temple, Guge, Zhaxigang Temple, Tradruk Temple, Sanga Gutuo Temple, Sangye Temple, and so on. In addition, the Benma walls of the region are more traditional and complicated in terms of production methods, decoration methods, construction procedures, the handling of Benma grass, overlapping of wooden structures, masonry in wall construction, the boiling and mixing of paint, and other such processes of masonry that need to be carried out simultaneously.

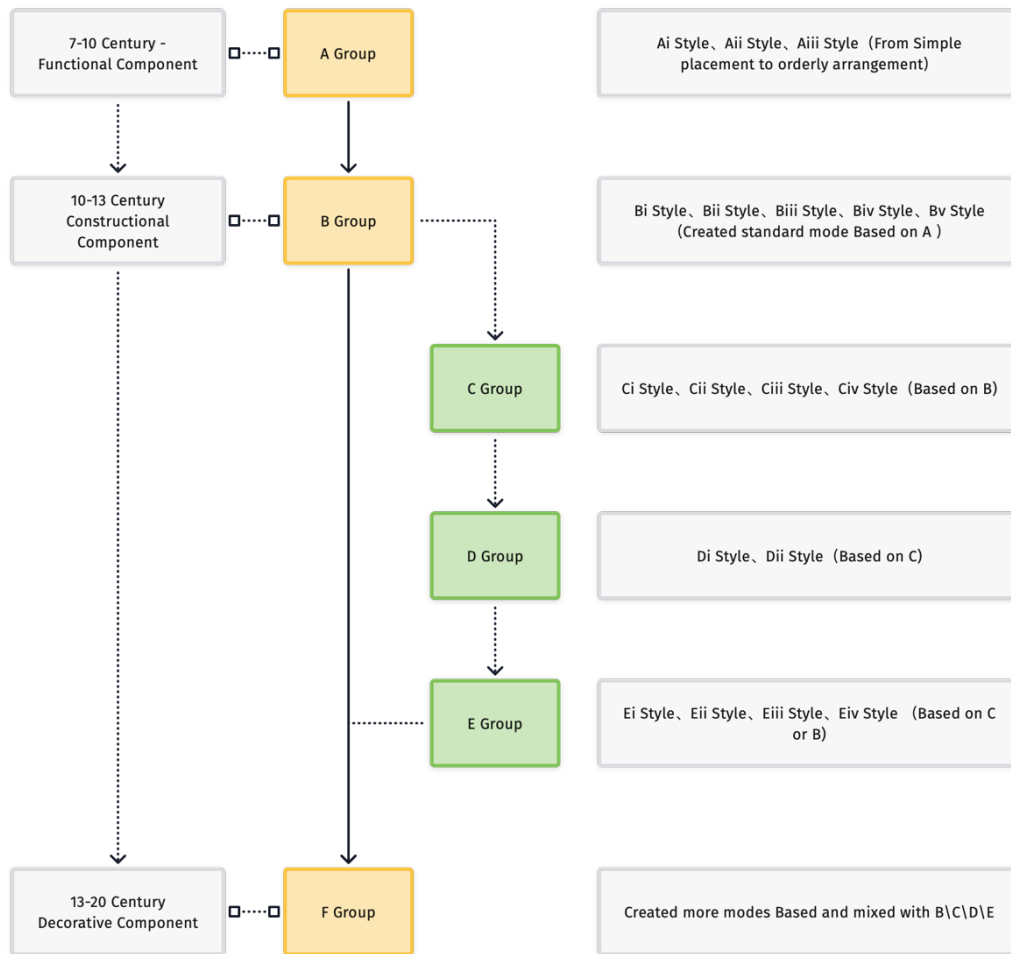
## 5.2 Evolutionary staging of Benma walls

This paper, in conjunction with the previous sub-conclusions, infers that the evolution of the Benma walls may be divided into three periods, namely: the period from the 7th to the 10th centuries when the Tibetan (Tufan) Empire held power (practical functional components); the period from the 10th to the 13th centuries when the tribes were divided (structural-functional components); and the period from the 13th to the early 20th centuries when there was a unity of religion and politics (decorative functional components) (Figure 10).

From the 7th to the 10th century, Tibetan architecture during the period of the Tufan Tibetan Empire was mostly composed of rammed earth houses, adobe houses, and carved houses—and earthen forts or watchtowers when these elements were collected together. Buddhism was not yet popular in Tibetan areas, with sutra halls, Buddhist halls and other spaces of faith-based functions appearing only in the earthen forts and watchtowers of these spaces. The initial monastical buildings and grottoes were generally small in scale, mostly imitating Indian Buddhist architectural spacial patterns, such as Jokhang Temple, Ramoche Temple, Sangye Temple, the Fawang grottoes, and so on. In addition, because of the "Buddhism-Bon disputes" at the time in Tibet, most of the surviving early Tibetan temples were extensively added to and repaired after the 13th century. Thus, there is no evidence of any standard Benma walls being used in Tibetan Buddhist monastic architecture before the 10th century, at least not yet. However, we can infer from an architectural perspective that the use of Benma walls from the 7th to the 10th centuries would have been more oriented towards satisfying practical functional needs, and would probably have been different from the complex standard patterns we see today. It also would not have had decorative or hierarchical functions. This is why "A-form" Benma walls appear in large numbers on rammed earth houses, castles, and carved houses in Tibet. This includes the Ai, Aii, and Aiii styles. These not only met the needs of survival in the harsh climate of Tibet, but also provided basic functional properties such as heat preservation, heat insulation, moisture-proofing, anti-theft proofing, and material stacking.

The 10th to 13th centuries were not only a period of local separatism in Tibet, but also a period of resurgence of Tibetan Buddhism. With the economic, political, and policy-based support of the Yuan government, various local family forces in Tibet built temples and carried out the translation of scripture. Many monastical buildings of this

period imitated the form of monastical buildings of the early Hong period, with the space and scale of buildings gradually increasing, serving to satisfy the increase in followers as well as defend against external invasion. This led to structural changes in Benma walls, as a means of meeting the needs of weight reduction, defence, protection against rain, sun, and moisture, as well as the decoration of the huge building walls. The Benma walls of this period were initially composed of the standard patterns of forms B and D and were dominated by the traditional Bv and Dii styles. An example is the Benma wall in the upper part of the Sakya-nan temple and the city wall.



**Figure 10. The evolutionary staging of Benma walls(Image Source: Drawn by the author himself).**

The period of politico-religious unity from the 13th century to the early 20th century was a period during which local sects such as the Caiba, Sakya, Phagmodrupa, and Gelug ruled Tibet in succession. Many temples continued to build on their original foundations, expanding their Buddha halls and sutra halls, adding external circumambulation and worship corridors and walls. 15th century Tibetan Buddhist architecture eventually formed a complete structure of monastic hierarchy, something that was reflected in various aspects such as construction, scale, pillars, roofs, worship paths, decoration, and so on. In the 17th century, after the 5th Dalai Lama established the Ganden Phodrang regime, the addition of systems of Benma walls became a distinctive feature of Tibetan Buddhist architecture with Benma walls gradually evolving into a form of roof decoration and a way of symbolising superior rank (Long Zhu Duo Jie). In this period, the complex and standardised B, C, and E forms became widespread, with the stacked, multiple-layered C form, in particular, becoming the main means of reflecting the architectural dignity of high-ranking monasteries.

As the spread and development of Tibetan Buddhism reached its peak around the 18th century, the rulers of the Qing dynasty became deeply aware of the political efficacy of Tibetan Buddhist temples and their political value in the process of the dynasty’s “Great Unification” (Qi Meiqin and An Ziang). Therefore, in order to draw in minority

groups and check Tibetan religious influence, many Tibetan-style temples were built—by royal decree—in Beijing, Inner Mongolia, Gansu, and Qinghai. These temples not only constituted a special political arena representing the “presence of the state”, but also reflected the trajectory of the integration of a frontier religion into the mainstream ideology of the central dynasty. At this time, in order to adapt to the construction needs of various places as well as to the needs of large-scale construction, Tibetan Buddhist temples accelerated the secularisation of religion; many traditional building practices were not confined to religious hierarchies and teachings but were subtly reconfigured and integrated with local building techniques and cultures. Benma walls of different materials and aesthetic expressions, such as the Bi, Bii, Biii, Bv, and Ci styles began to appear in large numbers. In addition, more advanced masonry techniques contributed to the emergence of Benma walls as important elements with decorative functions. For example, the Benma walls of royal Tibetan temples such as the Eight Outer Temples in Chengde and Wutai-shan were either omitted outright or simply imitated with mere brickwork.

The Qianlong Emperor also made various comments on this topic, saying: “Imitate the religion of the West to guard us make an example for China”, and “Something does not have to be rigid, there is no harm in something being natural and unrestrained”. What is more interesting is that the tendency and trend to simplify and to make ornamental was also reflected in the roofs of the royal buildings of the Ming and Qing dynasties. The same cannot be said for the Tang and Song dynasties. (Li Yunhe) For example, *dougong* became smaller, the variety of roof styles decreased, overhanging eaves became shorter, and so on. This is, of course, another topic altogether. Thus, the spatio-temporal changes of the elements of Benma walls not only show us the development of Tibetan Buddhist architecture but also, from one perspective, evidence of various Chinese dynasties’ changes in political attitudes towards Tibetan Buddhism.

## 6. Conclusion

Benma walls were already present in Tibetan architecture from an early date and were widely used to meet the basic construction needs of Tibetan castles and dwellings. The 10th century to the 13th century was a period when Tibetan Buddhism was reinvigorated and architectural technology shifted from “learning from without” to “digesting within”. By improving the production technology of Benma walls, the structural and functional requirements of large temple buildings were met, and standard forms and styles began to exist. In the 15th century, the political, economic, and cultural aspects of Tibet were increasingly controlled by various regimes that were politically and religiously unified. Tibetan Buddhist architecture not only represented different Tibetan political and religious power centres, but also formed a complete structure of monastical architectural hierarchy. Hence, the function of Benma walls changed again, with these walls widely being used as a kind of hierarchical and decorative symbol for the roofs of Tibetan Buddhist buildings of various sects. In the 17th century, the Qing government made great efforts to draw in Mongolian and Tibetan religious leaders and nobles and granted and assisted the construction of monasteries—located largely in Beijing (Inner) Mongolia, Sichuan, Gansu, and Yunnan—that sprung up like bamboo shoots after spring rain. As a standard configuration of monastical architecture, Benma walls were combined with different local construction practices and materials, and a wide variety of Benma wall categories, forms, and styles were derived. These are used as iconic and symbolic components of Tibetan Buddhist architecture to this day.

Within different political, cultural, and technological contexts, four standard styles of Benma wall have been produced; these have undergone diverse fusions and reconfigurations, and have gradually moved towards secularisation, diversification, and localisation. At the same time, the Benma wall also underwent three periods of dramatic transformation, i.e., from a utilitarian function to a structural function, to a decorative function. In addition, the development and evolution of the Benma wall not only reflects the different political backgrounds, historical backgrounds, techniques of construction, decorative aesthetics, and other matters of heritage but also is an important “living” example of the wisdom of the surrounding ethnic groups who learn from and internalise each other. The Benma wall has become a microcosm of the artistic and cultural development of Tibetan Buddhist architecture.

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