

# Traditional Chinese Detachment Method for Rescuing Tang Dynasty Tomb Mural in Yanggong's Tomb in Xi'an City

**ZOU LULI**

Interdisciplinary Doctoral School "Academia Copernicana"  
Nicolaus Copernicus University, Toruń  
email: [lulizou@doktorant.umk.pl](mailto:lulizou@doktorant.umk.pl)  
ORCID: 0000-0002-9657-6666

**HUA ZHOU**

Department of History and Museology  
Beijing Union University  
email: [zhouhua@buu.edu.cn](mailto:zhouhua@buu.edu.cn)

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## Abstract

The tomb of Yanggong was found in December 2019 in Xi'an City, Shanxi Province, through an infrastructure archaeology excavation carried by Beijing Union University archeology team. While doing the excavation, the team found numerous tombs (mostly were Tang and Song Dynasties) in that area and in one of them, there has wall painting decoration. According to the unearthed epitaph, the owner named Yanggong was buried in 849AD (late Tang Dynasty) and was the inspector in the Tang Dynasty army.

Two large fragments of wall paintings were still preserved in the tomb. The murals were partly destroyed by the investors during excavation and by the exposure to the



sun and air. With cracks, breakage, and hollows, they were peeling off and were too fragile. Following the Law of the People's Republic of China on Cultural Relics and for the reason of possible loss of these paintings as a result of planned buildings in the area of the site, it was decided to remove the paintings using the traditional Chinese detachment method. Painted images were separated from the walls together with the mud priming and later secured, attached to the auxiliary support, packed, and transported and deposited in the Beijing Union University conservation laboratory, waiting for future conservation. The preserved images have high historical, artistic, and scientific values, significant for better research of Tang Dynasty tomb murals.

The paper evaluates the Chinese traditional detachment method and concerns some issues of the painting techniques and the meaning of the images remaining on the wall. A discussion of different Chinese methods of tomb mural detachment is included.

### Abstrakt

#### **Tradycyjna chińska metoda przenoszenia malowideł ściennych na podłoża zastępcze – konserwacja dekoracji malarskiej z grobowca Yanggonga z czasów dynastii Tang w mieście Xi'an**

Grobowiec Yanggonga został znaleziony w grudniu 2019 roku w mieście Xi'an w prowincji Shanxi podczas prac wykopaliskowych prowadzonych przez zespół archeologów z Uniwersytetu w Pekinie (Beijing Union University). W trakcie tych eksploracji archeolodzy odkryli na badanym terenie liczne grobowce (pochodzące głównie z czasów dynastii Tang i Song), w jednym z nich natrafili na częściowo zachowaną dekorację ścienną. Według odsłoniętego epitafium, w grobowcu został pochowany w 849 roku (późna dynastia Tang) urzędnik o imieniu Yanggong, który był inspektorem cesarskiej armii.

W tym grobowcu zachowały się jeszcze dwa duże fragmenty malowideł ściennych. Dekoracje zostały częściowo zniszczone przez inwestorów podczas wstępnych prac budowlanych. Stwierdzono w nich pęknięcia, pęcherze i tendencje do odpajania się, były więc narażone na dalsze zniszczenia. Zgodnie z obowiązującą w Chińskiej Republice Ludowej ustawą o zabytkach kultury oraz ze względu na możliwą utratę przedstawień w wyniku planowanej zabudowy na tym terenie, zdecydowano się przenieść warstwę malarską wraz z zaprawą na nowe, zastępcze podłoża, wykorzystując tradycyjną chińską metodę. Wizerunki zostały oddzielone od ścian wraz z gliniastym podłożem, a następnie zabezpieczone, przymocowane do podłoża pomocniczych w postaci płyt, zapakowane oraz przetransportowane i zdeponowane w laboratorium konserwatorskim Uniwersytetu w Pekinie w oczekiwaniu na przyszłą konserwację. Zachowane przedstawienia mają znaczącą wartość historyczną, artystyczną i naukową, istotną dla pogłębienia badań malarskich dekoracji grobów z epoki dynastii Tang.

W artykule dokonano oceny tradycyjnej chińskiej metody przenoszenia malowideł, poruszono też zagadnienia dotyczące technik malarskich oraz znaczenie przedstawień. Dodatkowo omówiono różne chińskie metody rozwarstwiania malowideł.

## 1. Yanggong's Tomb Mural

### 1.1. Introduction and Background

Yanggong's tomb is one of the archeological excavation sites in Qujiang, Xi'an City, Shanxi Province, China. The land property belongs to a real estate company who was planning to develop this area after infrastructure investigation, where Yanggong's tomb with important Tang Dynasty murals were found.

The excavation is under protection of Beijing Union University (BUU). The BUU conservation team and local experts, conducted the detachment procedure from 18th to 24th December 2019. The murals were in bad condition at the moment they were found.

In history, more than a dozen dynasties established their capitals in Xi'an, and countless tombs of different dynasties are located at the foot of the city. Xi'an, in the Tang Dynasty, was called "Chang'an" and was one of the most prosperous capitals in the world in the ninth century. The economy, culture, and art flourished in this period. As a result, it is an area of concentration of a large number of Tang Dynasty tombs<sup>1</sup>.

According to *A Study on the Female Image Styles in the Tomb Mural of Tang Dynasty*, since the excavations in the 1950s, more than 100 Tang Dynasty tombs with painted decoration have been discovered in Shaanxi Province. Among them there were about 71 tombs with female images on the murals and in the Xi'an city it-self, the number is 29<sup>2</sup>. The rectangular tomb is about 1.4 meters deep and 3.1 meters long with a tomb path. The ceiling was destroyed while excavated. There were two large parts of remaining murals on the front of north (named W-01) and east (named W-02) walls (see Fig. 1) with human size figures images.

Two different wall support layers on which painted decoration was applied (the bottom layers) were found in these tomb murals: one is the wall made of bricks connected with lime mortar, and the other is the wall of the mud support (see Fig. 2, 3). Between support layer and painting layer, there are mud and lime layers of different thickness.

<sup>1</sup> Bai Su, "The Layout and Content of the Murals of Tang Tombs in Xi'an Area", *Acta Archaeologica Sinica* 2 (1982): 137–154.

<sup>2</sup> Jingfang Yu, "A Study on the Female Image Styles in the Tomb Mural of Tang Dynasty" (PhD diss., Xi'an Academy of Fine Arts, 2018), 3–4.

The side walls of the tomb path had small part of red and black color residue, but no image can be recognized. Presumably the tomb was entirely covered with painted decoration. Some parts were painted plainly with single color and some decorated with figures of people, animals, and artifacts.

According to the visual investigation, from bottom to the top, the W-01 wall has four technological layers: the wall made of bricks (support layer), the mud layer, the lime layer, and the painting layer, similarly as described in the literature of the period. The W-02 wall was constituted of the mud layer (support layer), the mixture of mud and grass layer, the lime layer, and the painting layer.

In another Tang Dynasty tomb in Xi'an (742AD, middle Tang Dynasty), the lime layer's thickness for different supporting parts was reported to be different<sup>5</sup>. Usually, the lime layer on mud was thicker than on bricks. Because the mud wall's adhesion is lower and being subject to physical factors such as thermal expansion and cold contraction, which will make the painting layer easy to fall off. The thickness of the layer of the mixed grass and mud and lime layer must correspondingly increase. This phenomenon can also be seen in the described paintings.

These investigations need to be followed by scientific analysis (like cross-section microscopy, scanning electron microscopy, and other instrumental methods).

## 1.2. Mural images reading

According to the unearthed epitaph, the owner named Yanggong, was buried in 849 AD and was the inspector in the Tang Dynasty army.

The most extended length and height of W-01 are 3.1m and 1.3m, while W-02 is 1.3m long and 1.05m high (see Fig. 4, 5). There are only seven residual images on the two large murals, which seems like two painting styles. One looks elaborate with more intricate headpieces and dresses, which also had color fillings on the headpieces, dresses, and other decorations (though it was found with fewer remnants). While the other is simpler with only several lines and color fillings (see Fig. 6, 7). These two painting styles seem to come from different periods. The former is closer to the style of the late Tang Dynasty and seems to be more in line with the owner's burial time. We can

<sup>5</sup> Shuqin Li and Xiaoxiao Wang, "Research on Restoration Technique and Materials for Preserving Fresco in Tang Hui Mausoleum", *Shanghai Wenbo* 1 (2005): 52-55.

boldly guess that the paintings created by these two styles may not have been drawn in the same period.

Except for the difference in painting styles, the content and topic, or “system”, as Chinese scholars called it, are different. Most scholars believed that there are two systems in the Tang Dynasty tomb murals. Yu<sup>4</sup> suggests that, the first system would like to express movement to another world where gods live. It contains mythical creatures, gods people, and vehicles, which will guide the tomb owner to the other world. Another system is more realistic. The male and female attendants, music dance performers, or noble ladies will face the tomb owner’s coffin to provide services for him/her and imitate human life.

In analyzed tomb, fortunately remaining murals represent both systems. On W-01 wall, from left to right on Fig. 4, there are the image of an animal (with only tail and claws left), a woman standing to the right (with the only upper part of the body left), a cooking utensil that looks a lot like hotpot (but maybe it is one of the sacrifice supplies), a figure facing left (with only the bottom dress left). The animal, resembles a turtle or tiger, lying on a round instrument with tail and powerful claws (see Fig. 8). According to the size, the shape, and the tradition of Chinese belief, it could be an image of Black Tortoise, which widely exists in Chinese mythology. It has many symbolic meanings, but in analyzed tomb painting it is in a role like a god, guiding the dead to heaven.

For the W-02 wall, there are three standing women face to the right with different things hold in their hands. The female figure on the far right is the best preserved.

Through the two walls, their characters meet the two systems. From the standing position, it is an interesting phenomenon that the two figures on the W-01 wall stand opposite to each other, while the figures on the W-02 wall stand facing one direction. If we think that the two ladies standing opposite each other are devas, then the meaning of guidance becomes even more apparent. As for the maids or ladies standing in the same direction, it is clear that they were designed to surround the owner(s) to serve him/her/them.

As for the color of the mural, there are red (on W-03 wall and little spots on W-04 wall), orange (on W-01 wall but maybe red after oxidation), black (on W-02 wall but maybe traces of smoke), yellow and green (on W-01 wall female figures’ dress). The color on the W-04 wall is well preserved, and the satura-

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<sup>4</sup> Yu, “A Study”, 45–46.

tion is relatively high, while the colors of other walls have varying degrees of fading.

In total, the remaining of this tomb mural conforms to the basic rules of the Tang Dynasty tomb murals. Its complete character images show people's values after death at that time, and the layout has high artistic and research value and can provide more physical support for the study of Tang Dynasty tomb murals.

### 1.3. Detachment Procedure

There was no possibility of saving the tomb's paintings on-site, so it was decided to remove them from their original locating detaching from the support layer. Due to the time limitation and the backfilling requirements of the pit at that time, as well as the poor environment condition (snowy) and fragile mural condition, the team chose to rescue the mural by using most simple but available for quick application traditional detachment method to remove the mural from site to the University laboratory. The detachment procedure was as follows:

- 1) Preliminary surface cleaning;
- 2) Reinforcement of the mural edges;
- 3) Detachment the mural from the wall (paint layer and part of lime layer);
- 4) Transfer of the mural on auxiliary support, temporarily to university laboratory.

#### 1.3.1. Reinforcement

Through visual investigation, it was found that damages to the mural are severe, and the most severe and urgent damages are hollows and breakage, which could cause the loss of the mural during the detaching process. Therefore, reinforcement procedures should be executed first. The team chose to use on-site mud to spread on the edges of breakage lines for reinforcing (see Fig. 9). The choice was supported by the opinion of local experts finds that mud can keep humidity and prevent the mural from becoming crispy and hard and is reversible after removing.

Besides on-site mud, there is a wide range of alternative reinforcement methods in painted relics in modern China. According to Lan Desheng<sup>5</sup> in

<sup>5</sup> Desheng Lan, "Application of Cementing Materials in Protection and Restoration of Painted Cultural Relics", *Research on Heritages and Preservation* 4, no. 1 (2019): 117.

2019, Chinese teams generally choose acrylicesters, ethyl silicate, animal, or vegetable glues for surface protection and reinforcement. Among them, Acrylic esters are widely used as reinforcement materials because of their high adhesion, controllable mechanical strength, and short drying time. The two most widely used Acrylic esters are Paraloid B-72 and Primal AC33, whose effects can be seen in the Hanxiu tomb mural conservation in the Tang Dynasty<sup>6</sup> and the tomb mural in Northern Song Dynasty<sup>7</sup>. (Paraloid B-72 is a polymer (PEMA/PMA) formed by the copolymerization of 70% ethyl methacrylate and 30% methyl acrylate<sup>8</sup>. And Primal AC 33 is a copolymer of methyl methacrylate and ethyl acrylate (60:40 w/w)<sup>9</sup>.)

It is important that before reinforcement, cleaning works should also be done on the surface. The cleaning was based on dry cleaning with a soft brush, cotton swabs, and end-sharpened bamboo sticks. Additionally, cotton swabs with a 50% ethanol solution were used for surface cleaning.

### 1.3.2. Detachment

After as much as possible details of the mural were recorded and samples for future analysis collected, we could start the detachment procedure.

The treatment was as follows:

#### 1. Preparation work before detachment

Before detaching, we prepared enough essential materials, which could be classified into two parts: materials for detaching and for packing. For the detaching materials, peach gum, gauze, nails, pins, wood charcoal, 70cm\*70cm stainless steel basins with iron gauze on the surface, tailor-made slab (the cutting tool) were well prepared. The peach gum plays an essential role as adhesive. It was to be used to stick the gauze and the mural together tightly, which is a way of mechanical stabilizing of the detached fragment in order to avoid cracking and braking during the later detachment for the reason of significant mechanical stress and weight. The choice of peach gum follows a traditional way, but it can be justified in use not only by its easy

<sup>6</sup> Wenzong Yang, "Rescue Protection of Mural Paintings from Tang Dynasty Tomb of Han Xiu", *Journal of National Museum of China* 12 (2016): 145–147.

<sup>7</sup> Rui Yang, "Detachment and Restoration of Wall Painting from the Northern Song Dynasty of Fu Bi", *Science of Conservation and Archaeology* 22, no. 1 (2010): 71–72.

<sup>8</sup> M. Brugnara et al., "The Application of the Contact Angle in Monument Protection: New Materials and Methods", *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 241 (2004): 1–3.

<sup>9</sup> Lan, "Application", 119.

availability and a pressure of time in order to have the possibility of rescuing the paintings at all. It also has a scientific explanation. It is a reversible material and is soluble in hot water without reacting with or dissolving in lime or mud. After removing, it can also be easily removed from the mural by using methods involving wet and warm environment – using swabs or other delicate mechanical methods in order to extract it from the painting surface. For the package materials, we asked carpenters to make tailor containers with accurate sizes by using a three-ply board, rough ground, sponge, and plastic membrane (see Fig. 10). Moreover, enough iron wire and lag spikes were also prepared.

## 2. Detachment process

The hot peach gum was prepared with the help of local experts. 3kg of peach gum was soaked in fresh water for one night (the precise percentage of the solution was not controlled), and then replaced with new water to guarantee purity as much as possible, and then heated in a water bath, continually stirring the peach gum until it becomes a viscous slurry. After firing the wood charcoal in stainless steel basins, putting two pieces of proper size gauze on the mural's surface, and using nails to immobilize the gauze's top, the peach gum 70°C hot was brushed separately on the two pieces of gauze (see Fig. 11). The charcoal basins were then placed at about 0.5 meters from the mural, facing the mural to achieve a drying effect.

After confirming the drying, the team used the custom-made flat iron to shovel the mural from the bottom, and a few people slowly placed the mural on the customized board and then covered the board with the same size and same material on top. The paint and part of the lime layer were both separated from the wall and stuck on the gauze tightly.

### 1.3.3. Transfer the mural

Relying on the adhesive force and support of peach glue and gauze, the painting layer (with part of the lime layer) will not be scattered, but complete. They are placed gently downward on a wooden board covered with sponge and plastic film. The board is strong and resistant to bumps, the soft sponge can ensure that the painting will not directly contact the hard board, and the uppermost plastic can prevent the mural from being stuck on it. Then the two boards were sealed tightly with nails and iron wire and finally transported safely (see Fig. 12).



After successfully intercepting all the murals, the tomb was backfilled. The murals were transferred into a temporary lab in Xi'an and then they will be sent to the conservation lab at Beijing Union University. Further restoration works of the murals are planned to do in the future, and once finished, the team would like to put them in the museum of Beijing Union University or other museums.

## 2. Mural detachment methods in China and Europe

When Discussing tomb mural conservation, the question about conservation methods or techniques is never simple. Instead, it is also a product of careful consideration of mural tomb values, government policies, local economic development, and other stakeholders.

According to Principles for the Conservation of Heritage Sites in China<sup>10</sup> and Law of the People's Republic of China on the Protection of Cultural Relics, principle of authenticity and integrity are to be followed, so executing the so called "rescue" and the technical conservation first. A standard made by the State Bureau of Cultural Relics of mural conservation plan also requires scholars to do value evaluation, environment investigation, current condition evaluation, and scientific recognition before making a conservation plan.

Even though there seems to have pretty much-legalized guidance, tomb mural, as a particular type of cultural relics, is still not easy to be well preserved on-site. The reasons are mostly because of the terrible environmental conditions that are not allowed murals to survive and the tomb's uses. For lots of tombs with the mural, even when significant value object is found – the lands' is commonly still devoted for the commercial use. In this case main way of rescuing the objects is to move them out of endangered tomb, including the mural. Tomb mural seems to become movable relics because of that or at least are treated as they would be. Considering this situation in China, the murals' conservation is mostly rescuing excavation, which involved the first step-how to preserve the murals by removing them from the tombs.

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<sup>10</sup> ICOMOS China, 2015, Zhongguo wen wu gu ji bao hu zhun ze = Principles for the Conservation of Heritage Sites in China. Rev. ed. Beijing Shi: Wen wu chu ban she, [http://hdl.handle.net/10020/gci\\_pubs/china\\_principles\\_2015](http://hdl.handle.net/10020/gci_pubs/china_principles_2015).

The development of mural conservation in China started in the 1950s<sup>11</sup>. There are two options: leaving paintings in the tomb – and the execution of conservation on-site or moving it out of the tomb. Furthermore, Chinese scholar Li proposed and summarized several methods during the past years<sup>12</sup>: 1) In-situ Conservation Method; 2) Traditional Detachment Method; 3) Framing Method; 4) Overall Relocation Method. The choice of method depends on the condition and type of tomb mural. The first method (on-site conservation) is only suitable for relatively simple tombs, and the mural should be preserved well, and there are very high requirements of the environment. The traditional detachment method is the most important and widely used in China. In a narrow sense, it separates the mural ground layer from the support and only retains the painting layer and part of the ground layer. This method's requirement is lower than others; therefore, it is still the most popular option. In Yanggong's tomb mural, this type of method was used. The third and fourth methods are other two types of detachment methods used for different types of tomb murals. The Framing Method is used for murals whose paint layer is very thin and cannot be removed by traditional method. The Overall Relocation Method is suitable for small tombs and it can ensure the integrity of the tombs and mural structure to the greatest extent, while also retaining the information carried by the cultural relics. But this method is expensive.

In Europe, detachment methods for murals are various, and the choices of which depends on the depth of separation – one method called “strappo”, which is only a lifting of the paint layer. The oldest method, “stacco a massello” detach all rendering and all or part of the support<sup>13</sup>.

### 3. Evaluation of the detachment method used in Yanggong tomb

To evaluate the applicability and effect of the traditional detachment method, we should consider its necessity first. Whether it is architectural murals

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<sup>11</sup> Jia Wang, “Inheritance and Development – the Exploration Road of the Protection and Restoration of the Murals in the Shanxi History Museum”, *Cultural Relics World* 10 (2019): 62–65.

<sup>12</sup> Man Li, “Discussion on the Conservation Methods of Several Tomb Murals”, *China Cultural Heritage Scientific Research* 4 (2017): 64–71.

<sup>13</sup> Paolo Mora, Paul Philippot, and Laura Mora, *Conservation of Wall Paintings* (London: Butterworths, 1984), 245–247.

or tomb murals, they are a vital part of architecture/tombs. The values maximize when they are together. Unless conditions do not permit to use other solutions, the detaching is inconsistent with the principle of minimum intervention and the principle of integrity.

Nevertheless, from another perspective, detachment is also a rescue method of conservation. For a city like Xi'an, which is full of ancient tombs, its urbanization development (such as constructing subways and real estate development) will inevitably need to sacrifice some "relatively low value" historical sites. Faced with the pressure of policies and modernization development, some tombs with low levels will face the fate of being backfilled. Rescue conservation is especially important at this time. China started the wave of archaeological excavations in the 1950s, which is also the wave of modernization. It can also explain why, since the 1950s, the methods of detaching murals developed rapidly, matured, and are still in use today. If they were not transferred away, these murals would disappear forever. Therefore, detachment is also a way of conservation.

Besides detachment, in-situ conservation is also used in China and other countries, but as we talked above, it is limited by the condition of the tomb itself and the surrounding environment, as well as unmaturing techniques.

However, in-situ conservation is still a development trend in the future in China, and at a meeting that has just ended in July, "Research on Key Technologies for In-Situ Conservation of Tomb Murals" was selected as a Chinese National Critical Research and Development Project<sup>14</sup>. It also shows that scholars in China have gradually realized that blindly detaching may not be the most appropriate method.

In the detachment of the murals in Yanggong's Tomb, the two large murals with pictures were removed intact and transferred to the laboratory safely. The laboratory environment is strictly controlled so that they will be well preserved before restoration. In detaching, the gauze was stained by peach glue on the front of the mural. During the restoration process, the possibility of residues is not ruled out. The addition of new materials will always be accompanied by risks, causing aging effects on the pigments on it (no direct evidence shows). Detaching separates the painting layer and the mural's support layer; its integrity is destroyed, and the original mural structure is

<sup>14</sup> "Study on key technologies for in-situ protection of tomb murals' launched", Sohu News, Accessed July 2, 2020, [https://www.sohu.com/a/405244450\\_119798?\\_f=index\\_pagefocus\\_7&trans\\_=000014\\_bdss\\_dkbjyq](https://www.sohu.com/a/405244450_119798?_f=index_pagefocus_7&trans_=000014_bdss_dkbjyq).

disturbed, too, making it impossible to thoroughly study the mural manufacturing process and materials in the later period.

Generally speaking, this traditional detachment procedure to rescue the first accomplishes its purpose of protecting the mural's painting layer when facing the fate of backfilling. It is crucial for the research of Tang Dynasty art, mural art, philosophy, tomb regulations, and mural materials. However, the rationality of this method of detaching is still to be discussed. The separation of the paint layer and the mural's support layer destroys the integrity, and the addition of new materials also increases the risks of later aging and destruction. However, these results are also caused together by policies and economic development. There is still a long way to go for a rationalized conservation plan for Chinese tomb murals. It is necessary to upgrade the technology and reach a consensus on ideas based on all stakeholders' coordination.

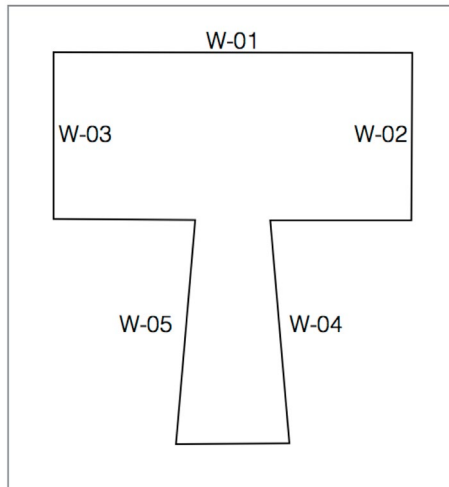


Fig. 1. Illustration of the walls in the mural.  
Source: Drew by Luli Zou



Fig. 2. The side of W-01 wall. Source: Author



Fig. 3. The side of W-02 wall. Source: Author



Fig. 4. The panoramic view of W-01 wall. Source: Author



Fig. 5. The panoramic view of W-02 wall. Source: Author

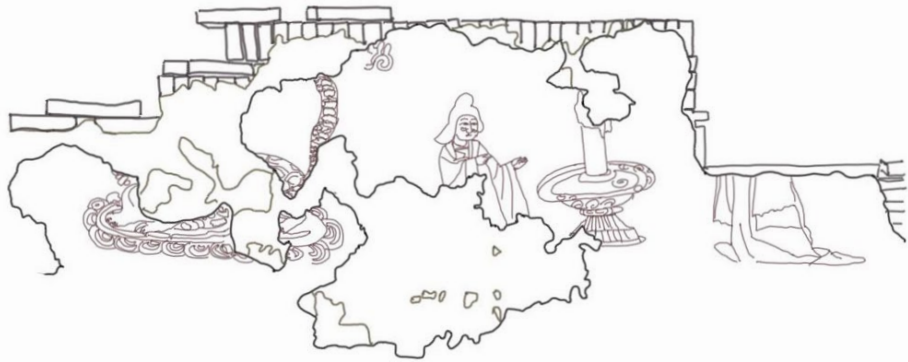


Fig. 6. Images on W-01 wall. Source: Drew by Luli Zou



Fig. 7. Images on W-02 wall. Source: Drew by Luli Zou





Fig. 8. The photo of the animal image on W-01 wall. Source: Author



Fig. 9. The team was using the mud to spread on the breakage for reinforcement.  
Source: Author

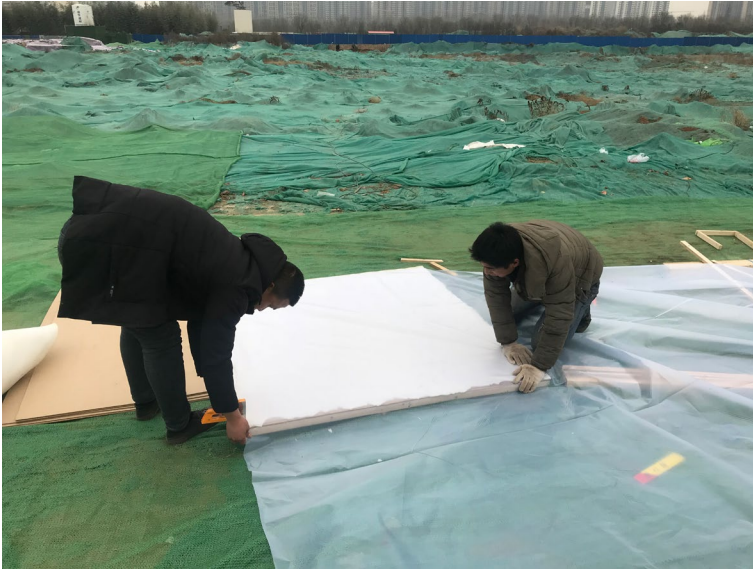


Fig. 10. The carpenters were making the tailor containers. Source: Author



Fig. 11. The prepared peach gum on site. Source: Author



Fig. 12. The ready-to-go boards with mural pieces in it. Source: Author

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