The Site of Ancient Towpaths along the Yellow River at Xihetou, Pinglu, Shanxi

Shanxi Provincial Institute of Archaeology and Archaeology Specialty, Shanxi University

Key words: Xihetou Site (Pinglu County, Shanxi) Sui and Tang dynasties towpaths–history

To cooperate with the construction of Xiaolangdi Reservoir Project, in July and August 1997, we conducted a detailed survey to the remains of towpaths on the north bank of Yellow River and to the east of Sanmenxia Gorge. This survey was conducted with references of the past investigations. The Xihetou section was surveyed during 12–17 July.

Xihetou is a countryside ford located in the south end of Caochuan Township, Pinglu County and about 60 kilometers to the east of the county seat. Across from the Yellow River is Huaiba Village of Chencun Township, Mianchi County, Henan Province, and this ford links the traffic of the nearby area of Shanxi and Henan Province.

The Remains

The remains of ancient towpaths in Xihetou were distributed in two localities; the locality upstream of the River formed an isolated unit and the remains consisting of the locality in the gorge were separated by the collapsed cliff into five fragments, each of which was surveyed as one unit in our work. These six units were named by us as Section One to Section Six: the unit at the ford was Section One and the isolated unit upstream, Section Six (Figure 1).

1. The towpaths of Section One was started from the ford and stretched about 90 meters to the west. On the cliff about 1–5 meters over the alluvial slope (which is 2–5 meters over the water table of the Yellow River), the towpaths opened in ancient times were preserved in various statuses. The towpath here was actually a side-opening ditch dug or hewn into the steep cliff and the "depth" of the ditch was the width of the path, the narrowest preserved surface was 0.3 meter in width and the widest, 2 meters. The "width" of the ditch, which was the height of the shelter-shaped towpath, was about two meters. To open a path in this shape should cut away large amount of stone, which was a hard work in ancient days; however, in the places where the cliff was not that steep, the path was simply made by cutting the sloping cliff into a right angle the horizontal side of which was the path surface, and the work was easier. In the gaps of the cliff, the path could not be cut out; two gaps were in this section, one of which was 15 meters long and the other, seven meters. Square or round holes chiseled or drilled on the path surface were found, three of which were intact. One notch cut for laying bridge across the gap was also found on the path surface. Square and

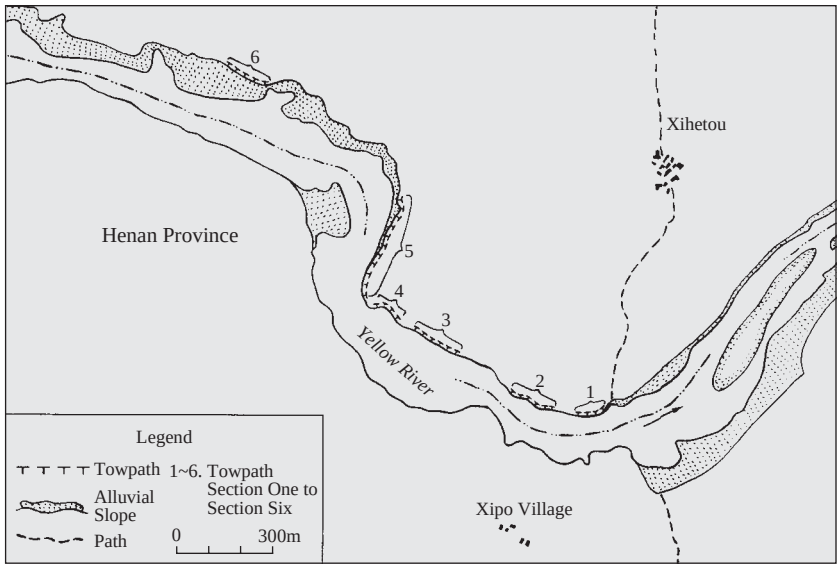

Figure 1. The Distribution of Towpath Remains at Xihetou Site

U-shaped holes were found on the cliff over the path surface (Figures 2–4).

Most of the square cliff holes were cut close to the path surface; three sizes of them - large, medium and small - were found. Their distribution were very irregular: the longest distance between two holes (no other holes between them) was 19 meters, while the shortest one, 0.1 meter. Few square cliff holes which were cut farther over the path surface had different functions from that of the ones cut close to it. The holes on the towpath surface and most of them on the cliffs were used for building the towpath. In the report *Sanmenxia Caoyun Yiji* **(**三门峡漕运遗迹 The Water Transport Remains in Sanmenxia, Beijing: Kexue Chubanshe, 1959**)**, the construction of towpath along the Yellow River were clearly described with detailed diagrams and captions. In total, three large, three medium and eleven small square cliff holes were found close to the path surface (including the sections of the gaps); moreover, two medium and one small cliff holes were found 30 meters from and 2.5–4.5 meters above the starting point of the path, and the usage of these cliff holes was still unclear.

13 U-shaped holes, which were the most popular artificial remains along the towpath, were found about one meter or so over the path surface on the cliff. The distribution of this type of cliff holes were relatively even: the distances between them were about 1.7-9 meters. As for the usage of this kind of hole, some scholars inferred that ropes had been passed through them for the boat trackers to hold as support; but a ferryman named Cao explained that as the anecdotes told by the late ancestors, a ring made of bamboo strip twisted rope was tied through the U-shaped hole, for the boat trackers to hold. More researches are needed to make the details out.

On the cliff in the middle part of this section, an inscription of the 29th year of Daoguang Era (1849) was found 1.2 meters over the path surface. The text comprising 32 characters in *Kaishu* style was cut vertically in nine lines, and the characters were 2–4 centimeters in size. The text could be interpreted as: “ The towpath was amended in the middle ten-day period of the third

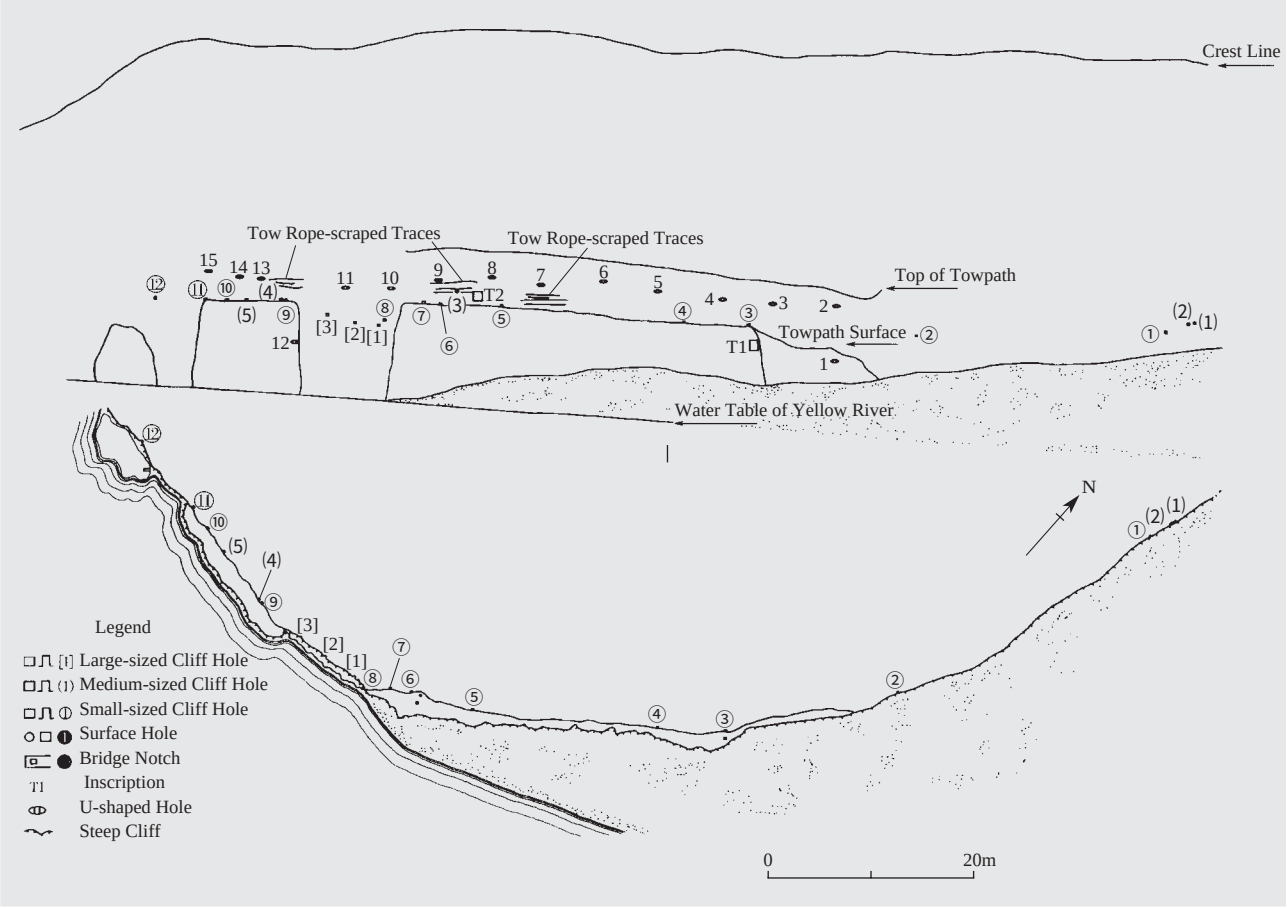

Figure 2. The Elevation and Plan of Towpath Remains of Sertion One

month of the 29th year of Daoguang Era; the business establishments of Shixing, Sanhe and Xietai shared the expense, 4000 cashes in total; the manager was Zhang Jianxian.” Trace of a vertical roller, which was a new type of towpath remains discovered in this survey, was found 2.5 meters to the west of this inscription. The whole set consisted of a cliff hole, a semi-cylindrical groove, a base and a round hole (might be used to set axle) on it. We inferred that this was originally a vertical roller preventing the tow ropes from being worn by the stone cliff and changing sliding friction into rolling friction to save boat trackers' labor.

Figure 3. Square Hole on the Path surface of Section One

Figure 4. Round Hole on the Path Surface of Section One

What specially noticeable was the tow rope-scraped traces on the cliff, three sections of which were found over the towpath surface. The most typical one was on the same height and place with the vertical roller, about 0.4–1 meter over the path. This section consisted of five traces in a range of 0.6 meter, the shallowest one of which was six centimeters in depth and the deepest one, 32 centimeters. The cutaway section view of the traces was semicircular with 2–3 centimeters in radius; the deeper the traces were scraped into the cliff, the wider they were. The lengths of these traces were generally 10 meters or so; all of them should have been scraped by the tow ropes during the hundreds of years. These traces were the valuable evidence of the long-lasting water transportation and the utilization of the towpath along the Yellow River. However, we cannot date the beginning and end of the towpath, either can we calculate the vessel-times needing towing and the loading capacities of the boats based on these traces.

Another towpath with the alluvial slope as surface was found below Section One, and some artificial remains were discovered including two tow rope-scraped traces, two U-shaped cliff holes and a cliff-side inscription of the third year of Xuantong Era (1911). The text of the inscription comprising six characters in *Kaishu* style was cut vertically in two lines, the content of which was “Sun Tai (seemingly a person's name), third year of Xuantong”. This towpath was guessed to be used in the low-water seasons of the Yellow River and, analyzed with the date of the inscription, used most possibly in early modern times.

2. Section Two was started from the collapsed portion about 80 meters to the west of Section One and stretching about 140 meters. Both ends of this section of towpath were severely destroyed and the path surface was collapsed; only some construction remains were

kept on the cliff or even on the collapsed rocks. The path surface was about six meters over the water table of the Yellow River and the waves are beating the cliff; the survived parts of path surface was very narrow (about 10–50 centimeters wide) and it was very dangerous to do onsite survey to this section, while our schedule was very tight. Because of these difficulties, we had to survey Section Two with telescope from across of the Yellow River, drew sketch maps and noted the remains and traces for reference. The artificial remains and traces observed through telescope were nine large square cliff holes, 32 small square cliff holes, 36 U-shaped cliff holes and four surface holes seen on collapsed rocks.

3. Section Three was separated from Section Two by a landslide section about 200 meters in length; the collapsed rocks were spread more than ten meters below the path surface of Section Three. The towpath of this section was about 150 meters in length and ended at a huge crater to the west. The path was 4–6 meters over the alluvial slope, which was still 3–4 meters above the water table of the Yellow River. The path surface of this section, which was 0.5–2 meters wide, was preserved better, except for a gap 80 meters long in the middle caused by collapse. In this section, seven medium square cliff holes, 26 small square cliff holes, 19 U-shaped cliff holes, ten surface holes, three bridge notches, one vertical rollers and two cliff-side inscriptions were found. One of inscriptions above the medium square cliff hole No. 3 had only two characters "太平 (Peace and Tranquility)" in *Lishu* style; the other one was on the right bottom corner of medium square cliff hole No. 7 with five characters "好大方孔了 (How large square hole finished)" in one line, which might be carved by the masons drilling these holes for pleasure. In addition, clear traces of chiseling and drilling were left on the cliffs in this section, which would be remains of opening the towpath (Figure 5).

4. Section Four was separated from Section Three by a huge crater mentioned in above paragraph. This crater was about 20 meters in diameter, to the west of which a landslide section stretches almost 30 meters westward; the remaining parts of towpath of Section Four were distributed from here along the cliff for about 85 meters to the west. The western end of Section Four was the corner of the cliff where the riverbank turns northward; the corner was in almost a right angle and the cliffs of both sides of which were like being cut out by knife. The towpath surface, which was 0.1–2 meters wide, was cut into the cliff about six meters over the water table; no complete gaps were found. The construction remains of towpath discovered in this survey were 26 small square cliff holes, 19 U-shaped holes, 24 surface holes and two

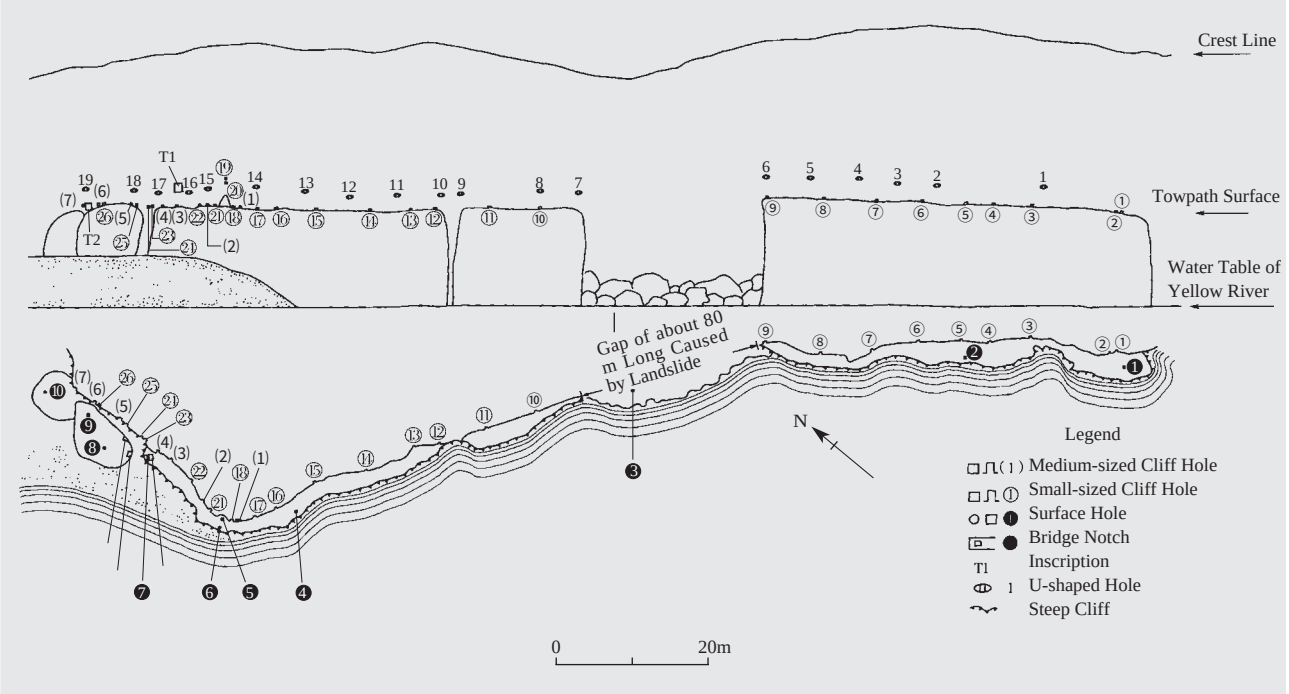

Figure 5. The Elevation and Plan of Towpath Remains of Section Three

bridge notches (Figures 6 & 7).

5. The towpath of Section Five was stretching northward along the riverbank for about 335 meters, which was the longest section of towpath with the most construction remains and traces in Xihetou Site. From the corner between it and Section Four, cliff holes in various shapes and sizes could be seen, until the northern end of the cliff. The traces of stairs descending from the cliff-side towpath to the alluvial slope were also preserved: at the end of this section, two square holes were found one and two meters below the towpath surface, which might have been the postholes for wooden stairs.

This section was linked to Section Four, the distance between remains of which was less than one meter; however, a part of towpath surface more than ten meters from the starting point of this section had been collapsed, so we surveyed these remains as two sections. The towpath surface, which was about 6-8 meters over the rapids of the Yellow River, was not flat but undulating along the rock's stratigraphic structure in order to reduce the amount of stone to be cut. The extant towpath surface was 0.1–2 meters in width; some narrow parts were still barely passable; only the part about 30 meters from the starting point was completely unreachable and we had to observe and survey with telescope from across the River or motor-driven boats in the River, so no precise data can be provided. The construction remains and traces of this section discovered so far are: 38 medium square cliff holes, 59 small square cliff holes, 53 U-shaped cliff holes, 53 surface holes and one bridge notch (Figures 8–10).

6. The towpath of Section Six was about 500 meters to the west of Section Five, and stretching about 160 meters in east-west direction. A gap about 20 meters long caused by landslide broke this section into two parts in the middle: the eastern part had path surface preserved, which was 0.4–1 meter in width, but all of the construc-

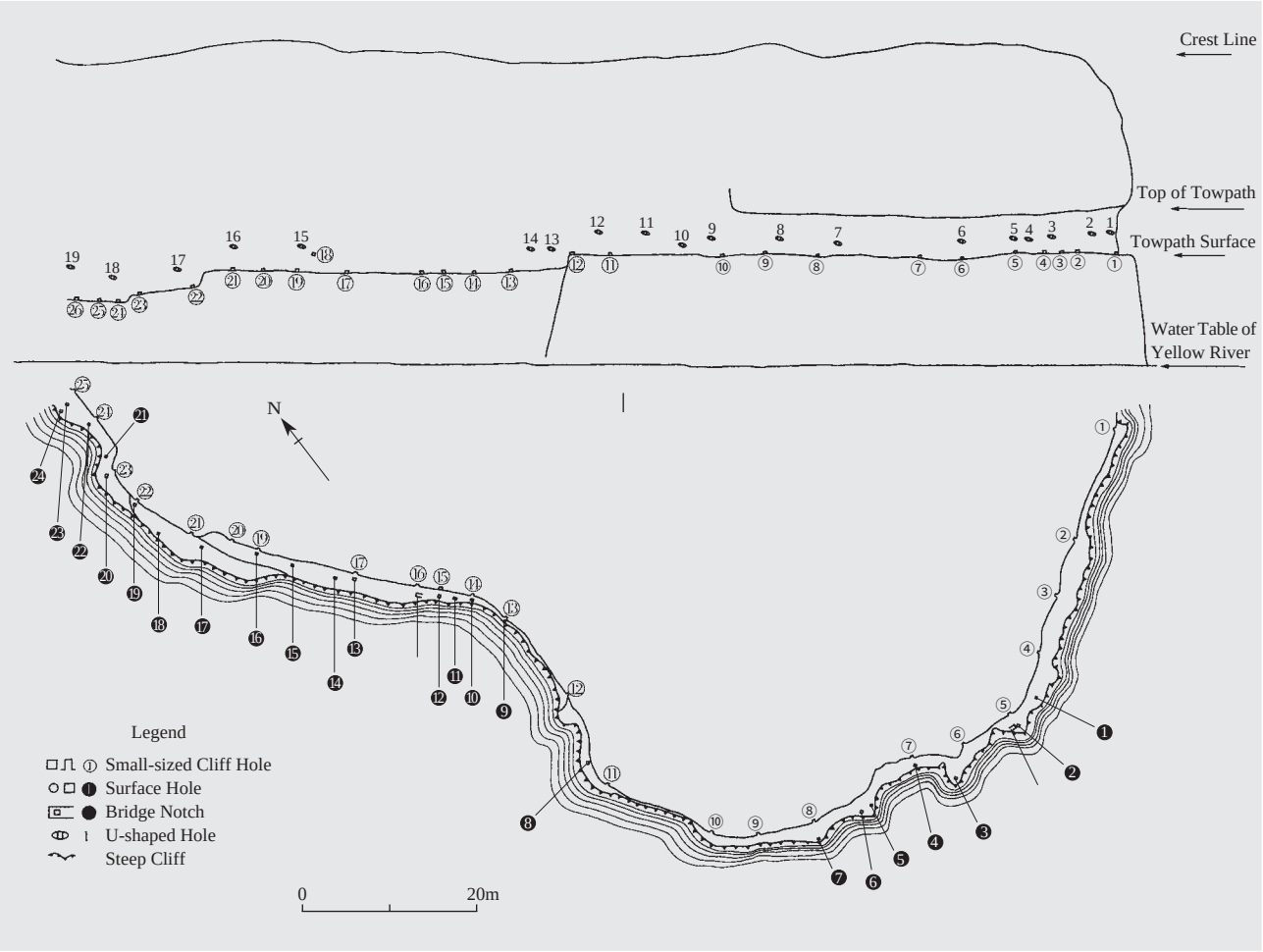

Figure 6. The Elevation and Plan of Towpath Remains of Section Four

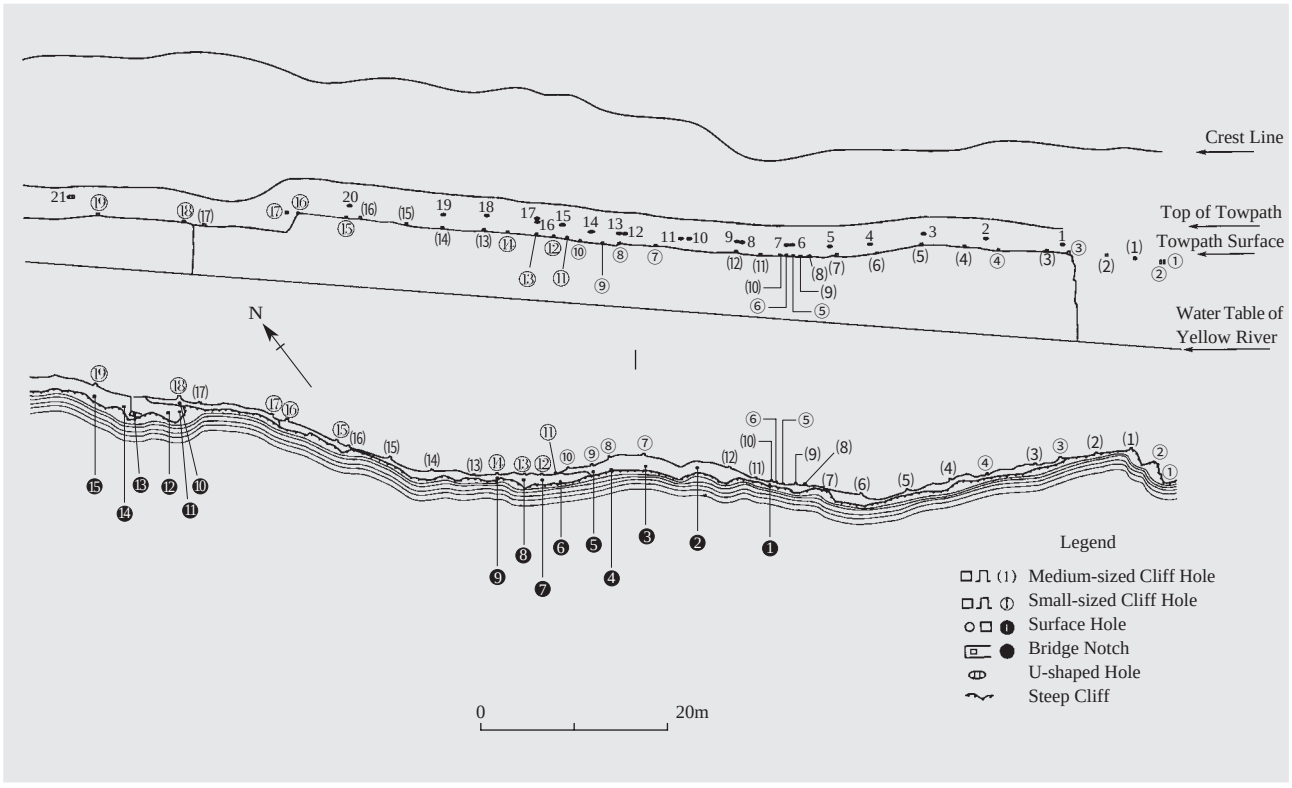

Figure 7. The Elevation and Plan of Towpath Remains of Section Five (1)

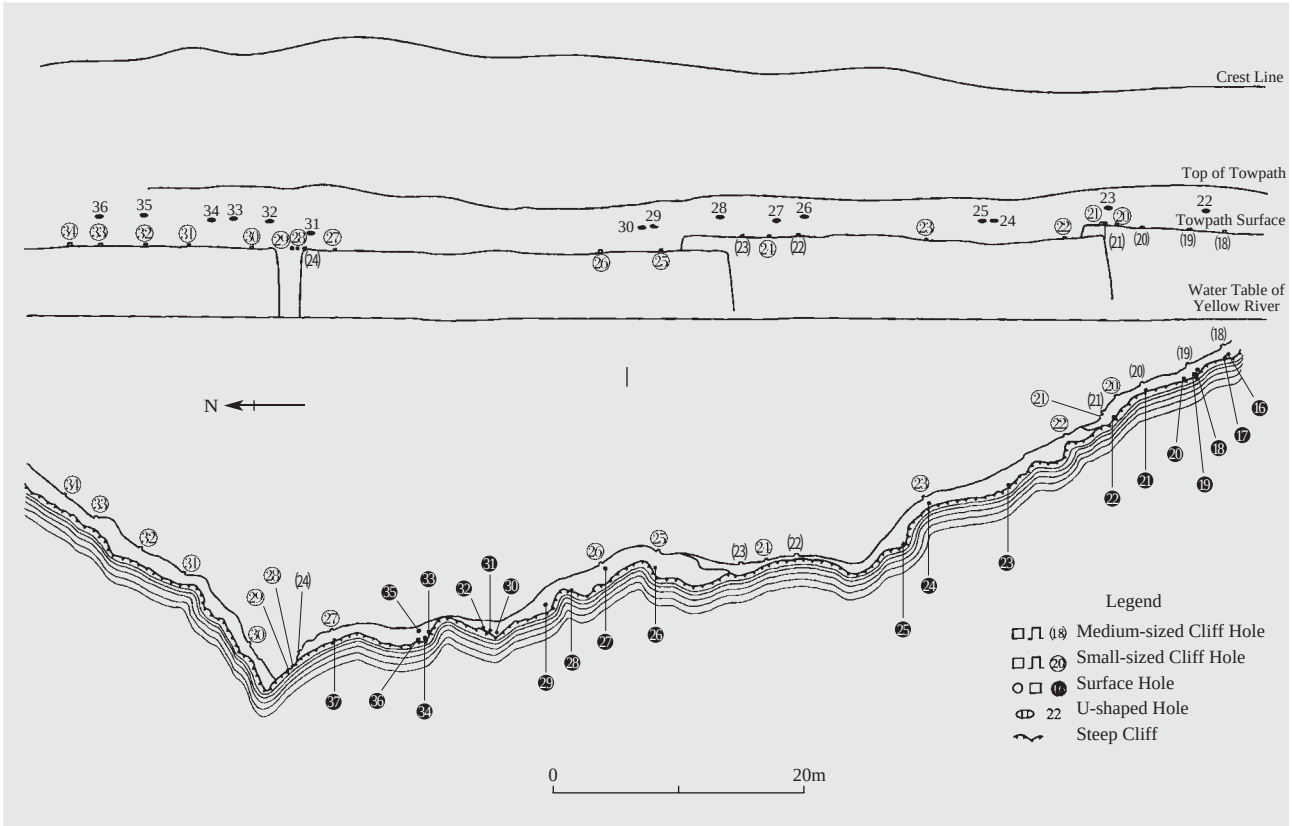

Figure 8. The Elevation and Plan of Towpath Remains of Section Five (2)

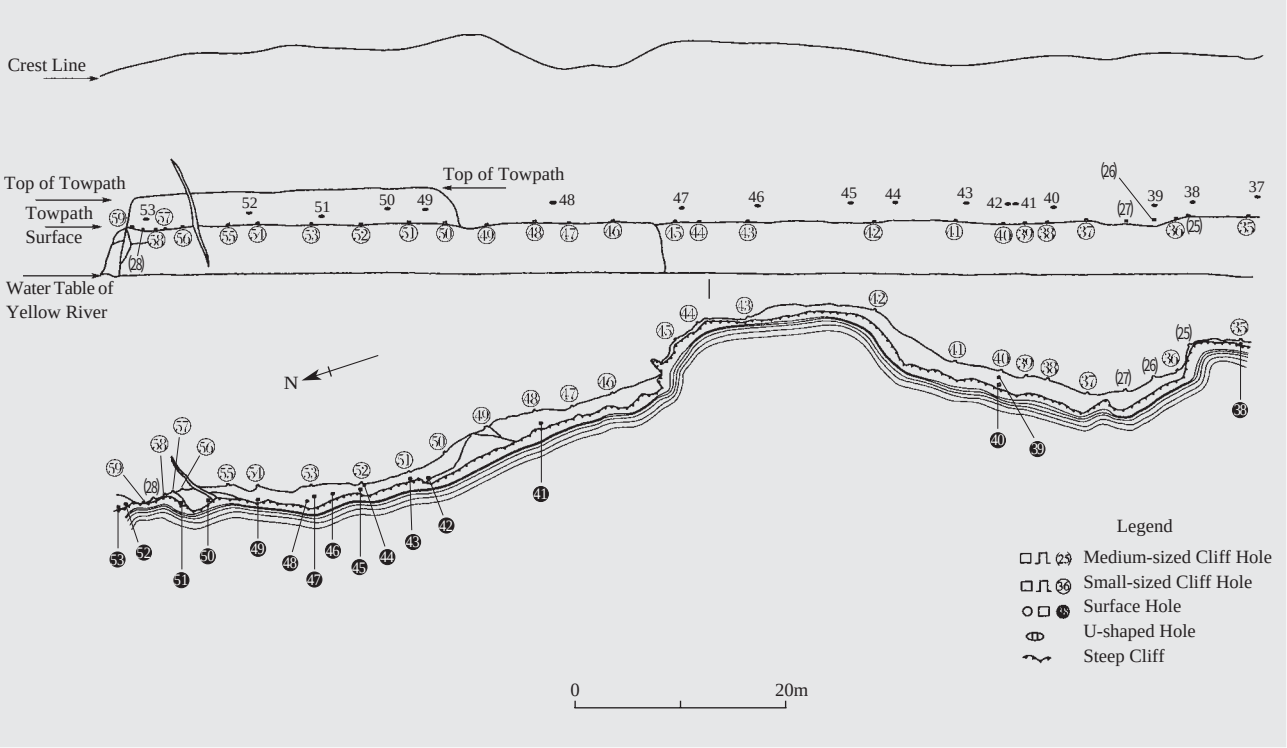

Figure 9. The Elevation and Plan of Towpath Remains of Section Five (3)

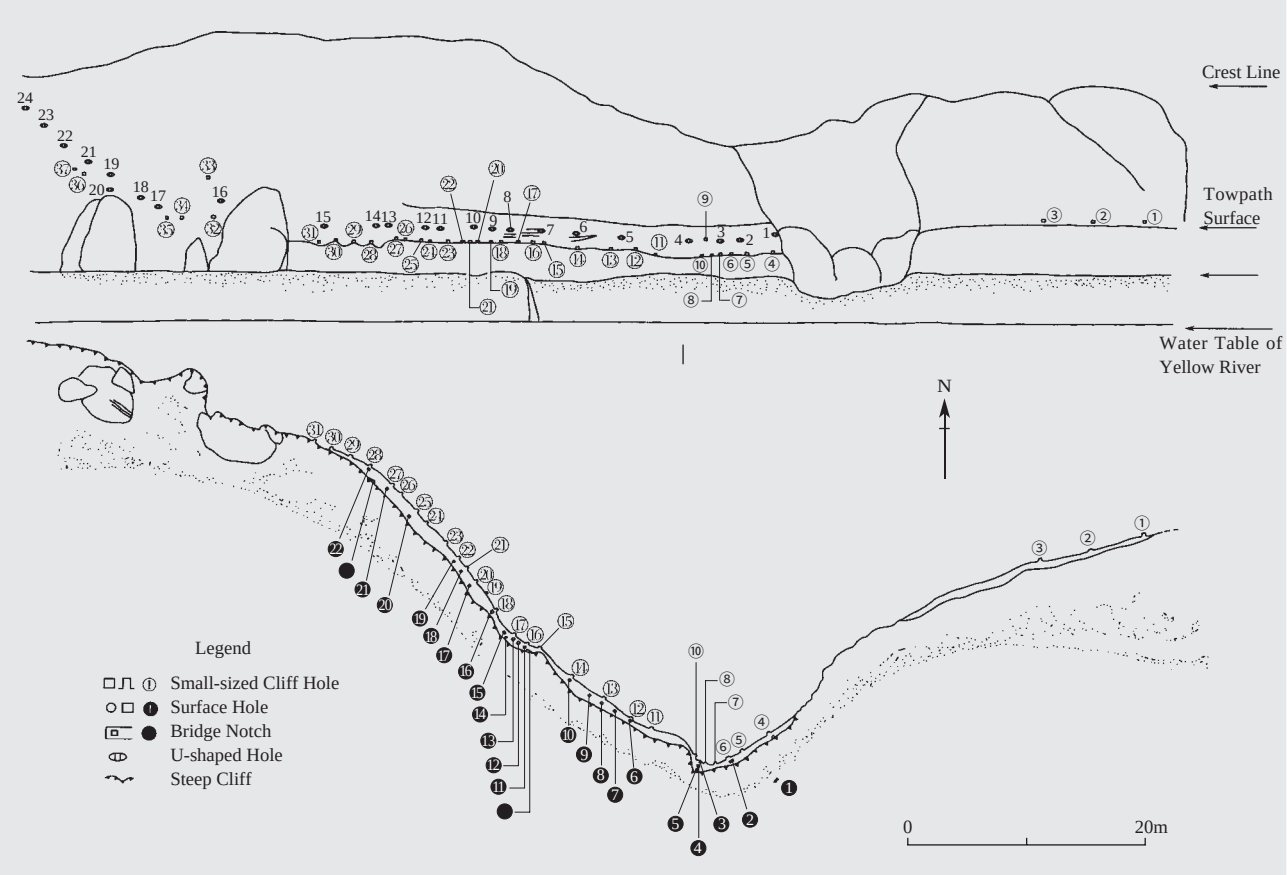

Figure 10. The Elevation and Plan of Towpath Remains of Section Six

tion remains preserved were only three cliff holes; the western part, which had fragmentary path surface kept, had more construction remains. The path surface, which was spoiled and destroyed by collapses and landslides, was 0.2–2 meters in width, and 5–15 meters over the alluvial slope. Because of the bad condition of the path, some construction remains could not be reached to measure but just numbered and noted. The rapid is separated from the cliff about 5–15 meters by the alluvial slope, which had two deposit layers, showing that the water table have been changing in very complicated way during past centuries. However, by the observation to the present status, we believe that the water could hardly reach the cliff and the water table at the time when the towpath was being opened must have been much higher than it is at present and more favorable for water transportation. In this part, 37 small square cliff holes, 24 U-shaped cliff holes, 22 surface holes, two bridge notches and one vertical roller have been found.

Conclusion

About the date of the construction of the towpath: Referring to the discoveries in other locations, we know that the U-shaped holes were cut in the Sui and Tang Dynasties and the vertical rollers were the remains of the most flourishing period of water transportation in the Tang Dynasty.

The inscriptions of Daoguang and Xuantong Era showed us that until the later period of the Qing Dynasty, water transportation was still run in the section of the Yellow River to the east of Sanmenxia Gorge. The earliest cliff-side inscription related to the opening and repairing of cliff towpath we found so far in our archaeological surveys to the cliff towpath along the Yellow River was that of the eleventh year of Jianwu Era (35 CE) of the Eastern Han Dynasty; to that of the third year of Xuantong Era (1911), the records of the construction and maintenance of the towpath in the over 1800 years can be seen in the inscriptions on the cliff of this section. These inscriptions reflected the value of water transportation of the Yellow River in the ancient national economy.

References

Institute of Archaeology, Chinese Academy of Sciences. 1959. 三门峡漕运遗迹 (The Traces of Grain Transportation by Yellow River in Sanmenxia). pp. 5 & 6 and Figure VI. Beijing: Kexue Chubanshe.

Shanxi Provincial Institute of Archaeology *et al*. 1998. 山西平陆五一石膏厂黄河古栈道遗迹 (Plank Road Remains along the Yellow River in May Day Plaster Factory, Pinglu County, Shanxi Province). *Wenwu Jikan* (Journal of Chinese Antiquity) 4: 5–8 and 10–15.

Zhang Qingjie *et al*. 1998. 黄河古栈道的新发现与初步研究 (Newly Discovered Remains of Ancient Cliff Roadway along the Huanghe River). *Wenwu* (Cultural Relics) 8: 48–58.

Postscript: The original article was published in *Kaoguxue Jikan* (Papers on Chinese Archaeology) No. 14: 238–66 with 16 illustrations (5 of which are photographs) and 15 tables. Authors: Zhao Ruimin 赵瑞民 and Zhang Qingjie 张庆捷; Reviser: Zhang Qingjie; English version translator: Ding Xiaolei 丁晓雷.