

## ACTIVITY REPORTS OF THE INSTITUTE OF TURKISH CULTURE STUDIES

### Design of Bamiyan Museum & Culture Center for People, June 2013 - January 2014

<http://www.mukogawa-u.ac.jp/~bamiyan/>

#### Background of the project of the Bamiyan Museum

The Department of Architecture of Mukogawa Women's University (MWU) is providing the basic design of the Bamiyan Museum & Culture Center (the Bamiyan Museum & Culture Center for People), planned for the Bamiyan World Heritage site in Afghanistan. The Architectural Design Studio at MWU (the office of registered architects in the Department of Architecture) has taken the lead on this project.

The Bamiyan region is located 200 km west of the Afghanistan capital of Kabul, where Buddhist art prospered during the 5th through 9th century. In 2001, the two Giant Buddhas of Bamiyan and many other cultural artifacts were destroyed by the Taliban regime. Bamiyan was then listed by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a World Heritage Site and the "Cultural Landscape and Archaeological Remains of the Bamiyan Valley" as a World Heritage in Danger. To the present, international experts under the initiative of UNESCO have carried out several safeguarding projects at the Bamiyan site.

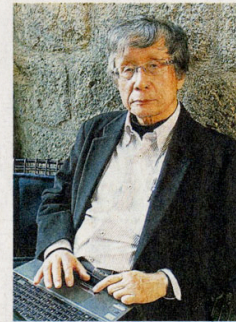
The necessity of the Bamiyan Museum was conceived and discussed at the 10th Expert Working Group Meeting for the Safeguarding of the Cultural Landscape and Archaeological Remains of the Bamiyan Valley World Heritage Property (Bamiyan Expert Working Group Meeting) in Tokyo in December 2011. It was determined that construction of the Bamiyan Museum was necessary to conserve Bamiyan's historical cultural properties and unite it with Afghanistan through cultural activities at the museum.

MWU's Department of Architecture offered to cooperate on the design of the Bamiyan Museum with the National Research Institute for Cultural Properties, Tokyo (NRICT), which is leading the safeguarding project for the Bamiyan site. In December 2012, at the 11th Bamiyan Expert Working Group Meeting

「自然、仏教、ペルシャ。全てを含めたものをつくるところが面白いんです」  
イタリヤで昨年12月に開かれた、アフガニスタンの世界遺産バミヤン遺跡の修復保存を考える専門家会議で、考古的遺物を展示するだけでなく、現地の人々が共に学べる博物館の建設構想を発表した。

#### アフガニスタン・バミヤンの博物館構想を発表した武庫川女子大教授

おかざき 甚 さん  
岡崎 甚 さん  
建築学科長を務める武庫川女子大（西宮市）の建築・都市デザインスタジオが中心となり、基本設計を担当。自然景観との融合を考慮し、ペルシャ文化の影響を受けたさまざまな様式の仏教石窟や、現在、イタリアの会議場には、日本



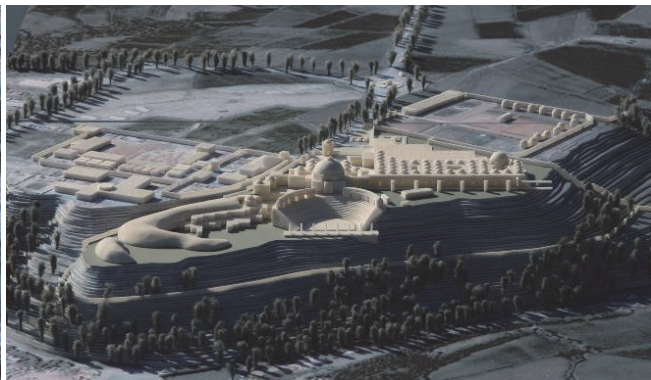
想が具体化していく。建築学科長を務める武庫川女子大（西宮市）の建築・都市デザインスタジオが中心となり、基本設計を担当。自然景観との融合を考慮し、ペルシャ文化の影響を受けたさまざまな様式の仏教石窟や、現在、イタリアの会議場には、日本

The Kobe Shimbun and Kyoto Shimbun reported on Prof. Okazaki and the Bamiyan Museum project on February 6, 2014. In these articles, Prof. Okazaki spoke of the "amalgamation of different cultures" at the heart of the museum's design and expressed how interesting it was to incorporate the natural landscape, elements of Buddhism, and other cultures.

co-organized by UNESCO in Aachen, Germany, Prof. Okazaki presented the conceptual design of the Bamiyan Museum. Following this, MWU received the UNESCO/Japanese Funds-in-Trust for Cultural Heritage (25,000 USD) in July of 2013 to develop this project. MWU later updated the basic design, including the museum and culture center and the exhibition plans for the museum, based on the results of a survey of the area surrounding the planned site conducted by NRICPT in September 2013. In December of that year, Prof. Okazaki presented the second basic design of the Bamiyan Museum at the 12th Bamiyan Expert Working Group Meeting in Orvieto, Italy, receiving great praise and high acclaim from specialists and authorities in Afghanistan. The project for the design of the Bamiyan Museum was featured on the web and in newspapers.



Right: Prof. Okazaki using film footage to explain the design concept of the Bamiyan Museum & Culture Center to the delegates. Left: Prof. Okazaki exchanging views with the Bamiyan governor (right), mayor (center rearward) and a staff member (left) on the plans for the building and its environment.



Left: One-500th scale model of the Bamiyan Museum & Culture Center and its surrounding area (width: 2m, depth: 3m). Right: Bird's-eye view of the model from the north. The model was transported by air to Orvieto, Italy, to be displayed in the Orvieto city hall, the venue of 12th Bamiyan Expert Working Group Meeting.

## Report of the Bamiyan Museum & Culture Center for People on 2013

### 1. Necessary of the Bamiyan Museum & Culture Center and its principal concept

The Bamiyan Museum at the Bamiyan site was first conceived and discussed at the 10th Bamiyan Expert Working Group Meeting in December 2011 in Tokyo. Habiba Sarabi, the then governor of Bamiyan Province, Afghanistan, intended the significance of the construction of the Bamiyan Museum for the people of Bamiyan Province, where its people has no facility to learn their culture and preserve their cultural heritage and to enhance the ties between peoples. Omar Said Sultan, the Deputy Minister of Information and Culture of the Islamic Republic of Afghanistan at that time, added the importance for the peaceful unification of Afghanistan and the recovery of its wealthy national identity, through the activities to understand their culture in the Bamiyan Museum.

Inspired by their compelling endorsement, MWU has developed the principal concept of the

Bamiyan Museum, including consideration of building design and harmony with surrounding landscapes and facilities, as well as the results of preservation efforts during the past decade at the Bamiyan site by the UNESCO/Japanese Funds-in-Trust (FiT).

The followings are basic concepts:

First, the Bamiyan Museum will not only provide a place for people to gather, strengthen their bonds, develop respect for their culture, and strengthen their generous spirit, but also serve as a model for the capacity buildings of the future generation. Furthermore, it will act as a foundation for the promotion of peace throughout Afghanistan.

Second, in addition to showcasing the impressive history of the region as a World Heritage Site and the results of the international preservation work accomplished since 2003, the Bamiyan Museum should be a center that provides the people of Afghanistan with a deep understanding of current Islamic culture, protects their intangible heritage, and establishes tourism facilities and comprehensive facilities to enhance their life.

Third, the Bamiyan Museum should serve as a venue to disseminate the rich international aspects of the Bamiyan region to reflect its unique history as a center of eastern and western cultural exchange.

Lastly, the budget for the construction of the Bamiyan Museum should be arranged and financed through transparent, multiple international funds.

## 2. Design concept of the Bamiyan Museum & Culture Center

The Bamiyan Valley is located 2500 meters above sea level and is approximately 1000-m wide. It is surrounded by the 120-m-high Bamiyan Great Cliff on its north side and a 50-m-high plateau on its south side. The planned area for the Bamiyan Museum is located on this plateau. Many caves including the caves that formerly housed the West and East Giant Buddhas stand on the Bamiyan Great Cliff. There are local farms throughout the Bamiyan Valley with long stretches of potato fields. The Bamiyan River runs through the center of the valley. New local bazaars have appeared along the Bamiyan River and become busier each year. An old bazaar street also runs in front of the Bamiyan Great Cliff.

The Bamiyan Great Cliff is backed by the 4400-m-high *Kuh-i Sangichaspan* Mountains, and the 4800-m-high *Kuh-i Baba* Mountains with Mount Foladi, the highest peak at 5143 m, span the back side of the plateau. Both mountain ranges are covered with snow in the winter and snowmelt water from the mountains flows into the valley throughout the year. The plateau, with scarps of over 45 degrees, provides exceptional views of the Bamiyan Great Cliff spreading a distance of 1300 m, as well as the landscape of the Bamiyan Valley. The airport is located on the back side of the plateau. The planned area for the museum is located on the tip of the plateau only one km north of the airport.



Left: Satellite image of the planned site on the plateau (outlined in dotted line) [Image: National Research Institute for Cultural Properties, Tokyo]. To the north side of the planned area is the Bamiyan Valley. The north and west sides plunge steeply. The Bamiyan Education and Culture Center is located on the west side of the planned area. Right: Sketch of the planned site. The channels follow the palisade on the north side of the planned area.

The planned area stretches east to west and is divided into two parts at the 10-m uneven part at its center. The west side is 2550 m high, and 10 m higher than that of the east. An amphitheater which will utilize these level differences is planned for this uneven part. An assembly hall will be constructed that will provide views down upon the Bamiyan Great Cliff through the amphitheater. The entrance gate of the Bamiyan Museum will be located on the back side of the assembly hall. The axis line connecting the entrance gate, the assembly hall, and the amphitheater will intersect at a right angle to the cliff line centered between the West and East Giant Buddha niches.



Left: Diagram of the Bamiyan Museum and Culture Center. The main axis is parallel to the Bamiyan Great Cliff, as the symbol of peace. The culture center faces to the Bamiyan Great Cliff. The area should be enclosed for the safety. The dome and *Laternen-decke* ceiling are on the main rooms. Left: Roof plan.

The museum's long corridor will extend toward the west from the domed assembly hall and lie parallel to the cliffs. Visitors can thus enjoy the landscape of the Bamiyan Great Cliff while walking through the museum corridor. The east side of the planned area will be developed in accordance with the land's shape and a Cave Garden will be established. Caves that are inaccessible will be reconstructed here. Visitors will experience the vast space of the caves in the Cave Garden. A library, meeting rooms, and more will be arranged around the assembly hall. These will serve as a culture center.

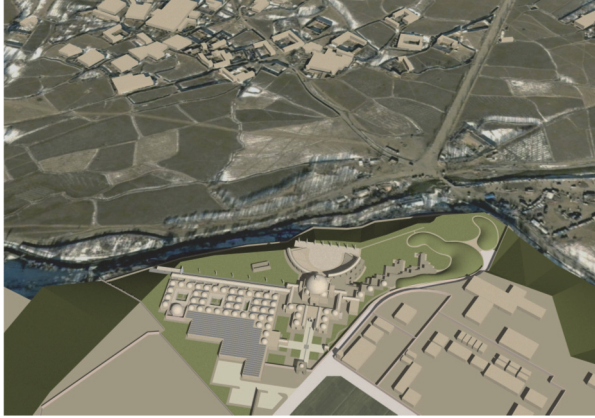
### 3. Overall Images

The plans call for an outdoor amphitheater, assembly hall, entrance piazza, and gate to be set on the central axis that intersects at right angles the line between the East and West Giant Buddhas. The museum and storage facilities are placed on the west side of the central axis and the reconstructed caves of the Cave Garden are on the east side.

Through the Bamiyan Museum & Culture Center's entrance gate, there is an assembly hall, that includes a library and meeting rooms at the front, and an outdoor amphitheater beyond the assembly hall. The museum is to the left of this entrance gate. Several exhibition rooms are arranged along the corridor extending from the west to the east. The main building will have dome-shaped roofs, and solar panels will be placed on the storage and laboratory sections south of the galleries.

### 3-1 Image by CAD

#### (1) View from outside of the site



Left: Bird's-eye View from the South. Through the entrance gate, the outdoor amphitheater is seen over the assembly hall containing library and meeting rooms. On the left side is the museum with various exhibition spaces having dome-shape roofs along the east-west corridor. In front of these dome roofs, looking from the south, are the collections storages and research facility with the solar-paneled roofs. On the right side of the axis is the Cave Garden with reconstruction of caves.

Right: Bird's-eye View from the North. The outdoor amphitheater, assembly hall, entrance plaza, and gate lie on the central axis. The museum is located on the right side, with collection storages and a research facility fitted with roofs equipped with antireflective solar panels. The Cave Garden is situated on the left.



Bird's-eye views. Top-left: The view from the south. Top-right: The view from the south at the lowest point. The axis running through the gate, dome of the assembly hall, and outdoor amphitheater hits the cliff at right angles in the middle of the East and West Buddha niches on the Bamiyan Great Cliff. Below-left: The view from the east. Below-right: The view from the West.



Left: View of the outdoor amphitheater and the assembly hall from the tree-lined street on the Bamiyan Valley. The plateau rises 40 to 50 m above the Bamiyan Valley.



Frontal view of the outdoor amphitheater as seen from the bottom of the Bamiyan Valley. The outdoor amphitheater and the dome of the assembly hall rising at the center of the outdoor amphitheater appear as a symbol of peace.



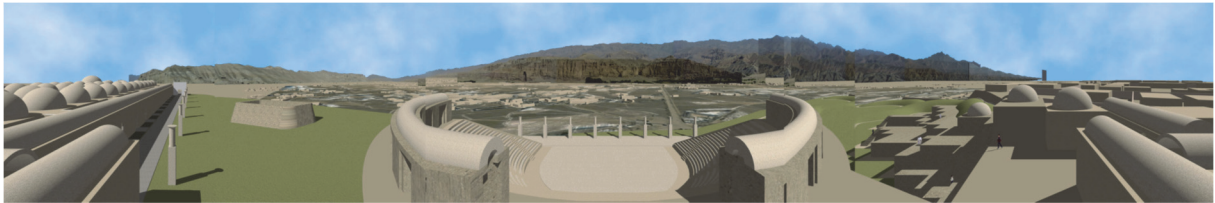
Night scene of the Bamiyan Museum. The lights of the outdoor amphitheater and the assembly hall symbolize peace during evening events. These lights are visible from many parts of the valley. At night, shining lights of peace blink over the outdoor amphitheater and assembly hall to signal the start of feasts. The scene is visible to the Bamiyan people from far and wide.

## (2) Design of Exterior

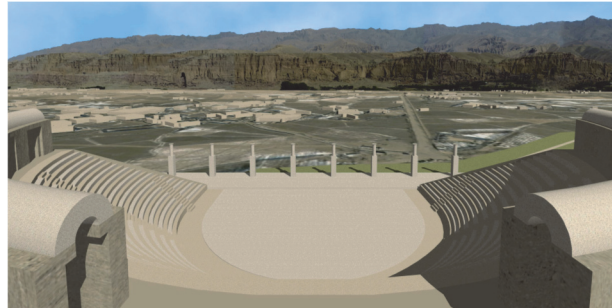
People gathering in the outdoor amphitheater will be rewarded with a glorious view of the Bamiyan Valley and Bamiyan Great Cliff. The caves, which cannot be accessed, will be restored in the Cave Garden on the Bamiyan Museum's east side. Exhibitions will be assembled along the corridor and Cave XI will be reconstructed in the courtyard of the museum section. The exhibition rooms and assembly hall will be adorned with the characteristic domes and *Laternen-decke* ceilings.



Left: View of the assembly hall from the entrance gate. Right: The stage and seats of the outdoor amphitheater and the assembly hall



Panoramic view from the assembly hall with the outdoor amphitheater in the center, the museum on the left, the Cave Garden on the right, and the Great Cliff on the far side.



Left: Bird's-eye view the Bamiyan Valley and the Great Cliff from the outdoor amphitheater. Right: View of the outdoor amphitheater and the assembly hall from the cave garden. There are cave garden on the left.



Left: Pedestrian mall of the west garden to the left of the museum corridor. It is reminiscent of paradises. Right: Museum corridor: The left side is the pedestrian mall with the museum located on the right.



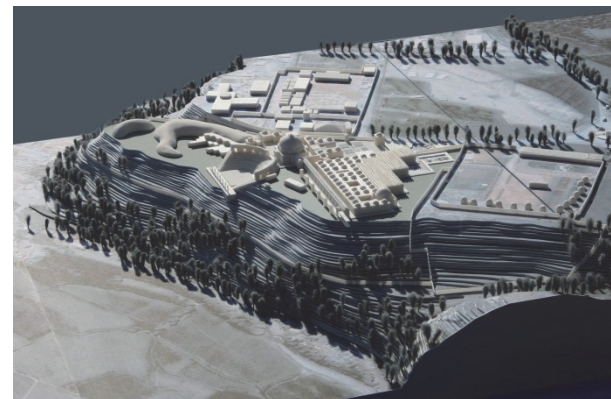
Left: Landscape of the courtyard. The Cave XI will be reconstructed in the courtyard. Right: Inside of the Cave XI. The inaccessible caves will be reconstructed. Visitors can feel the structure and carvings through the reconstruction.



Left: Museum exhibition room, with *Laternen-decke* ceiling, containing the Buddhism collections. Right: Inside view of the assembly hall. Squinch arches decorate the corners.

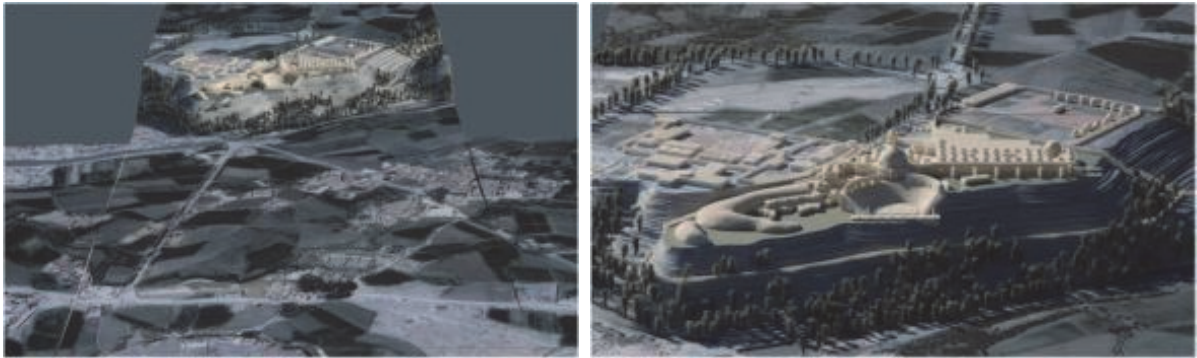
### 3-3 Architectural Model Images

The images and relationship among the Bamiyan Museum, the Bamiyan Valley and the Great Cliff can be understood by the architectural model, which is one-500th scale model of the Bamiyan Museum & Culture Center and its surrounding area (width:2m, depth:3m).

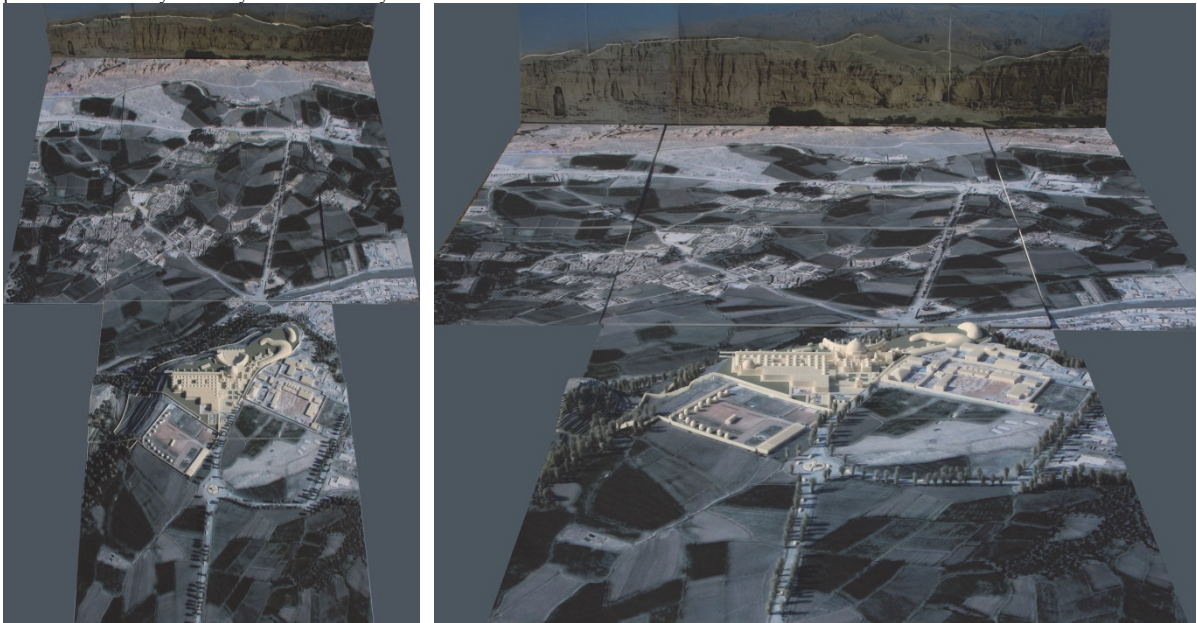


Left: Bird's-eye view of the proposed plan from the east. The cave garden, outdoor amphitheater, assembly hall are arranged from the front side. Right: Bird's-eye view of the proposed plan from the west.

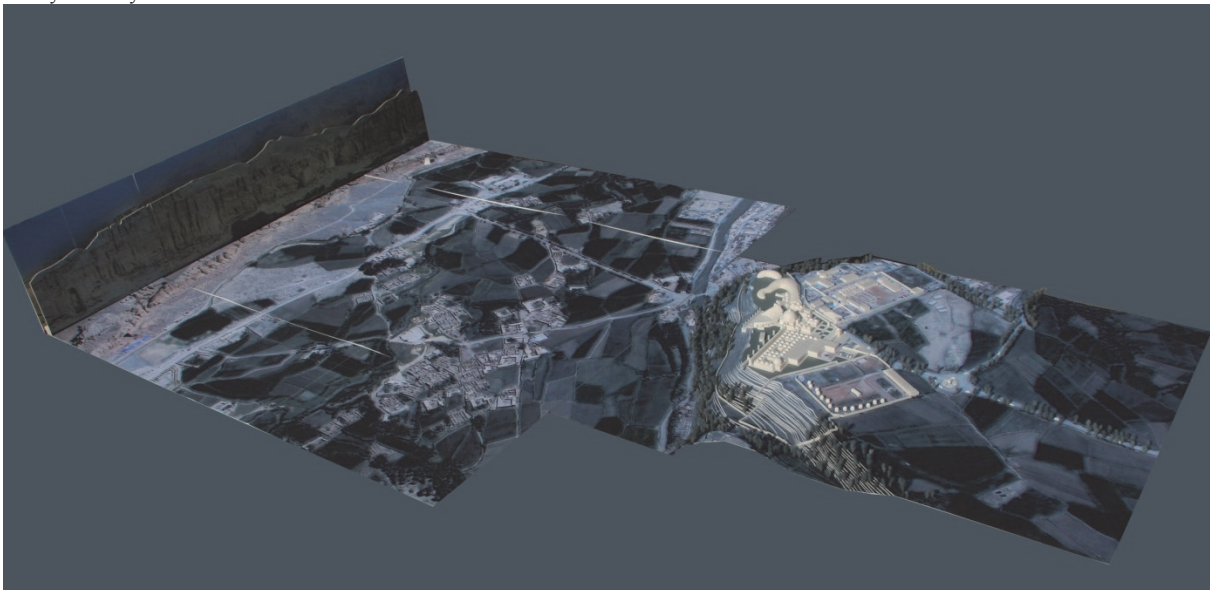




Left: Bird's-eye view of the proposed plan and the Bamiyan Valley from the Bamiyan Great Cliff. Right: Bird's-eye view of the proposed plan and the Bamiyan Valley from the Bamiyan Great Cliff.



Left: Bird's-eye view of the proposed plan, the Bamiyan Valley and the Great Cliff from the south. Right: View of the proposed plan, the Bamiyan Valley and the Great Cliff from the south.



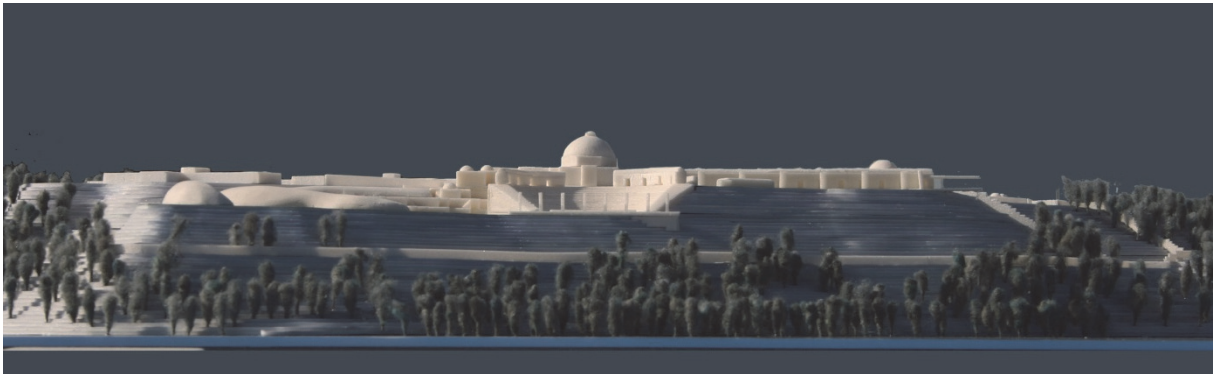
Bird's-eye view of the proposed plan, the Bamiyan Valley and the Bamiyan Great Cliff from the west.



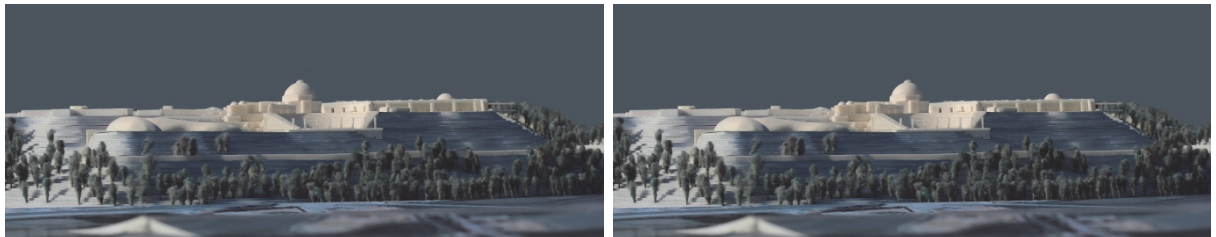
View of the proposed plan from above.



View of the proposed plan, the Bamiyan Valley and the Great Cliff from the south



View of the proposed plan from the valley plain



Views of the proposed plan from the East Giant Buddha's niche (Left) and the West Giant Buddha's niche (Right).

#### 4. Investigation of Existing Site

NRICPT conducted a land survey during their mission in Bamiyan in September 2013. The landscape, land surface configuration, plantings, water system, and more were investigated.



Sketch of the planned area and photograph points for investigation of the current site conditions conducted in September 2013. Panoramic photos of the numbered points were obtained.



Point 38, East side view of the planned area. The planned area is divided into east and west terraces. The incomplete building is on the east terrace. There is a difference in levels between the planned area and the location of the Bamiyan Education and Culture Center.



Left: Point 2, Approach to the site from the airport. The planned site is on the left of the road. The Great Cliff and the East Giant Buddha are seen on the center. Right: Point 16, View of the west terrace from the east side.



Left: Point 3, View of the Great Cliff with the East Giant Buddha from near the planned gate of the Bamiyan Museum. Right: Point 71, Buildings located on the east side of the west terrace.



Left: Point 70, South view of the west terrace. Right: Point 74, Retaining wall on the south boundary of the planned area. Retaining walls are made by adobes.



Point 42, View of the planned area from the rooftop of the Bamiyan Education and Culture Center located on the east side of the planned area. The uncompleted building is seen in the front ground.



Point 11, View of the Bamiyan Education and Culture Center from the rooftop of the uncompleted building which will be removed.



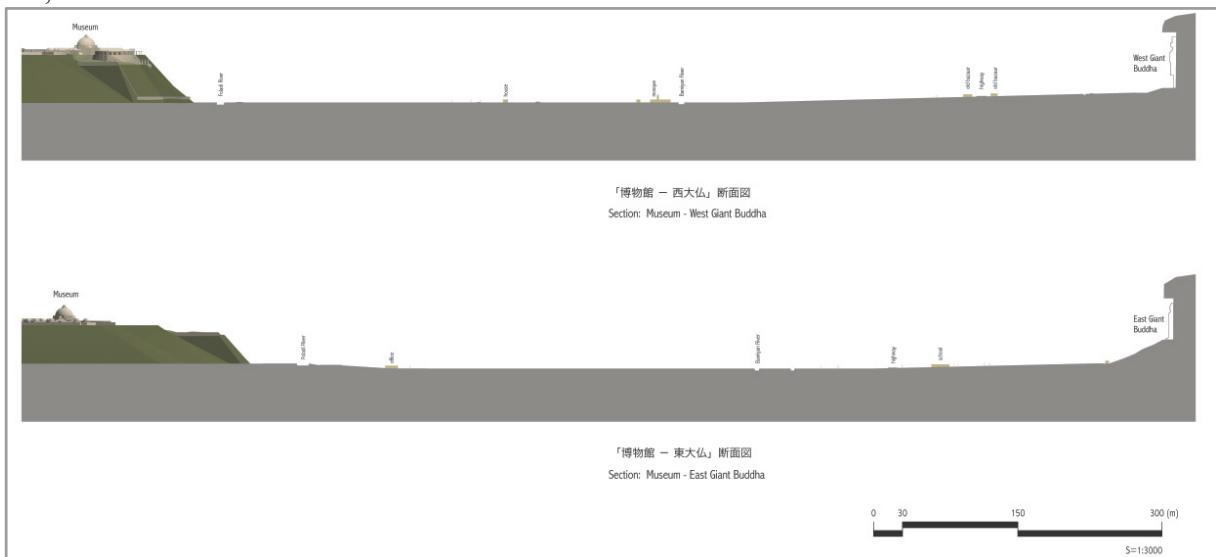
Point 11, South view from the rooftop of the uncompleted building.



Left: Point 21, Waterway along the slope on the north side of the planned area. Right: Point 37, Stream along with the slope on the north side of the planned area.

### 5. Cross Sections of the Bamiyan Valley

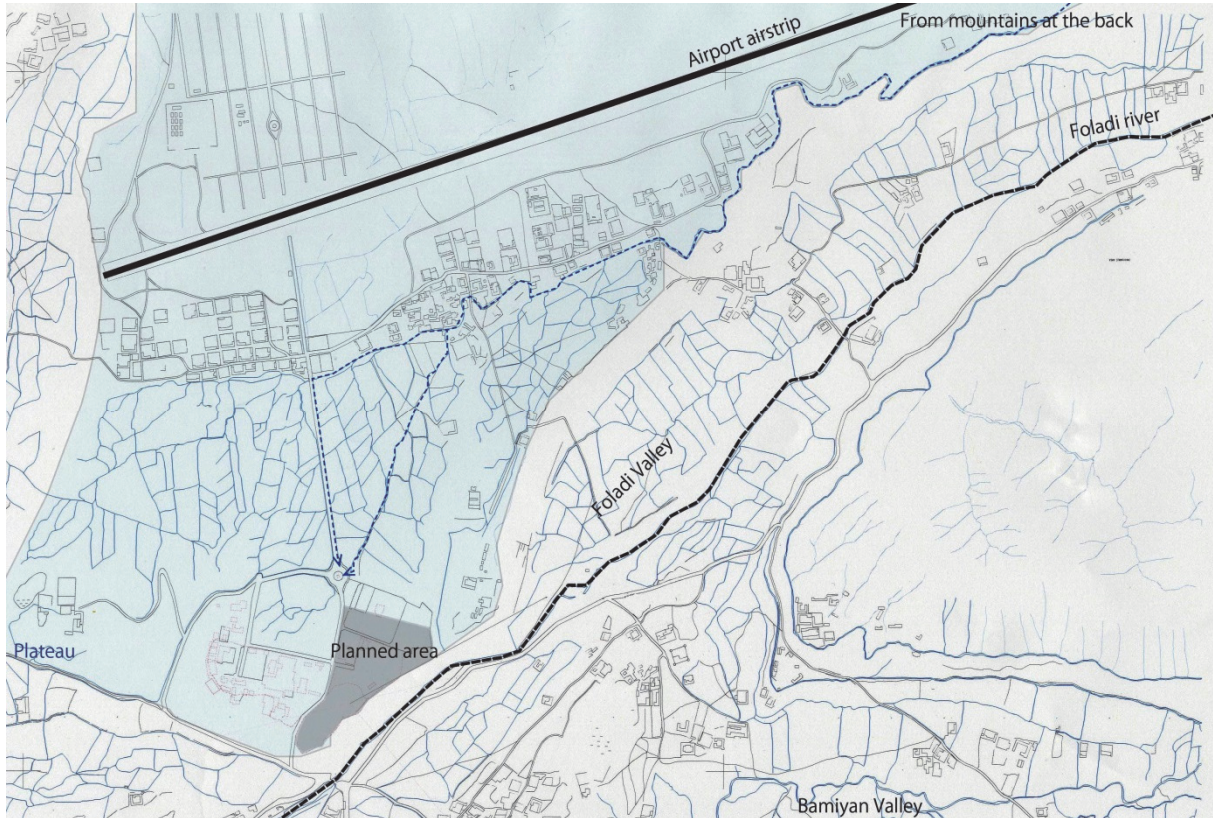
The distance from the planned area's terrace, seen on the left side of the figure, to the Bamiyan Great Cliff on the right side of the figure is about 1000 m. The terrace rises 40 - 50 m above the bottom of the Bamiyan Valley. The height of the Bamiyan Great Cliff at the area of the East and West Buddha niches is 100 - 120 m. The Bamiyan River flows through the center of the Bamiyan Valley. The bazaar runs along the river. The top figure is the cross section between the West Buddha and the site, and the bottom is between the East Buddha and the site.



North-south cross section of the Bamiyan Valley. Top: The section between the West Giant Buddha niche and the Bamiyan Museum. Bottom: The section between the East Giant Buddha niche and the Bamiyan Museum.

## 6. Water System Surrounding of the Site

Snowmelt water flow from the south mountains at the back continues to the west side of the Bamiyan Airport airstrip, travels through the north side of the airport, and then flows to the east at the rotary. Currently, the water from the airport flows to the east of the rotary; therefore, several channels from the rotary to the planned area will be necessary. Plantings are placed along the waterway on the slopes on the west and north sides of the plateau.

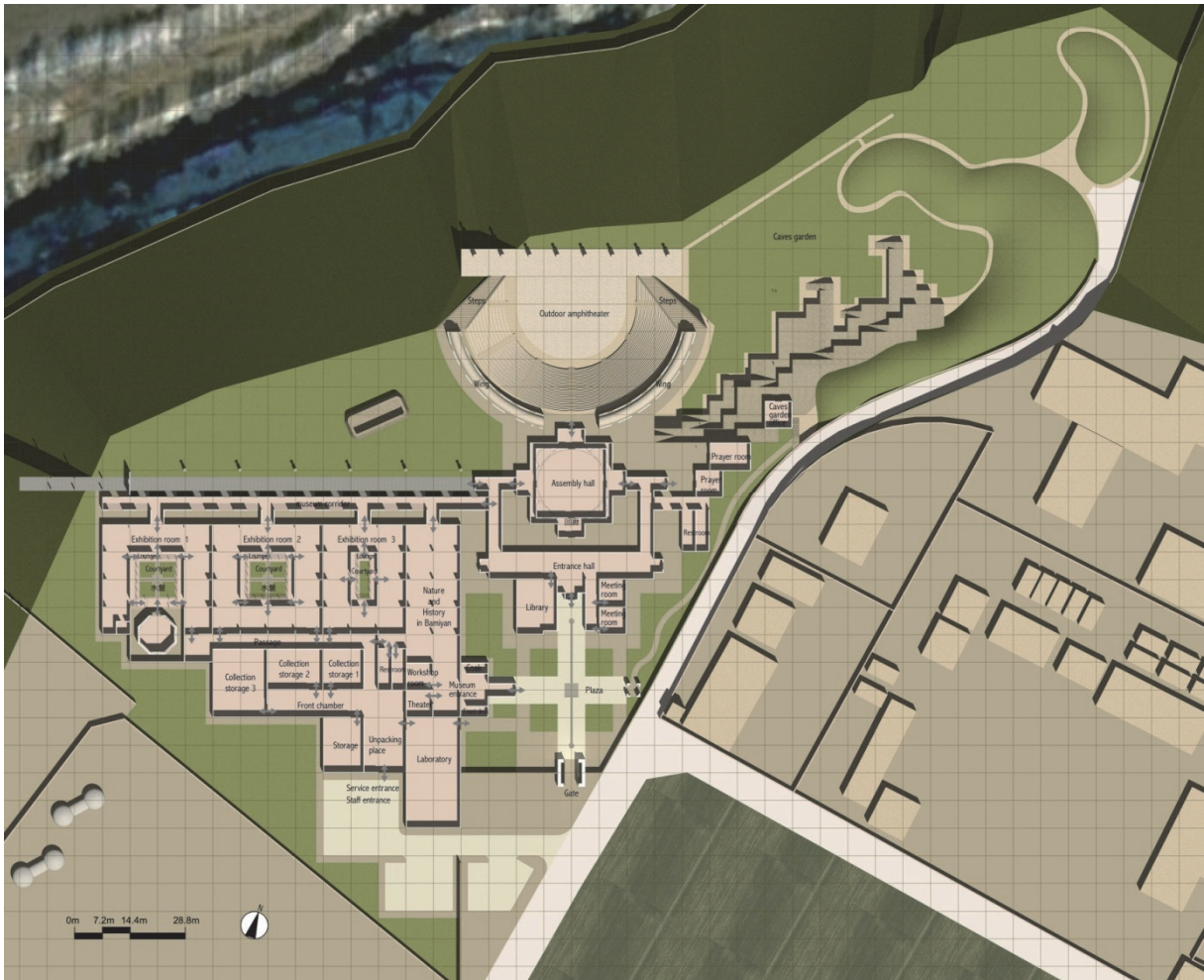


Water system surrounding of the site: Google Earth Image (This image is obtained from Google earth on 10 April 2013). The water goes along with the south side of the airstrip of the Bamiyan Airport

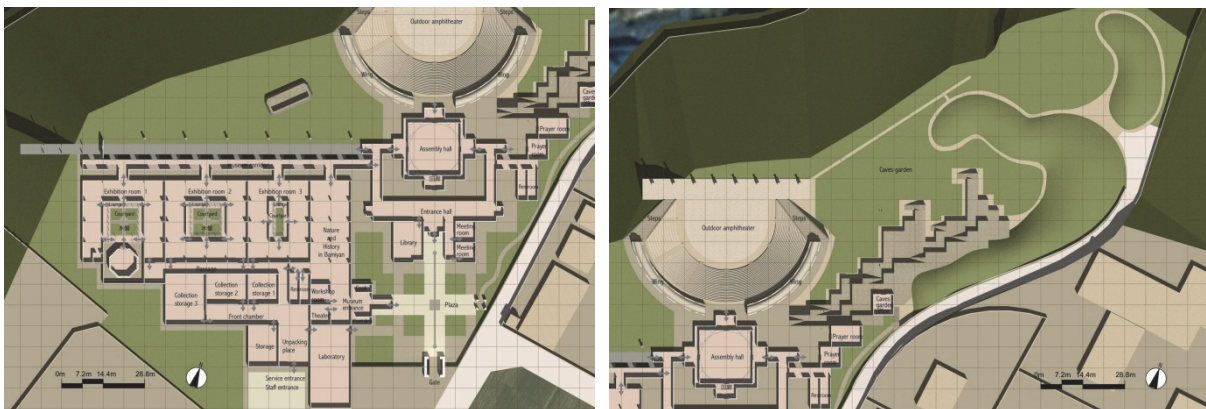


Waterway along the slope on the north side of the planed area (Left: waterway, Right: slope)

## 7. Design of the Bamiyan Museum 7-1 Plans

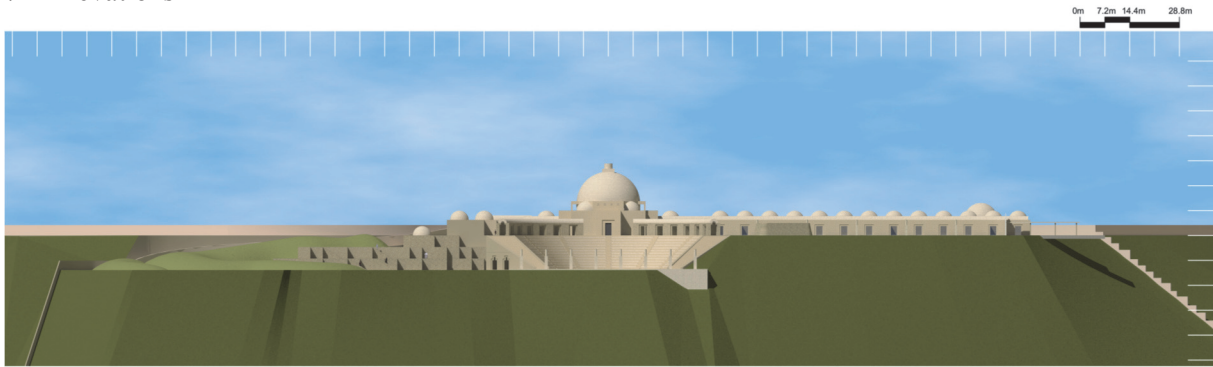


Overall plan. The gate, entrance plaza, entrance hall, assembly hall, and outdoor amphitheater are arranged in a straight line. The Cave Garden will be situated on the right side of the outdoor amphitheater. The museum and management office will be constructed on the left side.

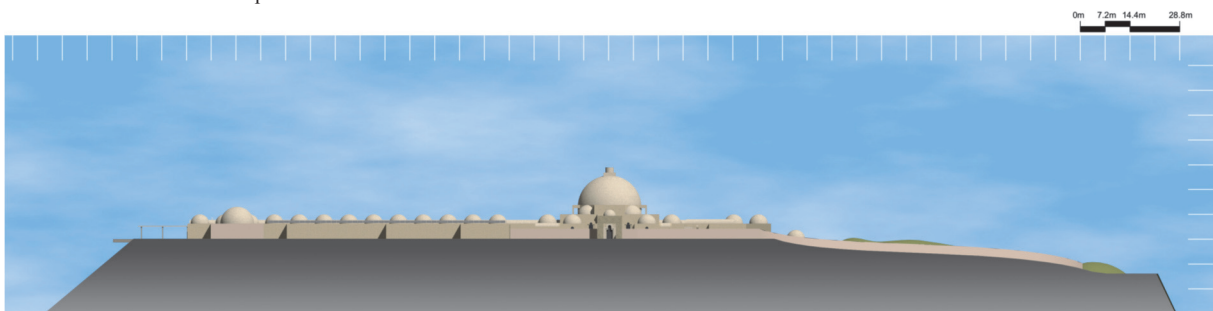


Left: This part of the museum is accessible from the entrance plaza and the entrance hall. There will be four exhibition rooms. The first exhibition hall is scheduled to showcase Bamiyan's nature and history. The north corridor of the museum will contain the exhibits. Workshop rooms and theaters are arranged behind the museum entrance. Backyard services, such as laboratories, collection storages, and storage facilities are arranged on the south side of the galleries. Right: The plan for the Cave Garden. The Bamiyan Cliff's inaccessible caves will be reconstructed in this garden.

## 7-2 Elevations

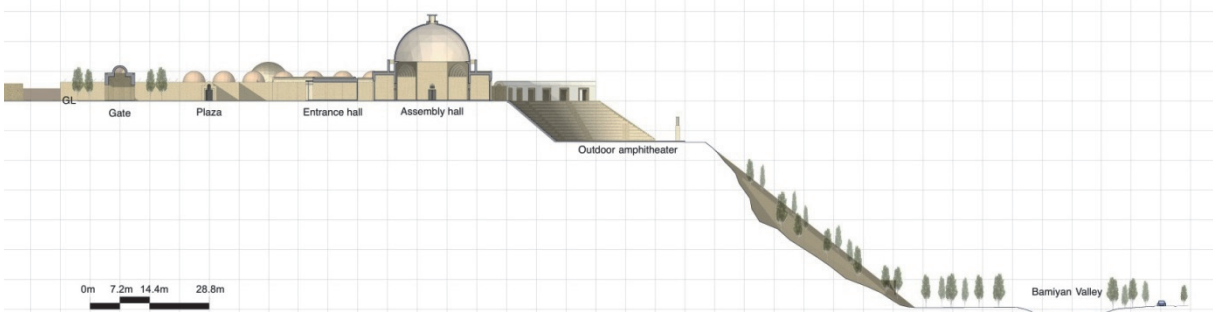


Elevation: North side. This part of the museum is to the right of the outdoor amphitheater with the Cave Garden on the left. There is a 10-m level difference between this part of the museum and the area of the Cave Garden.

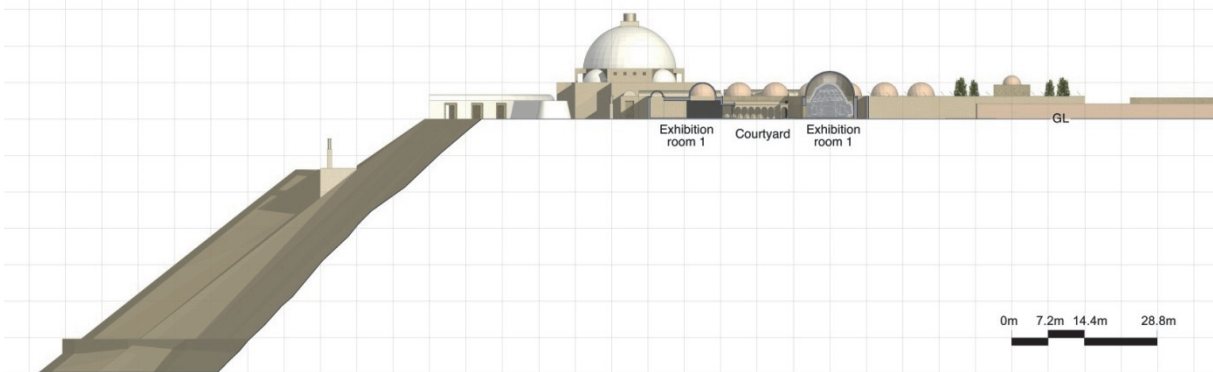


Elevation: South side. The dome-shaped roof of the assembly hall is seen in the center of this area. The domed rooftop of the museum is on the left side of the assembly hall.

## 7-3 Sections



Section: Axis between entrance gate, assembly hall, and outdoor amphitheater. The plantings are designed on the slope on the right side.

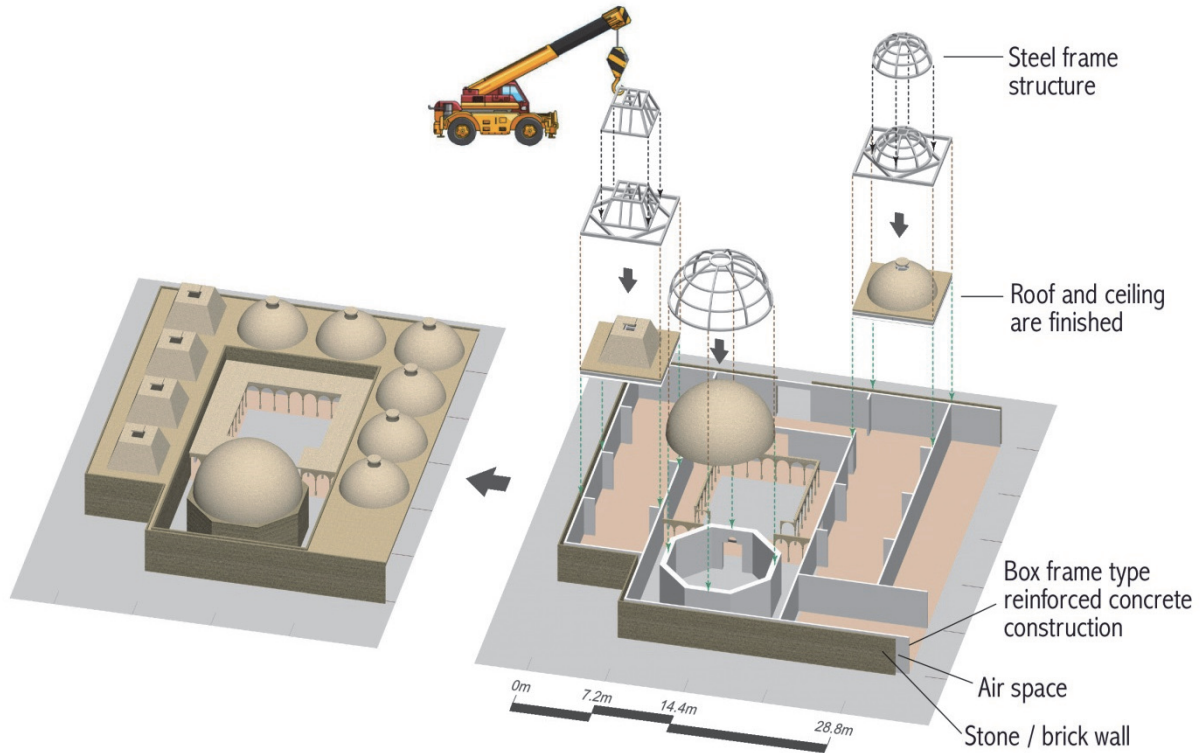


Section: Buddhism gallery including the reconstruction of the Cave XI, courtyard and museum corridor

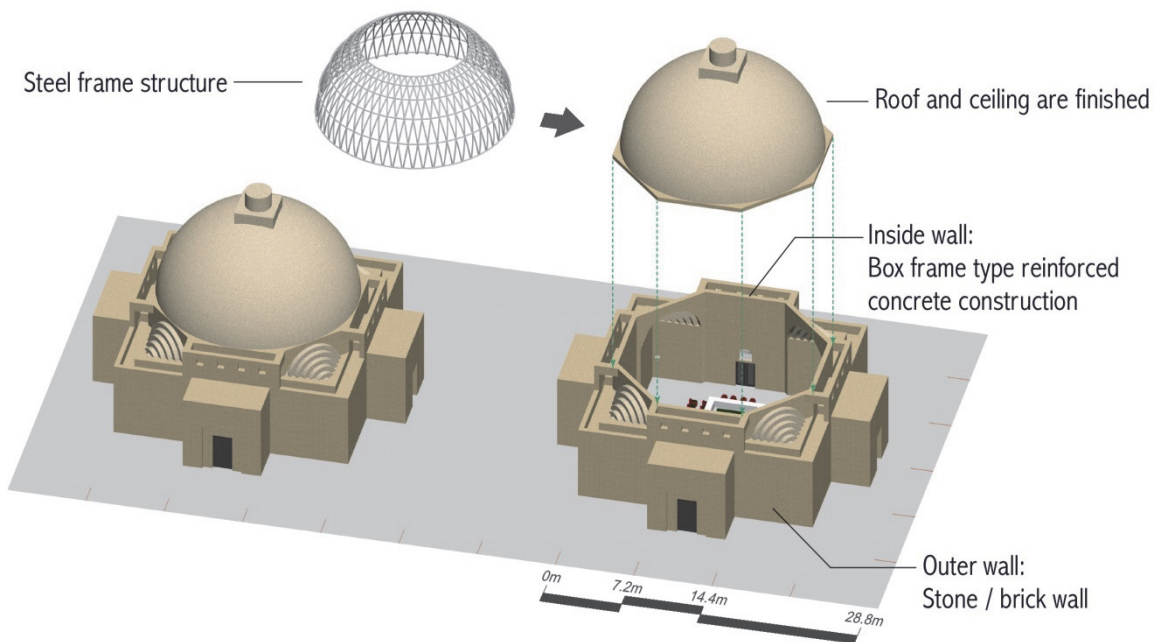


#### 7-4 Structural Design

Box-frame-type reinforced concrete construction is used. The domed or *Laternen-decke* ceilings of the assembly hall and museum are constructed of steel. The interior steel frames of the roofs are preformed and placed on reinforced concrete walls. Local rocks are used for the exterior wall facing. Openings for top lights and ventilation are designed on the top of the domes as necessary.



Structural design and construction of the museum. The steel frame structures and interior ceiling and exterior roof are finished on the ground, lifted by crane, and placed on the reinforced concrete walls.



Structural design of the assembly hall. The steel frame structures and interior and exterior of the dome are performed on ground same as the other roofs, and placed on reinforced concrete walls.

## 7-5 Facility Design

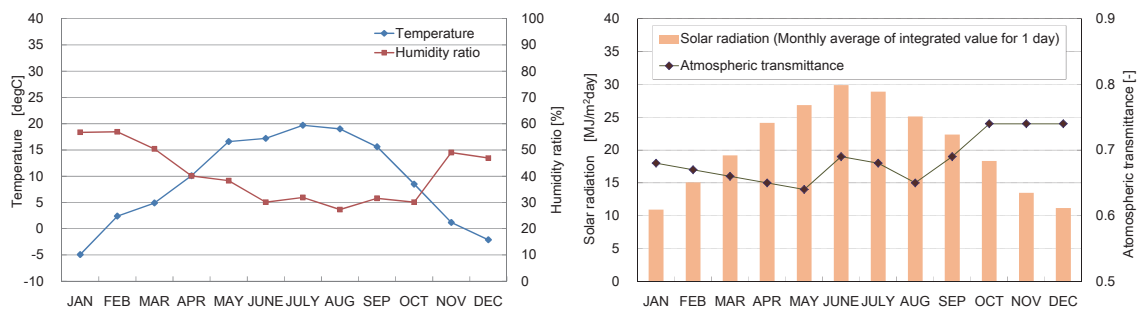
### (1) Concept for facility design

In recognition of the global warming and extreme weather caused by increasing CO<sub>2</sub> emission, as demonstrated by the 5th assessment report published by the IPCC\*<sup>1</sup> (Intergovernmental Panel on Climate Change), it is important to establish an environmentally conscious system and facilities.

\*1. IPCC (Intergovernmental Panel on Climate Change) was established by WMO (World Meteorological Organization) and UNEP (United Nations Environment Programme) in 1988 to provide comprehensive evaluation of climate change due to human activities and its impact on the environment, and to establish mitigating or adaptation strategies from a scientific, technical, and social point of view. According to the IPCC's 5th assessment, global warming is a true phenomenon that is caused by human activities. The IPCC recognized that ground and ocean temperatures are rising, and that global warming causes frequent unusual weather patterns and events, such as extreme rainfall and drought. The IPCC noted that the increase in ground temperature is commensurate with cumulative emissions of CO<sub>2</sub> and thus confirmed the impact of CO<sub>2</sub> emission on climate change.

### (2) Site Condition

The Bamiyan site is located at 2500 m. The climate is dry with little rainfall. The yearly average temperature is 8 deg C. The maximum summer temperature is 30 deg C and the minimum winter temperature is - 20 deg C. Thus, heating systems are necessary, but air conditioning is not. The atmospheric transmittance of solar radiation is high, with especially strong sunshine during the summer. This solar energy can be utilized. The wind direction is mainly from the SSN in the area planned for the construction of the Bamiyan Museum and the wind speed is constant at 2 m/s with blast. The wind direction and speed should be taken into account in the design of the natural ventilation system.



Left: Monthly average values of air temperature and relative humidity. Right: Daily average values of air temperature and relative humidity. Both figures are based on monitoring data from August 2005 to September 2006.

### (3) Infrastructure

Primary infrastructures, such as public electricity, water, sewerage systems, and gas, are not available. Therefore, the museum's infrastructure system should be self-sustained. It should be reliable and robust based on the local maintenance management system, which must be investigated and explored.

### (4) Electric system

**Electricity:** Generating systems are necessary because it is not available from a public electric supply. Thus, a private electric generator must be installed. In addition, in order to reduce electricity use, required maintenance, and costs, the capacity of the generator should be minimized.

**Lighting system:** An LED (light emitting diode) lighting system is recommended because of its long operating life and low energy consumption. The maximum electrical consumption for lighting is estimated at about 10 W/m<sup>2</sup>.

**Telecommunication system:** Telecommunication will consist of personal computers and control instruments. The maximum electrical consumption for telecommunication is 5 W/m<sup>2</sup>.

**Others:** Additional requirements will consist of ventilation fans and pumps for drainage and water supply, and induction heating (IH) cooking heaters. Maximum electrical consumption for these units is 5 W/m<sup>2</sup>. If a cooking system is necessary, heaters other than IH heaters should not be used because they have low energy efficiency and require a large capacity generator.

**Electricity capacity:** Required electricity is estimated at 20 W/m<sup>2</sup>. The planned area of the Bamiyan Museum is 8000 m<sup>2</sup> and has an estimated use of 160 kW of the electricity capacity. There will be two sets of 80-kW capacity generators or three sets of 50-60-kW capacity generators. Procurable oil at the site will be used as generator fuel. Renewable energy, such as photovoltaic, should be adopted. If wind power generation is considered, local sandstorms and dust should be evaluated.

Because the generator will be operating full time, it should be reliable and robust. Local procurement of maintenance and support must be investigated and considered. A cogeneration system\*<sup>2</sup>, which uses exhaust heat to supply hot water, should be investigated

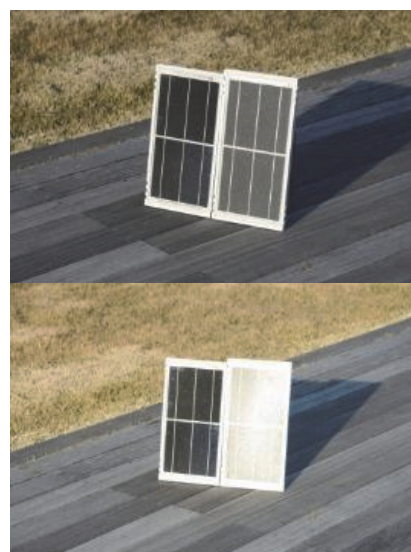
\*2. A cogeneration system is a comprehensive energy-efficient system that utilizes unused energy, such as exhaust heat from the electric generation of a hot water supply.

#### (5) Photovoltaic

The necessary energy supply should be covered by photovoltaic. The maximum system capacity is 90 kW. The area necessary for the solar panel is 1120 m<sup>2</sup> (= 160 kW x 7 m<sup>2</sup>/kW)\*<sup>3</sup> based on preliminary calculations. The angle of the solar panel and its construction should be determined with careful consideration of generating efficiency depending on the local climate, construction costs, and local maintenance and cleaning systems. Antireflective-type solar panels may be a better choice; however, any decrease in the generation efficiency should be examined. Generator power should be controlled depending on the output generation of the solar panel. A storage battery must be considered.

\*3. The solar panel generating efficiency in Japan is 7kW/m<sup>2</sup>. Because the solar radiation in Bamiyan is larger than that in Japan, it may prove to be more efficient.

**Lightning hazard system:** Lightning hazard system should be considered depending on the local condition.



Condition of reflecting solar light of the panels. Left is an antireflective type panel and right is a normal type panel. The top figure is the case of the panel reflecting solar light, and below one does non-reflecting.

#### (6) Air-conditioning system

A refrigerator air conditioning system is basically unnecessary. Air conditioners may be installed in rooms where there is a large amount of inside heat generation, such as a communications equipment room.

While a heating system is necessary. The heating systems will be oil-fired boilers and fan coil units or hot water radiators. Electric heaters are not appropriate because of the lack of electricity. Heaters might be installed in locations where humidification is needed during the winter months.

To reduce the energy used for cooling air conditioning, ventilation and, if possible, natural ventilation must be considered. Therefore, the insulation and thermal capacity of the buildings should be utilized. Natural ventilation must be designed after investigation of local wind direction and speed. Measures such as filters for fine sand due to dust storms should also be examined.

#### (7) Water and hot-water supply apparatus

Well water will be utilized. Based on investigation of the amount of water available, the capacity of the water receiving tank and other necessary systems will be determined.

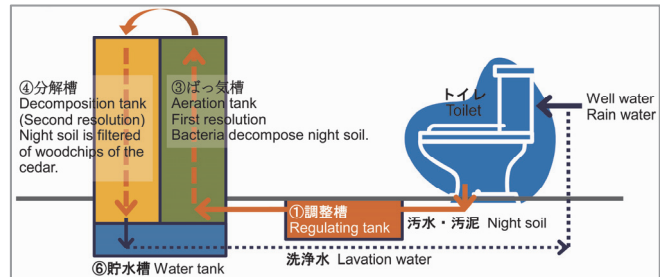
Facilities that require water, such as toilets, lavatories, showers, and kitchens, should be constructed in close proximity. Water supply piping must be installed inside the building or buried at a frost penetration depth in order to avoid freezing.

Hot water will be provided by an oil-fired boiler where necessary.

## (8) Drain facilities

Recycling systems for the drainage facilities and water supply are desirable. Sustainability and local maintenance for these systems should be considered. Basically, a water-purifier tank will have to be installed, and the treated water will be penetrated and sprinkled. If it is difficult to adopt this system because of local conditions, composting toilets\*4 or a natural penetration and evaporation system should be considered. Biotechnology restrooms using cedar woodchips have many merits, including high performance of the night-soil treatment plant, high environmental sustainability because sewage water and sludge is not diverted to the outside, and installation site flexibility.

\*4. A composting toilet is a dry toilet system using aerobic microorganisms which does not require water or uses less water. Excreta is decomposed and recycled as compost.



Composting toilet system. The composting toilets use well water and rainwater for drainage. The night soil is stored in a regulating tank and is decomposed by bacteria at the first resolution tank. The night soil is then filtered with wooden chips in the second resolution tank. Composting toilets have been installed at the top of Mt. Fuji, at a height of 3000 m.

## (9) Exhibition environment

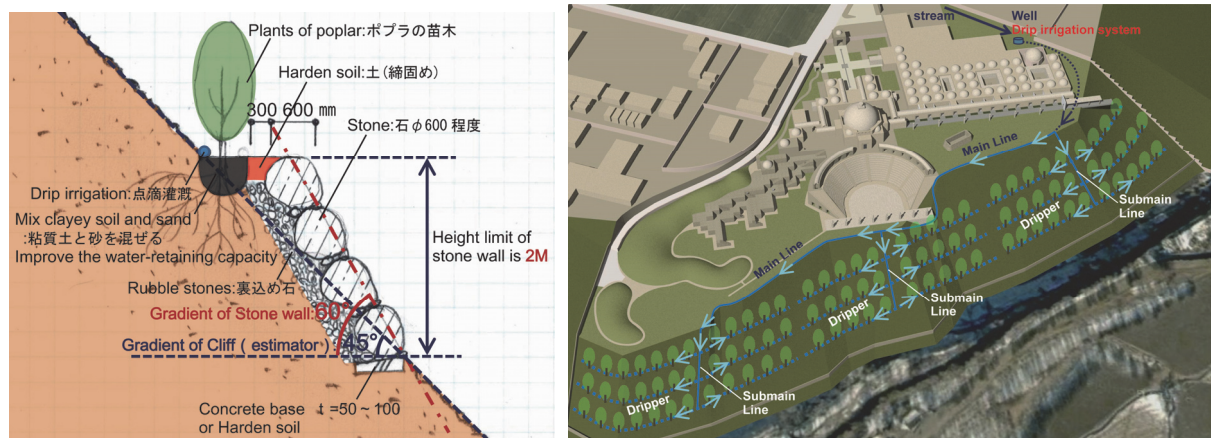
To create the appropriate environment for the exhibited objects, architectural measures, such as insulation, thermal capacity provided by thick walls, and natural lighting for the buildings should be studied and utilized where possible. Mechanical climate control, such as by air conditioning systems, would be ancillary.

The architectural design must also consider zoning depending on the different exhibition environments and need for humidity control the objects' materials. Where natural lighting is adopted, ultraviolet light and its potential effect on the objects must be taken into account.

## 8. Exterior Design

### 8-1 Protection of Slope and Planting Design

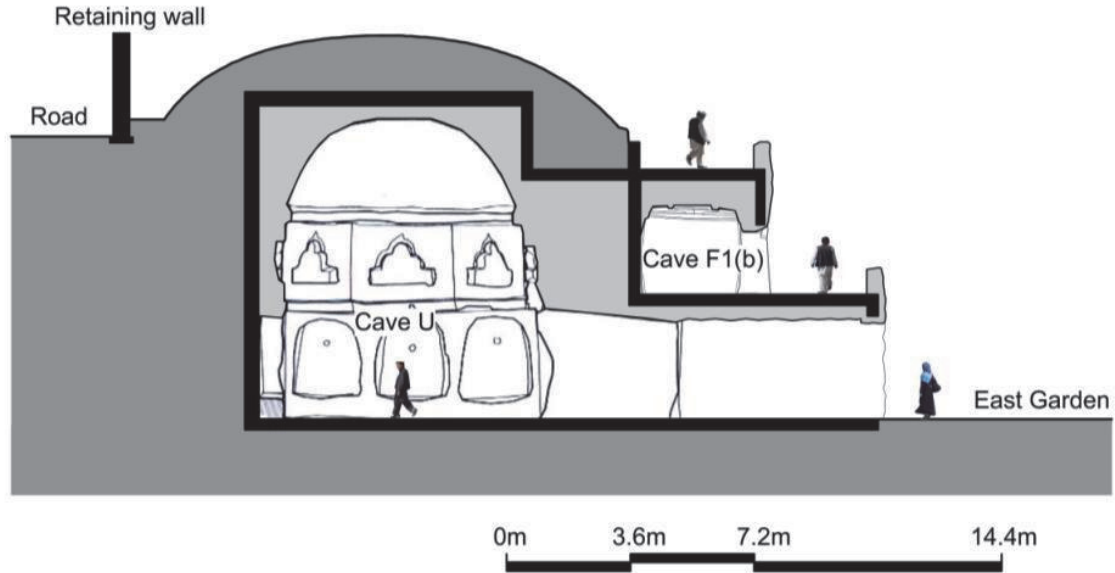
The local geological condition consists of stone mingling with a sandy silt layer. In order to consolidate the slope of the ground, 2-m-height stone walls limited less than 2 m with an angle of 60 degrees are constructed in the shape of stairs. For drainage, crushed stones are packed on the back side of the stone walls with 300-mm thick. Optionally, for planting seedlings, it will be necessary to mix clay soil and sand to improve the water-retaining capacity of the soil.



Left: Water channel and stone wall for planting on the north-side slope (Construction of the retaining wall). Right: Planting design and water supply system. A drip irrigation system is utilized. The main lines run beneath the planned area. A dripper is placed along the plant lines.

## 8-2 Cave Garden

The Cave Garden will be situated in the northern area of the Bamiyan museum. The existing caves, which are typical of Bamiyan and difficult to access, will be reconstructed in this garden. Several types of caves, such as Caves U, T, F(c), M, B(a), B(d), A lower (a), L, C(a), D, K3, J(d) and (g), O(a), and XV(b) in the Bamiyan Valley and Cave 4 in the Foladi Valley are recommended for reconstruction.



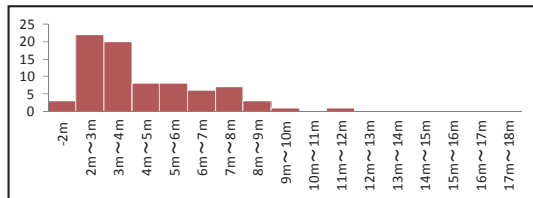
Section of reconstruction of caves.

### 8-2-1 Size of Caves in the Bamiyan

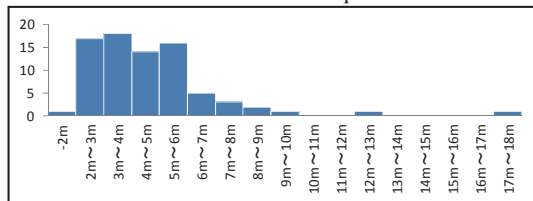
The sizes of the 79 caves were surveyed. Over half of the caves are from 2-4 m in width and 2-5 m in depth, and a third of the caves are between 2 and 3 m in height.

Caves	Width (m)	Depth(m)	Height(m)	Caves	Width (m)	Depth(m)	Height(m)
East VII(a)	3.6	3.6	4.7	S(d)	2.3	2.3	2.5
East VI(a)	2.5	2.5	2.3	S(a)	2.8	2.8	2.8
East IV(a)	7	7.5	5.7	S(f)	2.6	3.3	2.9
East III	3.7	3.7	3.8	S(g)	3.4	2.5	3
East II	3.5	3	3.3	E(c)	6.4	3	8
East II(a)	4	4.5	3.4	E(a)	3	3	3.3
U	7.4	7.4	8.6	E(b)	6.1	6	6
T	8.8	9.3	8.6	K3	2.8	5.2	2.6
V(c)	2.4	2.4	2.6	K(331)	2.6	5.6	2.6
V(d)	3.5	5.5	2.6	K(333)	2.6	3.5	2
G	6	6	6	J(a)	3.8	5.6	3.8
F(a)	7.7	7	6.5	J(b)	3.7	3.7	3.7
F(c)	3	3.1	2.8	J(c)	2.4	2.4	2.1
F1(a)	3.8	3.8	3.6	J(d)	2.4	2.4	2.1
F1(b)	3	3	2.6	J(e)	2	2.4	1.8
F3(f)	2.8	2.9	2.3	J(f)	2	2	1.7
F3(g)	3.4	3.4	2.9	J(g)	2.8	2.8	2.8
M	5.4	4.6	2.3	H(a)	11.7	4	13
118	6	6	4.8	H(b)	3	3.3	2.6
L	5.4	5.4	4.6	N(a)	2.5	2.5	2
A upper (a)	4.6	4.5	3.5	N(b)	3	3.4	1.8
A upper (c)	4.6	5	4.7	N(c)	2	3.5	2
124	3.6	3.6	3.4	N(d)	3	5	2
A lower(a)	5.1	5	5.4	N(f)	3.5	5.7	1.9
A lower(b)	3.2	3.2	3.8	N(h)	5.3	13	2.6
137	7.1	6.3	4.7	N(i)	2.5	4.8	2
B(a)	5.5	5.3	5.8	O(a)	3.8	3.3	2.8
B(d)	3.4	5	4.7	O(b)	4.7	7.5	2.7
B1(c)	7.5	5.9	5.5	I	7	3	5.3
35-I	4.6	4.9	4.2	Z1	3.9	4	4
35-II	4.8	5.4	4.3	Z(c)	4.2	4.4	4
35-III	4	3.6	3.8	XI	9.3	8.2	6.8
35-IV	6.8	4.2	4.6	53-V	6.6	6.5	6.6
C(a)	8	6.5	5	53-VII	6	5.6	6
C(b)	5	5.5	5	XV(b)	6.8	5.3	5.3
D	7.8	7	6.2	XIV(a)	8	17.8	7.4
D1	9	9	7.8	XIII(c)	5	5	4.6
S(a)	2.9	3	2.5	XIII 1(a)	3.5	4.8	2.4
S(b)	3.1	3.2	3.6	XIII 1(b)	3.6	5.5	2
S(c)	2.3	5	2.5				

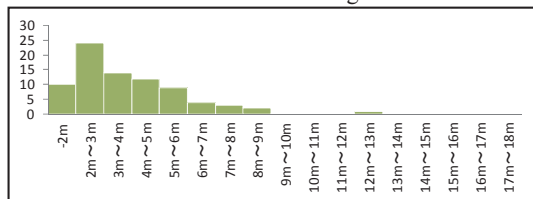
Distribution of width



Distribution of depth



Distribution of height



## 9. Exhibition Plan

The exhibition of the Bamiyan Museum is divided into following four categories; nature and history, life, Islam and Buddhism.

At the gallery of Nature and History of Bamiyan, nature and history of the Bamiyan are exhibited. The first room is for the introduction of the Bamiyan Museum, where the general information of the Bamiyan region will be introduced, and is connected the exhibitions of the other three categories. The visitors learn diversity of nature in the Bamiyan, and relation between people and nature such as climate with short summer and long winter there.

At the gallery of Life in Bamiyan, goods, such as clothes, carpets and kitchen tools, which show current life such as clothing, food and housing of the people in Bamiyan, and production tools such as farm implement, transportation tools such as house cart, tools for cultural activities such as music instruments will be exhibited will be exhibited.

At the Islamic gallery, Ceramics and metallic objects excavated from Shahr-i Gholghola and Shahr-i Zohak will be exhibited which show the Islamic culture in Bamiyan site. Buddhism has gone into a gradual decline from 8th and 9th century in Bamiyan, then Islam has been penetrated deeply to the people. After that, until when Bamiyan had been invaded by Mongol and damaged catastrophically, Bamiyan had prospered as the center of this district and Islam culture and arts had been flourished in the Ghaznavid dynasty, and following the Ghurid dynasty.

Buddhism was introduced to Bamiyan during the 2nd century, with Buddhist art and culture reaching its golden age between the 5th and 9th centuries. The East and West Giant Buddhas, the seated Buddha, and the hundreds of caves decorated with brilliant mural paintings were spread across the Bamiyan Great Cliff and the Bamiyan Valley. The reconstructed caves, mural paintings and decoration, replicas of the Giant Buddhas, manuscripts, and excavated results are exhibited. The details of the Buddhism collection are introduced.



Fragments of Islamic pottery assemblage collected by NRICPT. [NRICPT 2007: 66]

### 9-1 Exhibition design of the Buddhism collection in Bamiyan Museum

#### 9-1-1 Reconstruction of Caves

Cave N(a) has a square plan and *Laternen-decke* ceiling. The mural paintings remain on the ceiling and walls. This cave has high academic value because NRICPT investigated the materials and techniques used to create the mural paintings. Cave N(a) will be reconstructed at full scale and the ceilings will be built using the materials and painting techniques of that time. The ceiling will be completed by the Tokyo National University of Fine Arts and Music.

The Cave XI has an octagonal plan and a domed ceiling, which is typical of the Bamiyan caves. It has a niche and tambour that contained statues of Buddha. The molding is highly decorative with an arabesque design around the niche. The Cave XI will be reconstructed at full scale.

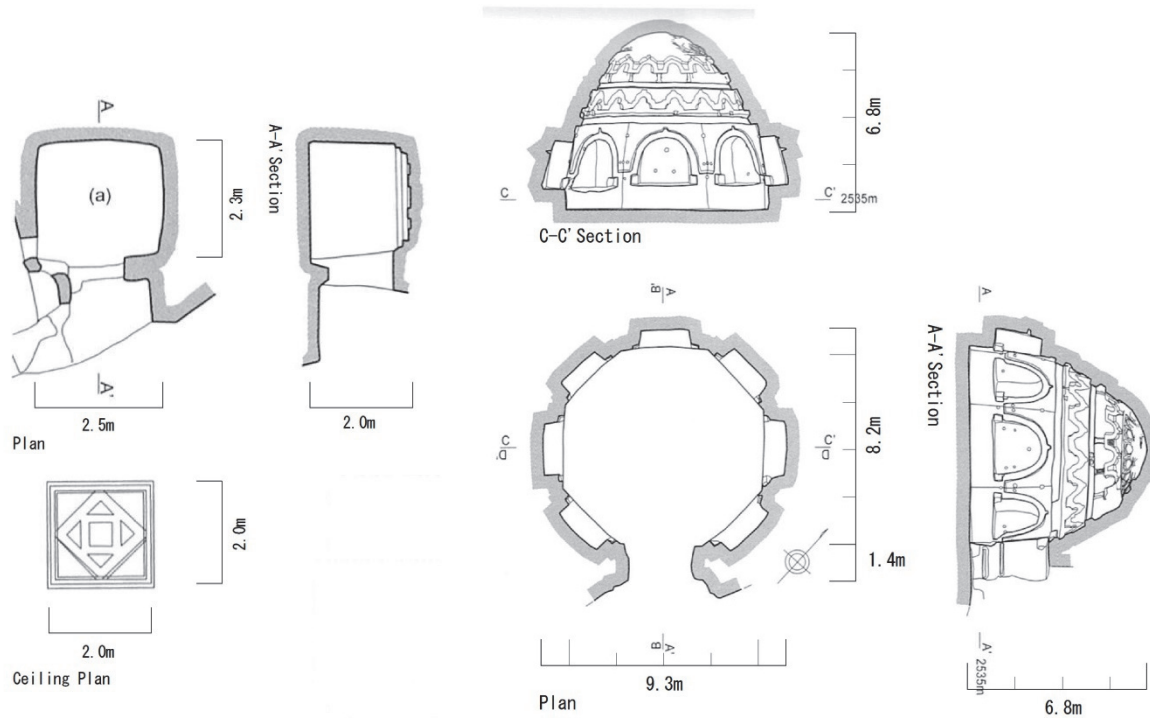


Left: Current condition of the ceiling of Cave N(a) [NRICPT 2013: 167]. Right: Reconstruction of the ceiling of Cave N(a) [Reconstruction and photograph: Yuki Watanuki]

### 9-1-2 Mural Paintings

The Bamiyan mural paintings were destroyed and looted during the civil war. Some of mural paintings looted during the civil war are safeguarded by the Japan Committee for the Protection of Displaced Cultural Properties as missing treasures in Japan. The NRICP collected fragments of these mural paintings as part of their mission.

The Kabul Museum has several collections related to Bamiyan. Some mural paintings and *stuccos* are possible exhibits.



Left: Plan, section, and ceiling of Cave N(a). Right: The plan and sections of the Cave XI. Right: The inside of the Cave XI [NRICPT 2013: 166, 178].



Top: left: Southern side of the inside Cave XI, middle: Northern side of the inside cave, right: ceiling. Bottom: left: Tambour, middle: three-dimensional designs at the tambour, right: hexagonal design at ceiling [NRICPT 2013: 178-179].



482 × 532 × 116

462 × 482 × 94

462 × 482 × 116

482 × 462 × 94

Left 4 figures are the displaced cultural properties [Photographs: Japan Committee for the Protection of Displaced Cultural Property]. Right figure is a fragment of mural painting corrected by NRICPT [NRICPT 2006].



Collections of Kabul Museum: Left: Medallion with two birds holding a string of pearls, Bamiyan Group D, Middle: Thousand Buddhas arranged in a circle, Kakrak, Right: Panel with a griffin, Bamiyan Cave V [Mizuno 1964: plates 8, 34, 183].

### 9-2-3 East and West Giant Buddha

ICOMOS (the International Council on Monuments and Sites) Germany investigated and collected fragments of the Giant Buddhas from the Buddha niches. They also found objects such as wooden pegs that provide information as to the Giant Buddhas' construction. Replicas of the East and West Giant Buddhas as they appeared before their destruction will be constructed. The East and West Giant Buddha replicas and artifacts involved in the creation of the Giant Buddhas will be exhibited and a description of their construction process provided.

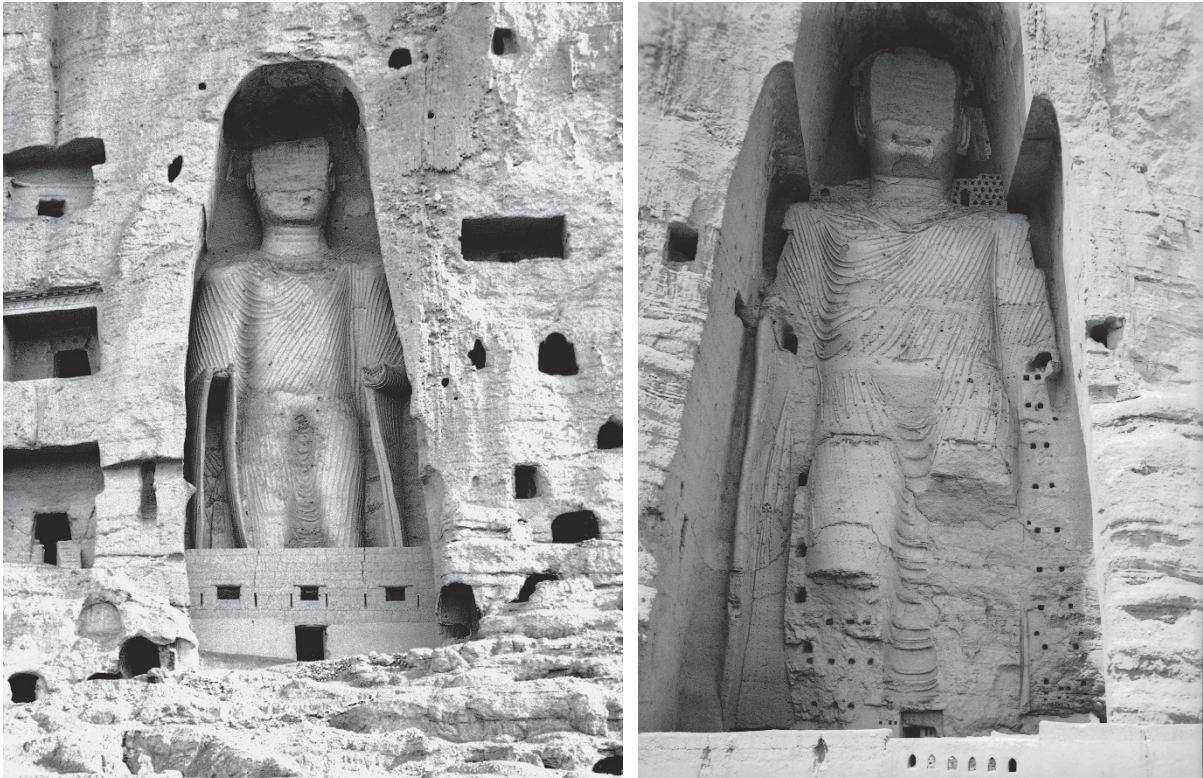
### 9-2-4 Excavated objects of *stupa site*

The collections excavated by Prof. Zemaryalai Tarzi will be exhibited in a dedicated space. Several Buddha clay heads, a seated Buddha, and other excavated objects will be displayed.



Left: A fragment of West Giant Buddha. This fragment is 2m wide, 2.3 m depth, and 1.8 m height. Middle: Pegs found from the West Giant Buddha. Right: Textiles collected from the West Giant Buddha. [Petzet 2009: 150, 205, 217]





East and West Giant Buddha at that time. Left is West Giant Buddha and right is East Giant Buddha [Photographs: National Research Institute for Cultural Properties, Tokyo]



Clay heads of a Buddha and seated Buddha excavated at Gazni [Ducoeur 2012: 134-136]. The size of the heads of Buddha is around 140mm wide and 210 mm height. The height of the seated Buddha is 680 mm.

Notes: This report has been revised to include additional information obtained from the report submitted at the end of the Bamiyan Museum Project in 2013 [S. Okazaki 2013].

## Project Members

### ■ Planning

Kosaku MAEDA: Professor Emeritus, Wako University

Kazuya YAMAUCHI: Head, Regional Environment Research Section, National Research Institute for Cultural Properties, Tokyo

### ■ Project Director; Architectural and Landscape Design

Shigeyuki OKAZAKI: Professor Emeritus, Kyoto University,

Professor, Head, Department of Architecture, Mukogawa Women's University

### ■ Supervision of Structure Design

Mamoru KAWAGUCHI: Professor Emeritus, Hosei University

President, KAWAGUCHI & ENGINEERS

Visiting Professor, Mukogawa Women's University

### ■ Supervision of Facility Design

Shushi SUGIURA: Professor, Mukogawa Women's University

### ■ Exhibition Design

Shumpei IWAI: Lecturer, Ryukoku Museum, Ryukoku University

### ■ Site Survey

Yoko TANIGUCHI: Associate Professor, Faculty of Humanities and Social Sciences, University of Tsukuba

Shogo KUME: Research Fellow, National Research Institute for Cultural Properties, Tokyo

### ■ Architectural Design and Edit

Department of Architecture, Mukogawa Women's University

Noritoshi SUGIURA

Kazuhiko YANAGISAWA

Toshitomo SUZUKI

Hideaki TEMBATA

Tomoko UNO

Ayane ISE

Yuna HONGO

Junko MORIMOTO

Aya YAMAGUCHI

## References

- Guillaume Ducoeur (ed.) 2012: *Autour de Bāmiyān, De la Bactriane hellénisée à l'Inde bouddhique*, Editions De Boccard.
- Michael Petzet 2009: *The Giant Buddhas of Bamiyan: Safeguarding the Remains*, Monuments and Sites XIX, Baessler, Hendrik Verlag.
- NRICPT 2006: *Inventory for Bamiyan Mural Painting Fragment*, Japan Center for International Cooperation in Conservation, National Research Institute for Cultural Properties, Tokyo.
- NRICPT 2007: *Preliminary Report on the Safeguarding of the Bamiyan Site 2006: 6th and 7th Missions*, Recent Cultural Heritage Issues in Afghanistan Preliminary Report Series 2, Japan Center for International Cooperation in Conservation, National Research Institute for Cultural Properties, Tokyo.
- NRICPT 2009: *Preliminary Report on the Conservation of the Bamiyan Birch Bark Buddhist Manuscripts*, Recent Cultural Heritage Issues in Afghanistan Preliminary Report Series 5, Japan Center for International Cooperation in Conservation, National Research Institute for Cultural Properties, Tokyo
- NRICPT 2013: *Structure, Design and Technique of the Bamiyan Buddhist Caves*, Recent Cultural Heritage Issues in Afghanistan, Volume 5, National Research Institute for Cultural Properties, Tokyo, Archetype Publications.
- Sigeyuki Okazaki et al. 2013: *Bamiyan Museum and Culture Center for People*, report for 12th Bamiyan Expert Working Group Meeting, Department of Architecture, Mukogawa Women's University.
- Shinichi Mizuno et al. 1964: *Ancient Art of Afghanistan*, Nihon Keizai Shimbun Inc.

Appendix 1  
Floor area and accumulation



Museum	Entrance hall	778
	Workshop	52
	Theater	52
	Exhibition room 1	852
	Exhibition room 2	748
	Exhibition room 3	583
	Gallery	415
	Restroom	78
	Staff room, laboratory, library	416
	Unpacking place	233
	Passage	246
	Front chamber	181
	Collection storage 1	117
	Collection storage 2	156
	Collection storage 3	259
<b>Storage</b>	<b>156</b>	
<b>Subtotal</b>	<b>5,322</b>	
Culture Center	Entrance hall and corridor	656
	Assembly hall	570
	Library	152
	Meeting room 1	52
	Meeting room 2	52
	Prayer room	130
	Restroom	78
<b>Subtotal</b>	<b>1,690</b>	
Entrance gate	52	
Cave Garden office	52	
<b>Ground total</b>	<b>7,116</b>	