ONE

Representations of Architecture on Vessels of the Warring States Period

The period of the Warring States takes its name from seven major and some dozen additional polities that vied for power between 475 and 221 BCE when they were unified by China’s First Emperor, Shi Huangdi, who established the Qin dynasty in 221. Each state or kingdom had its own ruler and its own capital. Bronze casting had emerged in China in the second millennium BCE. In the Warring States period, bronze and iron were crucial for weapons and other elements of warfare, but these were only a tiny portion of bronze objects in use at the time. In the Warring States period, most ritual bronzes were decorated, often with narrative scenes, and architecture frequently is the backdrop for those scenes. From this period when monumental architecture survives only in the form of tombs and excavation sites, the representations on bronze vessels are some of the earliest evidence of Chinese architecture.

Ancient texts tell of prosperous Warring States capitals and their beautiful palaces. Many ruins of fortified cities and high-rising building foundations from the period are extant, and their vast dimensions are consistent with historical records. However, most Warring States buildings combined earth and wood, so that it was almost impossible for them to survive the continuous warfare of the period or later natural destruction. None survives today.

A great number of large-scale architectural sites from the Warring States period have been excavated. Many are characterized by high foundations for multistory buildings; others clearly were single-story. The ruins allow us to understand certain aspects of building technology, particularly the feature known as taixie (high platform), whereby a wooden frame was built around an earthen core to provide support from underground for a tall structure. But excavation sites do not tell us what buildings looked like. However, bronze vessels with representations of architecture on them were discovered at some of the excavation sites. The combined study of their visual imagery with on-site information provides important clues about Warring States architecture. This essay is a discussion and comparative analysis of eleven bronze vessels that offer important information about Chinese architecture of the fifth through third centuries BCE.
Representations of Architecture on Warring States Bronze Vessels

Images of architecture are represented in bronze in the Shang (ca. 1600–1046) and Western Zhou (1046–770) dynasties and in larger numbers in the Warring States period. They are categorized here according to the technique used in the representation: *mozhu* (molding and casting), *qiancuo* (inlaying), *zanzao* (engraving), and *kehua* (incising). The first two techniques are quite simple; the latter two are more sophisticated.

MOLDED AND CAST IMAGES

Two examples are especially important. The first is a wine vessel with a scene of food offering in the Palace Museum, Taipei (fig. 1.1). A two-story building stands on a platform made of stone blocks or timber joists on the outer sides and vertical columns of stone or wood evenly spaced between them, dividing the platform into twelve small compartments. Wooden balustrades approached by steps are on the sides. The first story of the building has three columns that form two bays. The upper parts of the columns bulge outward, suggesting the use of cap-blocks (*ludou*); longitudinal lintels (*mei*) are installed above, and further above are crossbeams or transverse floor joists (*diban longgu*) that, in turn, carry the longitudinal floor joists (*dimianfang*) and floor planks. Sloping “waist eaves” (*yaoyan*) project from all four sides of the building, and above are the balustrades of the second story. This upper story has columns only under the eaves on the front and rear sides. Cap-blocks are indicated at the column tops. The image abruptly ends here, and the roof is not depicted. The first and second stories of the building each have two entries: two double-shutter doors at the lower level and a single- and a double-shutter door at the upper level. On both floors, some people offer food whereas others are seated and drink. As a whole, the image illustrates a two-story timber frame building erected atop a platform with waist eaves installed at the top of the lower floor. The design probably corresponds to a wooden framework erected around a rammed-earth core to prevent the building from falling down. The doors probably were made of stiles (*biankuang*, vertical frame members), rails (*motou*, horizontal frame members), and panels in between.

The second bronze wine vessel has scenes of feasting and hunting. The upper part of the vessel’s surface is divided into two pictorial panels, each of which has one building, divided by a decorative panel (fig. 1.2). The upper panel illustrates an architectural framework for ritual archery and mulberry picking.

1.2. Detail of cast decoration on bronze *hu* showing two pictorial planes of decoration. Excavation site unknown; whereabouts unknown.

The building where the archery takes place is small and directly on flat ground. It has two eaves columns with cap-blocks and brackets or braces to support the roof. Single incisions indicate that the roof has a central flat top framed by downward-sloping eaves.
The lower panel is backdrop for a feast, probably a ceremonial celebration. It takes place in a building elevated on a high platform. A long flight of stairs leads to the platform on top of which one figure hunts and those in the center of the hall offer wine in a horn cup. A tray with wine vessels is next to them. The building above has only two eaves columns (only one of which is shown in the drawing) crowned with brackets parallel to the wall plane and straight wooden strips that join two pieces of purlins together (timu) to uphold the roof. The roof has diagonally sloping eaves at the front, back, and two sides with a flat top in the center. Under the platform musicians play drums and bells are suspended. A figure on the staircase that leads to the first floor probably holds a spear. In addition to the buildings represented, this vessel is important because it has a very early example of a building elevation.

INLAID IMAGES

Again we look at two examples. One is in the Palace Museum, Beijing. The second is the most famous example of a Warring States period bronze vessel with pictorial planes on which architecture is represented. It was excavated in Chengdu, Sichuan province, in 1965 and is in the Sichuan Provincial Museum in Chengdu. Like the vessels discussed above, it is of the type hu, used for wine. Five details of architecture on the two vessels are shown in figure 1.3.

The vessel now in the Palace Museum (figs. 1.3-1, -2) has a scene of feasting and a smaller one for ritual archery. Both have foundation platforms shown as two thin horizontal bands of rectangles. Bronze vessels, perhaps of the type known as ding that can be supported by three or four legs, are shown to the right below the platform. Chimes are set up to their left, and bells are farther left. The instruments may be jade or bronze and are supported on wooden frames. The building above is one story. Columns are positioned under the eaves but not inside. The pillars support two differently sized rectangles that form a trapezoidal shape that denotes cap-blocks with brackets or timu to support the roof above. The roof has four downward-sloping sides with a flat top that consists of two thin horizontal bands of rectangles probably intended to show the wooden roof frame. Inside the hall a figure pours wine from a hu into a drinking vessel and another figure offers wine to yet another one; two human figures standing under the eaves on each side are about to enter the hall. The drinking vessels are shown in cross-section so that the viewer sees the level to which they are filled (fig. 1.3-1). The architecture for the ritual shooting also has bracket clusters atop columns and a roof with overhanging eaves (fig. 1.3-2).
Three buildings are shown on the vessel unearthed from a tomb in Baihuatan, Chengdu: one for feasting and two for ritual shooting (fig. 1.3-3 through -5). The banquet hall has two stories. Bracket sets on top of eaves columns support the upper story. Two thin horizontal bands denote the floor above the columns. The second story also has only eaves columns. Single-step bracket sets are on top of them. On this second floor, vessels are on stands. A figure holding a spear stands under one eave and a figure on the other side holds a sword. On the lower floor, bells and chimes are played. The buildings with scenes of ritual shooting have only eaves columns to support the roof; one of them has column-top bracket sets. The roofs of all the buildings have flat tops framed by downward-sloping eaves. The curved line on the lower level of figure 1.3-5 designates a structure within the larger building, perhaps something like a tent.
An oval-shaped bronze cup from the Warring States period in the Shanghai Museum has three images of architecture, two inside and one on the outside. They were engraved with a small chisel and contain dashed lines. The two buildings on the inner surface, one of feasting and the other of ritual shooting, have many similarities (figs. 1.4, 1.5). Each is raised on a flat timber-frame platform supported by wooden columns that anticipate the pingzuo (timber substructure) of later periods. The architecture of the feasting scene is better preserved: below the core building is the flat platform that is supported by eaves columns and one interior column to support the ground floor. The top of the floor is covered by two horizontal bands of rectangles, with the only difference from the previous examples being that here every other rectangle is filled with diagonal lines. On the left and right sides of the platform are stairs with six steps, each leading to the hall on top. This hall has only two eaves columns, no interior columns, and the columns bulge outward to the left and right sides at the top, indicating the use of brackets or timu to support the roof above. The roof consists of downward-sloping sides with a flat top in the center. The flat section is shown as two bands of rectangles in which empty areas alternate with diagonally hatched areas; the same design is used to represent floor construction. The sloping eaves are filled with diagonal lines. Rectangular cells clustered into an L-shape under the eaves may denote the balustrade. Two bronze vases are inside the hall, and a tripod is under one eave. Figures serve food and wine. A frame for hanging bells is set up on the right platform next to a drum with a bird-shaped frame; people dance to the music. Trees are visible on the left of the platform, where someone shoots birds with a bow and arrow (fig. 1.4). The building for archery ritual also stands on a flat platform supported by columns on both sides, but in contrast to figure 1.4, there are only exterior columns (fig. 1.5). Here, too, the floor is shown as two bands of rectangles where empty areas alternate with diagonally hatched areas. The hall proper has only two eaves columns. Although the part above them is not clear, we discern two bands of rectangles and assume, since they are like the ones in figure 1.4, they are of the same form and construction. Rectangular cells clustered into the stepped form of an L-shape are depicted under the eaves and denote the balustrade; but here their lower edges are level with the floor slabs, not higher as in the previous image. Vessels are set up inside the hall. In the central bay, wine is poured into one with a ladle. On either side, kneeling figures offer wine. Stairs on both sides of the platform lead to the top. To the right, two bowmen are about to climb the stairs. A large bronze vessel stands on the ground to the left of the platform. Here, too, a figure ladles out food while another one holds a vessel in both hands to receive it. A third figure carries another vessel and will ascend the steps to offer food.
1.4. Engraved image of feasting, inside of bronze cup. Shanghai Museum.

1.5. Engraved image of ritual shooting, inside of bronze cup. Shanghai Museum.
The third image is engraved onto the outer surface of the cup. A low *pingzuo* comprises three rows of short columns, each indicated by a short column on the front (fig. 1.6). They uphold the flat platform floor that consists of two horizontal bands of rectangles. A top are a large hall with two interior columns to bear the load of the flat roof and two exterior columns to support the downward-sloping eaves. Two bands of rectangles represent the flat roof, but in contrast to the engravings on the inner surface, in this image the two rows of rectangles, for the floor and the roof, are not aligned with each other. Furthermore, the sloping eaves display roof tiles in rows. Structural members like brackets or *timu* are placed on top of the eaves and interior columns. Zigzag stairs and L-shaped balustrades are on the left and right sides of the hall. A figure sits inside the hall drinking, and three other figures offer wine and food. A long table and two wine vessels are at the foot of the right staircase, where a figure spoons out wine into another vessel. A large vessel and four figures holding smaller vessels are on the opposite side.

There are many similarities in the representations of architecture in these three images on the vessel in the Shanghai Museum. A wooden *pingzuo*—be it high or low—is placed below the building proper, whose floor is upheld by the *pingzuo* columns. The hall itself has exterior columns and sometimes also has interior columns. The column shafts are decorated with a repeating cross-hatch pattern. Bracket sets or *timu* are mounted on the column tops. The roof consists of a flat top framed by downward-sloping sides. One building has rows of tiles. Balustrades are shown next to the platform edges and are L-shaped. The two images on the inner surface have balustrades that float in the air above the staircases on either side of the platform, which is unusual.

![Engraved image of feasting, outside of bronze cup. Shanghai Museum.](image)

1.6. Engraved image of feasting, outside of bronze cup. Shanghai Museum.
Bronze Dish and Mirror from Zhenjiang

A Warring States dish unearthed from an Eastern Zhou tomb in Zhenjiang, Jiangsu province, has two images of buildings with banqueting figures engraved with short, wedge-shaped lines on its inner surface (fig. 1.7). The first building has two stories. Its lower level features two exterior columns and sloping waist-eaves with a flat roof that is depicted as a band of rectangles like the roof of a single-story building. Atop the eaves are T-shaped and L-shaped sections that are filled with diagonal lines to represent the cross-sections of beams. The floor of the upper story is above. A one-bay arcade encloses either side of the second floor of the hall, spanning the distance between two columns. Balustrades are installed at the sides of the outer gallery. Between the two interior columns are beams that bear the weight of the roof. The roof is either hipped or a truncated pyramid. The first-floor eaves are filled with a diagonal hatched-line pattern, and the second-floor roof has widely spaced parallel lines that indicate the rows of roof tiles. As a whole, the structure looks like two single-story buildings on top of each other. A wine vessel in the center of the second floor also is shown in section. Four figures are on the first floor (fig. 1.7-1).

The second image depicts a one-story building with a basement that is supported by two columns with balustrades at the outer sides and stairs to ascend to the main hall. The eaves of the hall are one bay deep, with two columns each that support an additional set of lower eaves. The actual roof starts right above the lower eaves. Parallel lines indicate the roof is made of ceramic tiles in contrast to the lower eaves, which are made with diagonal lines. This is the only example among those examined here of a double-eaves building, as

1.7. Images of buildings engraved on inside of bronze dish. Excavated in a tomb in Wangjiashan, Jianbi, Zhenjiang, Jiangsu.
opposed to one with two stories, each with its own set of eaves, known from the Warring States period (fig. 1.7-2).

A Warring States mirror also was excavated in an Eastern Zhou tomb in Zhenjiang, Jiangsu. Although it is broken, the two buildings engraved on it with short, wedge-shaped lines are still visible. The first building is the backdrop for ritual shooting that takes place from an elevated room (fig. 1.8). The hall proper stands on a flat plane, but beyond it, the construction method and material are not clear. The foundation could be rammed earth but it also could be timber frame. The thickness of the floor and use of a diagonal grid pattern make a timber frame more likely. L-shaped balustrades are installed at the outer platform sides; and on the left side are stairs to ascend to the platform top. The hall has only exterior columns, one on each side, which bear the load of both the sloping eaves above the exterior galleries and the flat roof in the center. The flat section of the roof is filled with a diagonal grid pattern, the same one used to represent the floor. The upper parts of the eaves columns bulge outward, suggesting the use of cap-blocks or brackets. A table with bronze vessels on it is placed in the center of the hall, and other vessels are on the floor. Two figures on the right draw bows. To the left is another flat platform beneath which a *sunju*, a wooden frame for hanging musical stones, is suspended.

Only a fragment survives from the second scene. It depicts the left corner of a building with two levels: the ground floor with thick walls carries the floor of the upper story; balustrades are installed on both sides in the form of L-shaped brick parapets. Both the floor slabs and the flat roof of the hall proper are filled with a diagonal grid pattern, thereby denoting a similar construction method. The sloping roof eaves, by contrast, are filled with a dense, diagonal,

![Image of building, feasting, and hunting engraved on bronze mirror. Excavated in tomb in Zhenjiang, Jiangsu.](image)

1.8. Image of building, feasting, and hunting engraved on bronze mirror. Excavated in tomb in Zhenjiang, Jiangsu.
hatched-line pattern without further specifying roof tile rows. The building differs from the one described above only in that the ground floor articulates the use of thick outer walls.

INCISED IMAGES

A bronze mirror with feasting and hunting scenes was excavated at a Warring States tomb of the state of Wei in Hui county, Henan province (fig. 1.9). The architecture on it is three stories. The lowest level divides into two parts, an inner area and an enclosing corridor. It has eaves columns and interior columns that support the enclosing corridor of the next story, whose floor extends outward in the form of a balcony. The inner area features two columns on either side. Since they are taller than the eaves columns, the floor of the second story is elevated higher than that of the surrounding corridor. This second-floor gallery is two bays wide and has three columns to support sloping eaves. The enclosed inner area comprises five columns: three central columns standing in close proximity to one another and a flanking column on either side. Since the middle of the three central columns stands atop the supporting structure underneath, we assume that the ground floor, or at least the central section of it, consists of rammed earth, and the position of the understructure corresponds to the middle of the earthen platform. As on the first floor, the heights of the five inner columns that uphold the floor of the third story exceed the heights of the eaves columns. Short columns standing atop the sloping second-floor eaves support the edges of the balcony. The surrounding corridor of the third floor is one bay wide and has two columns that uphold sloping eaves. The inner area comprises four columns carrying beams, and above, the main roof of the building, which consists of a straight ridge framed by sloping sides. The roof slant on either side begins at the outermost inner column and extends downward and outward in a continuous line until it connects to the sloping corridor eaves. Probably a hipped roof is intended, but one more complex than portrayed in the previous examples.

The ground floor consists of a rammed-earth core. The architecture is thus of taixie style, a high-platform building supported by a wooden frame and earthen core. The central three columns on the second floor are decorated with a rhombus pattern. This distinguishes them from the other columns in the building, which have incised parallel diagonal lines, and marks them as important structural members. The third floor reveals several small squares that symbolize longitudinal and lateral intersecting floor joists. Since the third-floor balcony projects widely outward, small columns are positioned atop the second-floor gallery roof to support them.
A gourd-shaped gilt-bronze vessel from the Warring States period was excavated in Changzhi, Shanxi province. Approximately half of a three-story building is incised on the inner surface; the structure is reconstructed in figure 1.10. The ground story is a main structure with a one-bay corridor. The
second story also is enclosed by a single-bay corridor. Three columns support the second level, one of them the central column of the building. The enclosing corridor of the third floor is also one bay wide with two columns and sloping eaves. The enclosed inner area uses two columns to support the beams and joists that uphold the roof. A horizontal line denotes the principal ridge of the roof; it is framed by sloping sides. The slant on either side begins outside each of the two columns and forms a continuous line with the sloping corridor eaves. The roof is either hipped or flat. The third-floor construction extends beyond the exterior eaves in the form of a balcony with a balustrade mounted along its outer side, the load of its balcony resting on the second-floor corridor. The heads of the columns throughout the building bulge widely outward, suggesting the use of cap-blocks and brackets. The floor of the second level is depicted by a single line. Based on images discussed above, we assume the ground floor is made of rammed earth; and the surface of this earthen platform forms the floor of the story above it. The third floor is thick and comprises several small squares that stand for floor joists, so we know the floor is wooden. The roof atop the third floor is carved with parallel lines denoting rows of ceramic tiles. Outside the balustrade on either side of the third-floor balcony is a long, oblique line along which a figure walks. This might be a sloping pathway to the third floor.

Only the spout remains from a Warring States vessel found in Liuhe, Jiangsu province. The right half and most of the lower story of a two-story building remain incised on it (fig. 1.11). Parts of two walls on the lower level made from several rectangular blocks, every other one filled with a diagonally hatched line pattern, might be adobe. They are different from columns of the upper story, which have comparatively thinner and completely filled shafts. The floor of the upper story is mounted on the thick walls. Small, diagonally

hatched rectangles are positioned between the two lines that denote the thickness of the floor construction; they symbolize the cross-sections of the floor joists. Only two columns carry the sloping eaves of the surrounding corridor and the crossbeams of the inner section. Atop are carved small, diagonally hatched rectangles that denote joists. The roof is either a single-eave hip or a truncated pyramid covered with ceramic tiles, like the roof in figure 1.10. The upper floor extends beyond the corridor on either side, where it forms a balcony with an L-shaped balustrade installed at the outer side. A table is placed in the center of the hall.

Fragments of a bronze vessel from the Warring States period in the Beijing Palace Museum also show architecture. One piece shows the right half of a three-story building. The ground floor uses both exterior and interior columns to support the upper floor, which is thick and filled with a diagonal hatched-line pattern. The second floor uses eaves columns and interior columns to support the third floor, which is depicted as two bands of squares; every other square

is filled with diagonal lines. Sloping waist eaves project outward next to the gridded floor. They, too, are filled with diagonal lines. Only one column is visible on the third floor, upholding the roof and its projecting eaves. Each column is depicted differently: with diagonal lines, three or four vertical, parallel double lines, a dense diagonal grid pattern, and a W-shaped pattern. Steps lead from the ground to the second floor, and figures holding a bow and an arrow climb them. Figure 1.12 is the reconstruction in which a second column is added to the third story. The second fragment is very small and reveals only the left side of a multistory building.

A Common Visual Language for Architecture

Human activity inside, including bronze vessels on a table or used in offerings, archery, or movement on stairs, occurs with architecture as the backdrop in every building discussed so far. Buildings are represented as elevations, sections, and combinations of sections and elevations. Sectional views are the most frequent. Every roof has a flat top or sides that slope downward. Whether sloping or flat, the roofs are represented by a single line except for one example in which two bands of rectangles denote the flat section of the roof. Even in this simplified version of a cross-sectional view, the importance of the roof and its contour is emphasized.
The roofs of the buildings depicted in figures 1.4–1.6, 1.8, and 1.12 all have flat tops framed by downward-sloping eaves. These roofs, moreover, have a certain thickness; none is shown as a single line. The flat tops either consist of rectangular cells or are filled with a diagonal grid pattern; the same decoration is used for floor construction. The representations are sectional drawings, and they may inform us about the construction process and material. The roofs in figures 1.7, 1.9, 1.10, and 1.11, however, have flat centers and sloping sides in addition to parallel lines that are believed to indicate rows of tiles. The presentation suggests they are frontal elevations. The tile covering below the principal ridge does not reach as far as the cornice; it terminates before it and is bounded by two horizontal lines. The space between the two lines is either completely filled with a diagonally hatched line pattern or interrupted here and there by rectangles that are then also hatched diagonally. And similar to the mode of decoration used for the floor, this also presents as a cross-section. Looking at the interior columns positioned below these lines, the cross-section through the main beam framework of the core area rests on the interior columns. These four images use both the cross-sectional view and the elevation view: the first and second floors are cross-sectional drawings, the eaves and the upper halves of the flat sections are elevation drawings, but the lower halves are again shown in cross-section. Using two different modes of expression within the same image at the same time was an effective means to comply with different requirements for representing human activity and its setting. The artisans used the cross-sectional view to explain the construction of the building and human activity inside. This view overcame the limitations imposed by walls, doors, and windows that would have blocked the view if seen frontally from the exterior. Yet exactly for this reason, it could not capture the building’s outward appearance. The elevation is intended to resolve this shortcoming and, additionally, to make it possible to see human activity outdoors. Elevations were applied to scenes taking place in the open gallery. By these means, complex large-scale architecture was represented in two-dimensional designs on bronze.

Conjectures about Architectural Form in Warring States Images

The architecture depicted in the images includes single-story buildings, two-story buildings, and three-story buildings in taixie style (rammed earth with timber frames).
SUBSTRUCTURE

In the Warring States period, there were three basic methods for erecting a stable substructure: a rammed-earth foundation platform, a rammed-earth wall pier platform, and a raised-floor timber structure (ganlan style).

**Foundation Platform**

The substructure of the multistory building in figure 1.1 is divided into small rectangular compartments. Specifically, one sees a platform made of horizontal timbers to protect the edges of wooden floor planks and of short columns to prevent the structure from collapsing. All five buildings in figure 1.3 show bronze vessels or archery targets in front of the building. Their positions indicate the locations of ground level, thus confirming that the buildings are single-story structures. Their platforms consist of two bands of rectangles. This representation, which is used for floors in some multistory buildings, is probably of mud-brick, the method in use at the late first millennium BCE site Fengchu in Shaanxi province.

**Pier Platform**

We know the building shown as figure 1.9 is a three-story building because there are pillars beneath the second-floor central columns, and the single-line representation of the first and second floors, in contrast to the third-floor construction, is shown as double lines into which beams and joists are lodged. The core of the ground floor corresponds to a large rammed-earth platform with the central columns of the second floor positioned directly on the platform surface. Based on excavation of the capital of the Yan state in Hebei province and the Mingtang from the Han dynasty in Xi’an, we confirm the depiction as a typical taixie building of the time. It is the same construction depicted in figures 1.10 and 1.11.

Figures 1.4, 1.5, and 1.8 depict single-story structures elevated on high platforms. The solid cores of the stairways leading from either platform side to the top give us a hint about the substructures. From the outside, these platforms look as if they were made of rammed earth. However, the substructures comprise inner columns positioned on either side and sometimes also in the center to support the upper-floor construction. We thus assume that the core is hollow. Such platforms are a combination of rammed-earth and raised-floor (ganlan) construction.

Several sites dated from the Warring States to the Han period reveal buildings with a similar construction. Site no. 4 at Weiyang Palace of the Han dynasty from the second century BCE and the Nine Temples of Wang Mang (ca. 45 BCE–23 CE) from the early first century CE, both in Chang’an, have
stone bases for wooden columns, floor joists atop the columns, and wooden planks or adobe bricks above. These are elements of an interior floor raised on stilts. Weiyang Palace site no. 4 is built on a vast, rammed-earth platform. Rooms F4, F5, and F7 contain pits of about 1 m in depth of which the bottom surface was paved with square bricks. Square stone bases were installed on top of the bricks. Spaced more than a meter apart, they formed a square grid. Beams and floor joists were set above the bases in both the longitudinal and lateral directions, and further above was laid the wooden flooring. To prevent the timber framework inside the pit from deteriorating, air holes were drilled into the rammed-earth platform. In room F7, however, the wooden flooring was replaced with two layers of bricks that were laid on top of the floor joists. Then, a straw-mud-clay mixture was added as the bottom layer and covered with fine clay and color wash as the outer layer, thereby achieving a plaster floor (fig. 1.13).

The interior floors of the buildings of the Nine Temples of Wang Mang exceeded the rammed-earth foundation by about 1.4 m and comprised three layers of mud-bricks, each of which was 0.12 cm thick and covered by a straw-mud mixture and color. A fire damaged the flooring. As a result, it has collapsed onto the rammed-earth foundation and become interlaced with a 6–8-cm layer of wooden ash. Looking at the elevation of the original flooring that is still partly visible, the floor construction was probably built in ganlan style.

1.13. Plan of palace site no. 4, Weiyang Palace complex, second century BCE, Xi’an.
Warring States
Architecture

and consisted of wooden columns on stilts, beams, and joists, covered with mud-bricks and plaster.

From these two examples we know that a floor raised on stilts was made as follows: First, stone bases and short columns were placed on top of a rammed-earth platform, and these columns were independent of the columns of the building proper. Next, lateral and longitudinal floor joists were built. Next, a wooden floor was mounted above, and then sometimes mud-bricks were laid atop and covered with straw-clay to level the surface. Finally, a layer of fine clay was added to smooth the surface. If the building was surrounded by rammed-earth walls or if it was embedded into the rammed-earth platform, then it was necessary to drill ventilation holes that prevented the wooden parts from rotting.

Figures 1.4, 1.5, and 1.8 show a simplified version of this method. The column placement and layout in these images are drawn schematically, depicting only side columns and sometimes a central column as the support for the upper-floor construction. In practice, there must have been more columns, and they must have been placed closer to each other. The floors are carved with two bands of rectangles that denote adobe bricks. The floor joists are omitted. The diagonally hatched stairways on either side of the buildings in figures 1.4 and 1.5 differ from the single-line representation of the steps in figure 1.6 because they are solid and made of rammed earth. Their floor-supporting columns and transverse floor joists are enclosed in the rammed-earth foundation. This matches the method used for rooms F4 and F5 at Weiyang Palace site no. 4 (fig. 1.13).

An L-shaped form is shown above the steps on either side of the building in figures 1.4 and 1.5 as if it hangs in the air. The portions decorated with layered rectangles are used for the interior floors. Thus we assume this component is also made of mud-brick. The L-shaped blocks depicted in figure 1.4 are elevated higher than the floor of the building, whereas the blocks in figure 1.5 are basically level with it. In both images, the outermost edge of each block is level with the lower end of the stairway. The stepped form denotes a mud-brick parapet installed along the outer edges of the platform top.

There are two possible reconstructions of the stairways approaching the platforms: First, the distance between the platform top and the block on either side might be a tunnel at the end of a passageway, so that climbing up the steps, one passes through this opening in order to reach the platform top and enter the building. If so, the substructure should be a square pier platform with vertical walls; the side walls should have doorways leading to a straight flight of stairs dug into the rammed earth, so that, by following this passageway, one will ascend to the platform top. Such design and construction are shown in the reconstruction drawing in figure 1.14-1. Alternatively, a platform may have an open stairwell instead of a tunnel for passage, as shown in figure 1.14-2. Leading from the outer platform edge inward to the platform top, such a stairway would be completely
protected by the eaves and thus would contrast with the usual design, where the staircase extends outward from the platform edge. Such a staircase is known as nabi. The first possibility, a square pier platform, seems more likely.

**Ganlan Platform**

The architecture depicted in figure 1.6 resembles that of figures 1.4 and 1.5, but its platform is lower; the steps leading to the platform are represented only by a single line; and the balustrades do not project beyond the platform. A similar structure is reconstructed in figure 1.7-2. The substructure is a well-ventilated space open to the viewer’s gaze. What is shown in figures 1.6 and 1.7-2 is typical for ganlan architecture, with its high-raised floor and open space underneath. The method of elevating the floor, the basic principle of ganlan, is found in the structures of the Nine Temples of Wang Mang and in Weiyang Palace site no. 4. By contrast, in figure 1.7-2, the elevated floor is not enclosed on all four sides by rammed earth (as is the case at the two actual sites); rather, the space beneath and next to that floor is opened up (fig. 1.15-2). Figure 1.15-1 is a hypothetical reconstruction of the architecture depicted in sectional drawing in figure 1.4. The floor is still elevated above ground, but it
1.15. Reconstructions of buildings shown in line drawings in figures 1.4 (1) and 1.6 (2).

1. Mud-earth foundation supporting wooden frame.
2. Timber frame in *ganlan* style.

is enclosed on all sides by rammed earth; from the outside, it thus looks like a pier-platform structure.

**MULTIPLE LAYERS**

The depicted buildings usually contain either two eaves columns or two eaves columns and two interior columns. Either representation indicates an intentional reduction of the column number, probably because the fewer columns open the interior space for illustration of human activities. In the first scenario, buildings have only exterior columns: a column supports the roof at either boundary line of the flat roof section; the eaves as the outward-sloping roof overhang start immediately afterward. This kind of structure is depicted in figures 1.2-1, 1.3, 1.4, and 1.8. These are simplified representations. In practice, such a construction is overgeneralized and impossible. Archaeological sites from the late Neolithic to the Shang and Zhou periods often reveal a great number of small holes under the platform all around it in addition to the regular columns placed on top of the platform. Columns small enough to fit into these holes were used to uphold the eaves’ front ends, and they correspond to an early form of what was later known as eaves lifting columns (*qingyanzhu*). All the overhanging and deep-projecting roofs depicted in these images should have small columns placed at their outer ends for additional support, but these columns were omitted during graphic simplification because they were not part of the principal structure. In the second scenario, when
buildings have exterior and interior columns, the interior columns support the flat roof section, and the two exterior columns uphold the outward-projecting eaves. This, most likely, reflects the actual situation (fig. 1.6).

Columns are always shown standing upright on the interior floor (reaching only from floor to ceiling rather than spanning two or more stories). In gan-lan style, the floor is raised on stilts and bridges the empty space below that is void of any supporting columns. Yet structurally, upper-floor columns can be erected only if the lower-floor columns are already well placed according to the requirements for stability and safety, and if the beams and floor joists possess corresponding load-bearing abilities. Extant Liao (907–1125) and Song (960–1279) buildings in which upper-floor columns often stand on top of an exterior platform (pingzuo) and are slightly recessed compared to the lower-floor columns so that the columns’ axes are not aligned follow this method. Representations of buildings on Warring States bronze vessels illustrate the same techniques. Looking at archaeological sites from the Han period, we observe that the floors of buildings at the Nine Temples of Wang Mang are 1.4 m higher than the ground, and at Weiyang Palace site no. 4, the floor of room F17 exceeds the ground by more than 1.35 m; both examples have pillar foundations that would be too large for the small columns of the floor. This suggests that the interior floors were elevated, and beams and joists were put on top of regular columns to form the structural floor framework. This method does not appear in buildings in the Warring States images.

Figures 1.1, 1.7-1, and 1.11 depict two-story buildings. Figures 1.9 and 1.10 depict buildings elevated on high wooden frames with earthen cores (taixie) in which the ground floor provides a stable substructure for the second and third floors. Most floors comprise beams shown in cross-section, as shown in figures 1.1, 1.9, 1.10, and 1.11. The representations indicate that beams and joists were used to build a stable, flat platform on which the next upper level then stands.

Some columns are simply hatched diagonally, whereas others are filled with certain decorative patterns. Figures 1.4, 1.5, 1.7, and 1.9 have triangular pattern grids and figure 1.12 has W-shaped patterns that might symbolize caihua (decorative polychrome painting). Figure 1.8 depicts columns filled with bundled vertical lines, probably bundled bamboo columns (shuzhuzhu). The Warring States representation suggests that this column type is very old. Upper column parts usually bulge outward, indicating bracketing. Ceramic bearing-blocks with one-dimensional or cross-shaped openings or without openings unearthed at Pingshan, the capital of the Zhongshan state, date to the Warring States period. The ones with cross-shaped openings include both bearing-blocks as well as cap-blocks. The square dragon-and-phoenix table from the tomb of King Cuo, ruler of the Zhongshan kingdom, that features an orderly arrangement
of bearing-blocks (*dou*), bracket-arms (*gong*), and dwarf columns (*shuzhu*) also
dates to this period. By the mid- and late Warring States period it was possible
to arrange brackets and *timu* crosswise on top of columns, cap-blocks, and
end-blocks (*sandou*) to provide support for the beam framework and the roof
eaves. However, the images on the bronze vessels portray simpler structures:
only cap-blocks, no bracket sets, are shown.

**ROOFS**

Roofs are usually depicted with flat tops framed by downward-sloping sides.
They are shown in cross-section and elevation (fig. 1.16).

Flat-topped roofs with downward-sloping sides are filled with either two
bands of rectangular cells or a diagonal grid pattern. The graphic representations
of the flat roof and the floor construction of buildings often match. One thus
assumes that their construction methods matched. If they did, the construction
process would have been to mount beams on top of columns; install longitudi-
dinal and lateral roof joists; and last, lay mud-bricks atop and cover the surface
with a straw-mud mixture and a waterproof mortar finishing. Using lime mortar
as the surface layer and moisture barrier is a technique that appears by the
Western Zhou period. The architectural remains in Fengchu, Qishan, Shaanxi,
are examples. In representations on bronze, the sloping roof parts that form the projecting eaves are decorated with dense diagonal lines, except for depictions such as in figures 1.4 and 1.6 that specify tile rows. Figures 1.4 and 1.6, two of the three images engraved into the cup in the Shanghai Museum, show two modes of graphic representation and thereby suggest two building methods. The upper-floor roof in figure 1.7-2 shows specific tile rows, but the double eaves on the lower floor are diagonally drawn. Different carving techniques applied to the same picture suggest that different representational modes refer to different building methods (fig. 1.17).

None of the images gives specific enough information to know how roof slopes were constructed. From Shang, Western Zhou, and Warring States sites, we learn that only the largest and most important wooden buildings of the time used a principal framework of crossbeams. Less important surrounding structures, including the colonnaded rooms on each side and floor of a taixie structure, have columns arranged lengthwise, parallel to the front façade, without the need for additional transverse alignment. Longitudinal lintels (mei) were placed on top of the columns to create a lengthwise framework (zongjia). In the case of comparatively large buildings, slanting crossbeams (xieliang) were installed between the lengthwise construction. Purlins (lin) are placed above. The purlins support rafters (chuan) or bundled reeds ([lu] weishu). Comparatively small buildings had rafters or bundled reeds mounted directly onto the lintels, without rafters. Using reeds instead of rafters is a very old building tradition. In the remains of early Shang architecture in Mengcun,

1.17. Roof and pillar representations on excavated bronze vessels.
1. Zhenjiang, Jiangsu
2. Hui county, Henan
3. Liuhe, Jiangsu
4. Changzhi, Shanxi
Henan province, reed bundles are mounted atop the purlins in the direction of the roof pitch. This is also seen at the later site in Fengchu, and the even later remains of the state of Yan capital Xiadu in Hebei, dating from the mid- to late Warring States period. The method is still used in the rural areas of Henan and Shaanxi. The reed bundles are densely placed in the direction of the roof slope, and the remaining gaps are filled in with a straw-mud mixture to level the surface that is then covered by a lime layer, above which ceramic tiles can be laid. The Zhou dynasty site in Zhaochen, Fufeng county, Shaanxi, has tiles on the reed-covered roof sides.

The flat-topped roof described above probably represents a truncated pyramidal roof. The flat top has mounted wooden beams and joists and adobe bricks; the sloping sections use densely packed bundled reeds with a surface layer of plaster, and above, sometimes ceramic tiles. Figure 1.14 shows these features.

The second roof type blends the cross-sectional view with the front elevation view. Each building of figures 1.7, 1.9, 1.10, and 1.11 shows rows of roof
tiles in the upper roof part. This part of the representation is an elevation drawing. The central roof section below the ridge is slightly interrupted by two horizontal lines between which are beams shown in cross-section (figs. 1.17–2, -3, -4). The form and construction of this type of building are completely different from the roofs depicted in figure 1.16. We are observing two different building methods.

Looking at the beams mounted atop columns with cap-blocks and upholding one tile-covered roof end, it is even more likely that the representations are of hipped roofs with principal ridges and four sloping sides (si’ě). Although not clearly expressed in two-dimensional images, more than one hip-roofed building was discovered at the mid–Western Zhou remains in Zhaochen, Shaanxi province. Further, a bronze ornament shaped like a gate-tower (que) with a hipped roof was unearthed at Dongguancheng village at the Yan capital Xiadu in Hebei (fig. 1.18). This is important evidence that hipped roofs were used at that time. Based on these conjectures, figure 1.15-2 reconstructs the building shown in figure 1.7-2.

**TAIXIE, BUILDINGS RAISED ON HIGH FRAMES**

The architecture depicted in figure 1.9 is a three-story building in which the central column on the second floor stands atop a foundation; the representation of the second floor is achieved with single lines. It differs from the representation of the third floor construction that exposes the cross-sections of beams and joists. Thus we know that the core of the ground floor is an earthen platform (tai) with the central column of the second floor right on top of it. In other words, this is a taixie building. Although only a single line and pieces of columns and cap-blocks from the first floor in figure 1.10 survive to indicate the structure, the second floor shows not only a certain thickness but also the cross-sections of beams. The representation is close enough to what is shown in figure 1.9 to assume it, too, is a taixie structure with three floors.

Beginning in the Warring States period and continuing for the next several centuries, taixie architecture was in vogue. It was important in palace design. Excavations of platform remnants at Yan Xiadu and at Xianyang Palace no. 1 confirm taixie construction. Taixie buildings from the Western Han and very brief Xin periods (206 BCE–23 CE) have been excavated at the Numinous Hall (Mingtang) and the Nine Temples of Wang Mang. The ground floors of all three structures are large rammed-earth platforms with ground-level buildings installed all around and with their backs against the platforms. The main buildings are on top of the platforms. Each ground floor has rooms dug into the rammed earth, leaving some original soil as load-bearing dividing walls or piers.
between two adjacent rooms; mud-earth walls further divide them into small rooms. Each of these small rooms has door and window openings in the front wall below the eaves. Looking at rooms 6–11 on the ground floor at Xianyang Palace no. 1, rooms 6 and 7 are well preserved with remains of front doors and windows. The sections near the upper edge of the platform wall show traces of horizontally positioned wooden beams, which suggest that these two rooms probably had a flat roof or at least a flat interior ceiling. But the surrounding corridors have single-pitch eaves. The site of the Nine Temples comprised twelve taixie buildings that were nearly square and had two floors. Only no. 12 at the Nine Temples of Wang Mang still shows traces of an upper taixie story.

At Xianyang Palace no. 1, a square main chamber is centrally positioned atop the platform and enclosed by more than 2-m-thick walls made of rammed earth or adobe bricks. The interior floor is red. A pillar foundation of about 1.4 m on each side is sunk into the earth in the center of the platform. It supports a column of 6.4 cm in diameter. Together with the load-bearing earthen walls enforced by embedded columns, this pillar carries the load of the upper building. A few smaller rooms that act as subsidiary wings are located on the east and west sides of the main chamber. The remains of building no. 12, the one associated with the grand ancestor, at the Nine Temples suggest a structure with a front twice as wide as the other buildings. It was square, almost half as wide as the platform on top of which it is centrally positioned, enclosed by load-bearing rammed-earth walls that were enforced by embedded columns on their inner and outer surfaces. A single column stands in the middle of the chamber. This is very similar to Xianyang Palace no. 1, with the main difference that the Nine Temples building has no wing rooms.

If we use these remains to guide our understanding of the representation of taixie in figure 1.9, we can identify a rammed-earth platform reaching up to the second floor at the core of the ground floor in the incised representation. A column is positioned in the main chamber atop the platform. The ceilings of ground floors of the taixie represented in bronze are flat, and their outer sides extend outward in the form of balconies. This is the construction we observe in rooms 6 and 7 at Xianyang Palace no. 1, where the rear platform edge reveals traces of horizontal beams placed at the top of a wall, thereby indicating a flat ceiling rather than a sloping roof. The main chamber is a multistory structure with a third floor above. This is also what remains at Xianyang Palace no. 1, where mud-straw blocks that fell off the floors and ceilings are piled on top of each other inside the building. All these buildings must have had more than one story. We thus conclude that the typical design and construction features illustrated in figure 1.9 are basically consistent with actual buildings of the time. The architecture depicted in the figure has undergone simplification. The representation was influenced by the drawing and carving skills of the time.