Baiheliang Ancient Hydrologic Inscription —— No.1 Ancient Hydrometric Station in the World and In-situ Underwater Protection Project

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Abstract:
Baiheliang, a natural sandstone ridge, stands in the water of Yangtze River, north to Fuling town, Chongqing city. This sandstone ridge was named the Baiheliang (While Crane Rocky Ridge) since flocks of birds, especially cranes, used to perch on or fly over it in the ancient time. Baiheliang, whose top elevation is about 138m, has been submerged under water until the end of winter when the river is low-flow. On Baiheliang many inscriptions had been engraved in the ancient time, which recorded the water levels of 72 low-flow years of Yangtze River since the Tang Dynasty (763). Baiheliang inscriptions could be fairly claimed as the No.1 well-preserved Ancient Hydrometric Station and the rare under-water inscription in the World. These inscriptions emerge from water once every three or five years. The Baiheliang inscription is the national-grade key cultural relic preservation unit. It is significantly valuable in science, history, art, etc. Unfortunately, Baiheliang ridge will be submerged into the water forever when the normal storage level of TGP’s reservoir rises to the elevation of 175m. To preserve these underwater cultural relics really and integrally, the in-situ ‘No-Pressure Vessel’ protection scheme is proposed, which comprehends the multidiscipline techniques, such as the cultural relic, water conservancy, architecture, civil, navigation channel, submarine and special devises. By this protection scheme, the Baiheliang Ridge is preserved in-situ and could be visited in its intact state after the protection project is completed. The total construction area is 8433 square meters and the total investment is 0.19 billion RMB. The constructions of the Baiheliang in-situ protection project began on Feb. 13, 2003, finished and open on May 18, 2009. It is the only underwater museum that is constructed in the over-40-meter-deep water in the world. It provides a successful paradigm for the cultural relic in-situ protection under water, glorifying the great Three Gorge Project of China.

Key words: Baiheliang Inscription; Ancient Hydrometric Station; Three Gorges Project; Underwater in-situ protection for ancient cultural relics
1 Introduction to Ancient Hydrometric Inscription of Baiheliang

The No.1 ancient hydrometric station of the world—— Baiheliang inscription stands in the water of the Yangtze River north to Fuling City, which is located at the reservoir area of the Grand Three Gorges Water Control Project. Since the Tang Dynasty (763), the Chinese people had been used to engrave the pattern of fish on the Baiheliang ridge to record the water level for each low-flow year in the last 1200 years. For flocks of birds, especially white crane, used to perch on or fly over this ridge in the ancient time, this ridge was called Baiheliang (White Crane Ridge).

The Baiheliang stands in the main channel of the Yangtze River, in the section of Fuling town, Chongqing City, 1 kilometer away from the join of Wujiang River and Yangtze River. It is a natural stone ridge with length 1600m and width 25m, stretching along the west-east direction and parallel to the Yangtze river. The elevation of ridge top is 138 meters; about 30 meters lower than the highest flood level of Yangtze River. Baiheliang consists of three sections, i.e. the west, the middle and the east section. The inscriptions were engraved on the 220m-long middle part, especially on the east 65m-long area of the middle part.

The surface of Baiheliang Ridge is formed with a smooth thin layer of light color sandstone, which is quite suitable for engraving. It inclines with a gentle angle of 14.5° towards the main channel of Yangtze River. According to the incomplete statistics, the inscription falls into 165 paragraphs and has total over 30000 characters, among which one paragraph is from Tang Dynasty, 98 Song Dynasty, five Yuan Dynasty, 16 Ming Dynasty, 24 Qing Dynasty, 14 Modern Time and seven whose time were not clear. There are 18 fish engraved on the stone ridge, among which one is engraved in the 3D relievo, two in bas-relief and 15 in plane line relievo. Moreover, there are also one white crane sculpture and three status of Bodhisattva.

These inscription and relievo locate at different places. They usually submerge under water in winter and only emerge from water in the quite low-flow winter. According to the statistics, they emerge one time every 3-5 years. In ancient times people engraved fishes on the stone to indicate the water level. The emerged fishes on the stone used to harbinger a harvest year. For generations and generations in the ancient time, people recorded on the stone the exact time of the fishes emerging from the water, the name of the observers, and the distance between the fish marks and the water surface. They even wrote and engraved articles and poems on the stone which told about the grand occasions when people cheered the fish marks’ emergence.

2 Location of Baiheliang Ridge

The Baiheliang ancient hydrological inscription is located at the reservoir area of Grand Three Gorges Water Control Project (TGP). Fig. 1 shows the relative locations of TGP, Fuling and Baiheliang ridge. Fuling Town is located at the merging join of Wujiang River to Yangtze River, which has been the important port city of East-Sichuang basin and the biggest exchange center of goods in the Wujiang basin. In Fuling City live the Han, Tujia, Miao, Hui and Mongu nationality people, which have a long history. There are over 2000 cultural relics in reservoir area of TGP,
among which the Baiheliang Inscription is the most famous. Baiheliang Inscription is also the earliest national-grade key cultural relic preservation unit in the reservoir area which will be submerged. The location of Baiheliang ridge and the situation of Yangtze River at Fuling City are shown in Fig. 2. The Baiheliang ridge is immediate to the deep-water channel of Yangtze River. Fig. 3 is the Baiheliang Ridge viewed towards south at the north area of Fuling City. Fig. 4 shows a certain local view of Baiheliang inscription.

Fig. 1 The relative locations of TGP, Fuling and Baiheliang ridge

Fig. 2 The location of Baiheliang ridge and the situation of Yangtze River at Fuling City
3 Scientific Value of Baiheliang Inscription

The rocky fishes engraved on Baiheliang ridge were actually used to record the lowest-flow level of Yangtze River in the ancient time. It provides extremely valuable physical references for studying the variation rules of global and local climate and the hydrology of Yangtze River in history. Before Tang Dynasty (763), there had been two fish carvings. But now only one remains. It is 60 centimeter long and two characters “石鱼”(Rocky Fish) in Li Script were carved on it. The exact engraving time remains to be investigated though it is proven that they were engraved before A.D. 763. The governor of Fuling engraved the couple carp fish to replace the fish engraved in Tang Dynasty in the 24th year of Emperor Kangxi of Qing Dynasty.
According to investigation, the elevation of the eyes of Double Fish is equal to that of the zero-point—water-level of the local Chuanjiang navigation channel and the elevation of Tang Fish paunch equal to the average elevation of low-flow levels of all years recorded by hydrometric station in Fuling City.

Baiheliang inscriptions have recorded the water levels of 72 low-flow years in history, which are handed down to us with extremely valuable hydrologic data. Fig. 5 shows the rarest stonefish. The ancient hydrologic data suggests that the lowest-flow of Yangtze River during the 1200 years occurred in Song Dynasty (1140), which was suggested by the inscription “水去鱼下十尺” (Water level was ten chi below the stonefish) in that time.

The hydrologic data mentioned above are of significant scientific importance for the comprehensive development of Yangtze River basin, inland navigation, field irrigation, bridge construction, urban water supply, etc. Both Gezhouba Hydroelectric Power Station and Grand Three Gorges Water Control Project consulted the above hydrologic data in their design stage. In the international conference of hydrology organized by UNESCO in Paris in 1974, the representative of China introduced the Baiheliang Ridge (Ancient Hydrometric Station), which greatly interested the specialists and scholars. So, we can say that the Baiheliang is the earliest-found, the longest-spanning and the most abundant hydrologic inscriptions for the low-flow water level records. There are also the similar hydrometric inscriptions in Nile in Egypt, but the quantities and the spanning-time are much less than that of Baiheliang.

![Fig. 5 Stone fish](image)

### 4 Historical and Artistic Value of Baiheliang Inscription

Since the Tang Dynasty, the achieved scholars, officials and merchants from different dynasties visited to Baiheliang Ridge and engraved poems on the ridge, among whom are 300 famous figures including Huang Tingjian, Zhu Ang, Qin Jiushao, Liu Jia, Huang Shou, Wang Shizhen, and Gong Wu. The calligraphies were engraved in various type fonts and different styles. Some of them were written in Mongolian. Among these inscriptions, that by Huang Tingjian, the great litterateur of Song Dynasty, is the most famous. The inscription is “元符庚辰涪翁来” (Huang Tingjian visited in A.D.1100), few words but impressive, shown in Fig.6. Fig. 7 shows...
the carving fish, modeled on a wooden fish, which was made in 1333, Yuan Dynasty. The official of Fuling town, Zhang Badai, engraved on it. Fig. 8 shows the stonefish and the inscription (140cm×47cm) by Dong Weiqi in the 45th year of Emperor Kangxi, Qing Dynasty. Fig. 9 shows the 280-centimeter-long fish relief by Shifan Zhang in the 20th year of Emperor Jiaqing (1815). Fig. 10 shows the inscription (97 cm×47cm) by Sun Hai in the 7th year of Emperor Guangxu (1881), which is vivid, elegant and majestic. Fig. 11 shows the mother Bodhisattva engraved on the ridge. Fig. 12 shows the Chirping White Crane.

Baiheliang is an underwater wonder and deserves the name Collection of Stone Inscriptions for the large amount of stone inscription, long history, detailed records of hydrological data, rich content of inscription, wonderful forms and merging into an organic whole with Yangtze River and circumstance.

Fig. 6 Inscription “元符庚辰涪翁来” (Huang Tingjian visited in A.D.1100) by Tingjian Huang

Fig. 7 Modeled wooden fish in 1333
Fig. 8 Stonefish and inscription by Dong Weiqi

Fig. 9 Fish relief by Zhang Shifan in the 20th year of the reign of Emperor Jiaqing in Qing Dynasty (1815)

Fig. 10 Inscription by Sun Hai in the 7th year of the reign of Emperor Guangxu (1881)
Fig. 11 Inscription of Mother Bodhisattva

Fig. 12 Inscription of Chirping White Crane
The Three-Gorge-Project and the ancient hydrometric inscription of Baiheliang

The construction of Ground Three Gorges Water Control Project began in 1992 and completed in 2009, lasting 17 years. TGP is the most magnificent hydropower station, with double five-grade ship lock. The reservoir of TGP is 600 kilometer long, the tailing water reaching the Chongqing City. Fig. 13 illustrates the back water of TGP. From Fig. 13, it is seen that the Baiheliang is located at the bottom of reservoir near Fuling town. Therefore, the Baiheliang will be submerged under water forever. According to the scientific experiment, the Baiheliang inscription will be submerged in the silt of reservoir bottom in about thirty years after the TGP is constructed.

![Fig.13 Illustration of back water in TGP reservoir](image)

The present paper only makes a brief introduction to the TGP of China. Fig. 14 is the birds-eye view of TGP. The profile of the spillway dam of TGP shown in Fig. 15. The hydropower station of TGP consists of three parts, i.e. the left behind-dam power station (14 power units), right behind-dam power station (12 power units) and the underground power station (6 power units). Fig.16 shows the profile of behind-dam power station. The total capacity is 22400MW. The TGP has a double five-grade ship lock, which ensures that the 5000 ton ship can directly reach Chongqing City. Fig.17 and Fig.18 respectively shows the profile of ship lock and the running conditions. The adjustable capacity of TGP reservoir is 33 billion cubic meters, which can ensure the safety of cities along the lower reaches of Yangtze River in case of flood which happens once in one hundred year. The length of TGP reservoir is 600 kilometer and the submerging area is shown in Fig.19.
Fig.14 The birds-eye view of TGP

Fig.15 The profile of spillway dam

Fig.16 The profile of behind-dam power station
Fig.17 The profile of ship lock and ship lift

Fig.18 Ship lock picture
6 The proposed schemes for Baiheliang Protection in recent years and some comments

Since 1994, many major studies on Baiheliang protection have been organized by the competent government department. For the purpose of saving space, only two typical protection schemes are briefly introduced in this paper.

The first one is the “Crystal Palace” scheme proposed by Tianjin University. It suggested that the inscription should be protected by a shell. Fig. 20 shows the Crystal Palace scheme. This shell is a double deck (dome) arch shell 20m×120m, which is made of reinforced concrete. The grouting curtain is adopted along the foundation to prevent water seepage, leaking-off and to protect foundation rock. An underwater tunnel is built. The feature of this scheme is that people can directly enter the underwater shell to see the ancient inscription. But this shell structure will bear 40 meter water-head pressure; it is actually a pressure vessel.

The shell structure is big, so the load applied on it is big. Certain damage on the shell structure can lead to a sudden collapse during construction. Once it is the case, no one can escape from it. When this “Crystal Palace” is put into use, the impact from ship on shell or the heavy object drop can also make damage on the shell structure to collapse. Once this happened, the visitors under this shell structure have no chance to escape.

Moreover, the building of grouting curtain might damage the Baiheliang inscription for these inscriptions are engraved in a thin sandstone layer. Even the curtain grouting were built, the water will seepage through the layered rock mass due to the big difference of water pressure, which will make damage to shell structure upmostly.

The reason that Baiheliang inscription could be preserved well during more than 1000 years is that it has been submerged into water of Yangtze River and exposed into the air in few time. If the ‘crystal Palace’ were implemented, these inscriptions would be exposed into air in long term and will be damaged due to rock weathering.
Additionally, due to the long period of building, expensive cost and serious influence on navigation, the ‘Crystal Palace’ scheme was completely denied in 1998 after investigations. It gave such impression that underwater in-situ protection of Baiheliang inscription seemed to be nearly impossible!

![Fig.20 Illustration of ‘Crystal Palace’ Scheme](image)

The second scheme could be briefed as ‘protected in-situ, but displayed out-situ’. The so-called in-situ protection in this scheme is actually in-situ buried. That means the most suitable approach to protecting these inscriptions is to bury them with silt subjected to the current technique and economic situations. These inscriptions could be excavated and presented to people when the economy and technique are developed enough after one or two hundred years in our country. Another part of this scheme is to duplicate the Baiheliang inscription with 1:1 scale using the model material and display them in a museum on the bank. This protection scheme must have a serious negative influence on the historical relic protection of our country and the Three-Gorge-Project. Moreover, whether these inscriptions are still safe during so long-term bury is still suspended. Additionally, this protection scheme is not conforming to the principles of historical cultural relic protection. Because at that time no other better protection schemes were proposed in many national congresses and the time was tight for the reservoir of TGP was going to storage water, the Examination and Appraisal Meeting seemed to approve this scheme ahead and some relevant design work had been asked to process in February of 2001.
7 Proposing a new innovative scheme—no-pressure container scheme for protecting Baiheliang inscriptions

The author attended the Fuling meeting very occasionally in Feb. 2001. It was the first time for us to attend the Baiheliang’s protection meeting. When we learned various protection schemes and their evolutions. The author did not agree with the scheme which would be adopted by the meeting. After meeting at day, we considered whether the new scheme could be better to protect the Baiheliang inscriptions or not at night. A new scheme gradually was formed. When the meeting nearly closed, approved by the meeting organizers, the author took presentation for half an hour, proposed a new in-situ underwater protection project based on the concept of no-pressure container after passing the scheme of cover by soil in situ, exhibition of the copy for Baiheliang at another place. It is fortunate that the scheme of no-pressure container was unanimously agreed by all the committees, who suggested the relative responsible departments should carefully study and consider the new scheme.

Explanation in simple: The no-pressure container does not mean that it has no pressure in container, but the pressure outside underwater protection body is the same or basically the same as that inside it with a little difference. So the technical difficulties of damage failure, seepage damage, grouting curtain and so on are avoided. That is to say, water pressure inside protection body synchronously changes with that of the Yangtze River outside it. However, according to the progress of the Three Gorges Project, the underwater protection project must be completed before the flood season in 2006. Otherwise, it was not of possibility. It seemed too late in February 2001, although they all agreed with no-pressure container scheme.

Therefore, the author wrote the letter to present the mechanism of no-pressure container.
container scheme to Premier Zhu Rongji on March 23rd, 2001, in order to obtain the support by national leaders. At the same time, the suggestions by Chinese Academy of Engineering were submitted to the state council. At last a feasibility study on the scheme of no-pressure container was admitted to carry on by national authorities in August 2001.

8 Formation, approval and construction of the no-pressure container scheme for the in-situ Underwater Protection Project for Baiheliang ancient hydrometric inscriptions

In Sept. 2001 approved by State council Three Gorges project construction committee office, National historical relic bureau and Chongqing government, coordinating with Changjiang institute of survey, planning, design and research, the author was in charge of writing feasibility research report which was completed for three months. On March 2002, engineering design was carried on at once after the revision of feasibility research report was approved by the concerned leading departments. Changjiang institute of survey, planning, design and research was in charge of design, where the author was a consultant of the project in the institute and investor. Because of complexity of the project, the nine special subjects were studied by the Institute of Rock &Soil Mechanics, Wuhan, China, Chinese Academy of Sciences, the Institute of Geotechnical Engineering, Shanghai Jiao Tong University, The forth investigation and design institute of China railway, Wuchang shipbuilding industry company Ltd., Huazhong university of science and technology, Wuhan University, Chongqing institute southwest hydrology science, Chongqing Jiao tong College and so on. The topics of special subjects were as follows: (1) Influence of the in-situ underwater protection project for Baiheliang ancient hydrometric inscriptions (hereafter the ‘underwater protection project’) on flow pattern and trend by tests; (2) Three dimensional nonlinear structure analysis on the Underwater Protection Project; (3) Underwater traffic gallery (immersed tube method); (4) Visiting gallery design of the underwater protection project; (5) Underwater lighting and CCD remote controlled observation system; (6) Pressure balance between inside and outside underwater project, circulate water system of filtration; (7) Safety and health monitoring system of the Underwater Protection Project; (8) Research on construction methods of the Underwater Protection Project; (9) Research on channel and navigation. The total design was completed by the end of Oct. 2002. The engineering design and budget were approved by the concerned state department on 2002. In 13th Feb. 2003, the in-situ Underwater Protection Project for Baiheliang was started to construct. (See Fig.22).
Fig.22 Start of the in-situ underwater protection project for Baiheliang

Particularly the principal part of the underwater protection project was completed during the low-flow season from Nov. 2004 to April 2005, which was a basis for the whole project.

9 The basic contents of the in-situ underwater protection project for Baiheliang ancient hydrometric inscriptions

The basic concepts of the no-pressure container in the in-situ underwater protection project are as follows:

1. Water table of reservoir was basically the same as that of the container in the underwater protection project.

2. From 1200 years history it was shown that water in Yangtze River is of good quality, which is a best medium to protect Baiheliang. But water of the Yangtze River should be filtered to avoid silting and make water transparent, which is good for visitors’ viewing on inscriptions.

3. The underwater protection project is built on the above 65m long area in east of middle section of Baiheliang where the most of main inscriptions are distributed.

Fig.23 A profile of engineering geology

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4. Inscriptions of Baihe Liang are surrounded by ellipse-shaped reinforced concrete guide wall of 3.5m in thickness in plane. The sections of more inscriptions distributed are protected by guide wall and dome. (See Fig.23)

5. Guide wall is covered by the strong reinforced concrete dome shell of 1m in thickness, in which internal mold without removing are formed of stainless steel composite boards.

6. The serious accident can not occur because of no-pressure characteristics of the container. The principal part of the project with low cost and short construction period can be restored.

7. The visitors can go into the museum on the shore, pass through slope and horizontal traffic galleries of high pressure, enter the visiting steel gallery inside protection shell, and watch Baihe Liang ancient inscriptions from observation window at any time. Fig.24 was shown that condition of low-flow season in 2006.

8. There are underwater lighting system of high power LED and advanced camera devices. Visitors can observe Baihe Liang inscriptions from glass windows by handling the remote device inside visiting gallery (It can bear pressure of 60m water level according to submarine design).

9. Exit of frogman is established, special visitors can watch inscriptions guided by frogman.

Fig.24 Scheme of the in-situ underwater protection project in Fuling

10. Based on the planning, the principal underwater part of project can be completed in three low-flow seasons, corresponding to the progress of water storage in Three Gorges Project. It is not serious to hinder navigation during construction.

11. Compared with the scheme of crystal palace, it costs lower.

From the above mentioned, there are some principles to be abided by Baihe Liang In-situ underwater protection project as follows
Keeping the cultural relics in their original state, corresponding to international principle of protection cultural relics.

Principle of protecting important relics. The underwater protection project is built on the above 65m long area in east of middle section of Baiheliang, where the most of main inscriptions are distributed.

Principle of easy watching for visitors except protection.
Principle of feasible implementing.
Principle of engineering integrity.
Principle of sustainable development.

Fig. 25 Distribution map of inscriptions in east of middle section of Baiheliang

10 Construction of the principal part of underwater protection project

It is a key to successfully complete main principal part of underwater protection project. Elliptical guide wall, next to deep water channel with high flow velocity, is located on the slope, so the whole rigid mold are adopted, underwater concrete are needed. Construction of 3.5m thick guide wall in the protection structure is shown in Fig.27, transporting condition of embedded pipe joints in Fig.28, completion state of guide wall in Fig.29, cofferdam construction is shown in Fig.30. The state of approaching completion of cofferdam is shown in Fig.31. Successful close cofferdam created favorable conditions for follow-up construction by dry method. Construction field after closing cofferdam is shown in Fig.32. Construction of the horizontal traffic gallery at up and downstream is shown in Fig.33-36, and construction of the slope traffic gallery is shown in Fig.37-40. The approaching completion night scene of horizontal and slope traffic galleries are shown in Fig.41. Visiting galleries are key metal structures in underwater protection project, which are formed of circle steel structure pipes with 3.2m in diameter, 28mm in thickness, which can bear more than 40m water-head pressure, which are designed and constructed according to submarine standard totally.
Fig. 26 Rigid mold

Fig. 27 Construction of 3.5m thick guide wall in the protection structure
Fig. 28 Transport of embedded pipe joints

Fig. 29 Completion state of the guide wall

Fig. 30 Cofferdam construction
Fig. 31 Approaching completion of the cofferdam

Fig. 32 Construction field after closing cofferdam
Fig. 33 Construction of the horizontal traffic gallery at up and downstream (I)

Fig. 34 Construction of the horizontal traffic gallery at up and downstream (II)

Fig. 35 Construction of the horizontal traffic gallery at up and downstream (III)
Fig. 36 Construction of the horizontal traffic gallery at up and downstream (IV)

Fig. 37 Construction of the slope traffic gallery (I)

Fig. 38 Construction of the slope traffic gallery (II)
Fig.39 Construction of the slope traffic gallery (III)

Fig.40 Construction of the slope traffic gallery (IV)
Fig.41 The night scene when approaching completion of horizontal and slope traffic galleries

Fig.42 is a section of visiting gallery loading manufactured by Chengdu chemical pressure vessel plant from Chengdu. In this section five round cylinders in pipe are observation windows with double glass, which is resin glass with 800mm in diameter, 82 mm in thickness (Fig.43). The whole visiting gallery is constituted of seven pipes with 23 observation windows. A lifesaving spherical storehouse (Fig.44), an equipment spherical storehouse and seven pipes are hoisted and installed inside cavity of guide wall. The maximum weight of pipe is up to 45t. Every pipe is accurately oriented and welded without water. All welds are strictly inspected by many methods, must be 100% qualified. Fig.45 through Fig.47 show visiting galleries assembled and welded are installed in the protection shell cavities, shown in Fig.45 through 47. Fig.48 and Fig.49 show installation of steel frame in dome and steel meshes of reinforced concrete dome. A tunnel-type escalator is installed in up and downstream, slope traffic gallery (Fig.50). The scene submerged by the Yangtze River after construction of the principal part of the underwater protection project is shown in Fig.51.

Fig.42 A section of visiting gallery loading from Chengdu
Fig. 43 Observation window

Fig. 44 A lifesaving spherical storehouse and equipment spherical storehouse

Fig. 45 Visiting gallery installed in the protection shell cavity (I)
Fig. 46 Visiting gallery installed in the protection shell cavity (II)

Fig. 47 Visiting gallery installed in the protection shell cavities (III)

Fig. 48 Steel frame in dome
Fig. 49 Steel meshes of reinforced concrete in dome

Fig. 50 A tunnel-type escalator
There are eight systems in the underwater protection project as follows:

Circulating water system —— ensure small difference of hydraulic pressure between inside and outside of protection body to meet design requirement, filter suspended matter to make water clear as city water, automatically replace water body in a certain period.

Underwater lighting system —— 108 sets of high power LED lamps and lanterns with maximum power of 63w.

Underwater camera system —— 28 sets of underwater camera devices of automatic tracking for the target, which can be used by visitors to watch the words clearly.

Fire control system.

Lifesaving system and high pressure gas supplement system.

Air-conditioning and ventilation system in visiting gallery and traffic gallery.

Low power lighting system inside protection body.

Health diagnosis system inside protection body.

11 Exhibition hall on the shore

The exhibition hall is built on the flood fighting dike in Fuling city to save land. The effect figure of the exhibition hall is shown in Fig.52, its bird’s eye view in Fig.53. Due to limited space, exhibition hall in detail is not introduced in paper.
12 Strong influence of the underwater protection project on societies

The project is concerned by national persons, and reported by various media. Two examples are as follows.

In recent years a text in the language textbooks of national compulsory education standards is named by ‘ups and downs of Baiheiliang’ at the next term of sixth grades, which introduces the scientific, humanism and artistic values of Baiheiliang inscriptions, and the scheme of no-pressure container. The cover and directory of the textbook are shown in Fig.54 and Fig.55. Up to now about 100 millions school boys and girls have learned ‘ups and downs of Baiheiliang’ in China.

The second question in the 2004 national college entrance exam of language (12 points, the three points) was reading comprehension of the paragraph which took Baiheiliang as a topic.
13 Conclusions

The ancient hydrometric inscriptions of Baiheliang are the excellent representatives of Chinese ancient civilization and scientific achievements, matchless in the world, and underwater tablet forests of Baiheliang are pearls of Chinese culture. The great Three Gorges Project’s construction makes them on the bottom of the Three Gorges reservoir. So it is necessary to protect them by scientific method. The completion of the underwater protection project will be a good example for our cultural relics protection and the Three Gorges Project.

Because the ancient hydrometric station takes the stone fish as an indicator, it is not advisable to resettle them from bedrock and bury them in situ.

The principle of in-situ underwater protection is correct, based on the concept of no-pressure container.

‘No-pressure container’ concept overcomes the technical difficulties of mechanics, structure and rock & soil mechanics. It is feasible and reasonable.

Scientific innovation is our soul of scientific research, which is a guideline of the underwater protection project of no-pressure container scheme.

The underwater protection project is supported by the all levels leaders and lots of persons. The proceed of adopting no-pressure container scheme shows that the party and the government pay more attention to cultural relics protection and scientific suggestions, which are adopted (Quoted from Lu Y. X., vice chairman of China National Congress).

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