

7. Reference

7-1. Topographical Survey Map





## 7-2. Geotechnical Survey Report (excerpted)

### 1. Introduction

This report is prepared upon the request of *Matsuda Consultants International CO., LTD.* It includes the final results of the Geotechnical site investigation and testing, laboratory tests results, design parameters and *conclusions & recommendations* for the “*Rehabilitation of Great Bath Hall – Hisham’s Palace*” located in Khirbet El-Mafjar - Jericho -Palestine.

### 2. The Purpose of the Study

The site investigation for foundation exploration is part of comprehensive study to prepare a special and complex design to install a special structure to form a roofing to cover the Great Hall, thus, to provide protection for the mosaic flooring from environmental actions and to preserve and expose it to be a site seeing for tourism.

### 3. Project Description

Hisham’s palace is an important archaeological site located five KM north of the town center of Jericho City. It consists of three main parts: a palace, Great bath Hall and an agricultural estate. An elaborate irrigation system provided the complex with water from nearby springs. The most famous artistic aspect of the site is the “tree of life” mosaic in the Diwan of the bath complex, although the mosaic floor of the main Bath Hall is considered the most famous mosaic area in the region.

The designated rehabilitation is to consider building a proper roofing structure to cover the Bath Hall to expose the mosaic flooring for tourism.

### 4. Scope of Investigation

The aims of our investigation study are:

- 1- To investigate the geotechnical properties of the foundation by drilling two boreholes adjacent to Great Bath Hall and conduct Standard Penetration Test (SPT) every 1 m.
- 2- To perform plate bearing test in two locations at site.
- 3- To investigate the geotechnical properties of the foundation under the existing 3 predefined pillars.
- 4- To analyze and evaluate the bearing capacity and other properties of foundation soil.

## 5. Geotechnical Investigation:

### 5.1 Boring, Sampling and Standard Penetration Test (SPT):

The field investigation to determine the engineering characteristics of the subsurface materials included drilling of boreholes, extracting disturbed and undisturbed samples, and perform SPT test. The drilling consists of two borings at predefined locations in previous agreement with Matsuda consultants. These locations are shown on the Site Plan (**Appendix A**).

The drilling was carried out on 10, 11 & 13/08/2015 using a mobile rig (B-31) by applying rotary drilling and auto percussion method.

### 5.2 Standard Penetration Test (SPT):

In general, this test is used for sand deposits and could be of value for clean sand deposits where the sand flows out from the sampler when relieved from the ground.

The SPT test consists of driving a thick-walled sampler into the sand deposit. Per ASTM D 1586-92 (1998), the SPT sampler must have an inside barrel diameter  $D_i=3.81$  cm, and outside diameter  $D_o=5.08$  cm. The SPT sampler is driven into the sand by using a 63.5 kg hammer falling a distance of 0.75 meter.

The method of carrying out this test is as follows:

1. The split spoon sampler is connected to a string of drill rods and is lowered into the bottom of the bore hole which was drilled and cleaned in advance.
2. The weight is guided to fall along a guide rod. The weight is raised and allowed to fall by means of a manila rope, one end tied to the weight and the other end passing over a pulley on to hand operated winch or a motor driven cathead.
3. The number of blows required to penetrate each of the successive 15 cm depths is counted to produce a total penetration of 18 in.
4. To avoid seating errors, the blows required for the first 15 cm of penetration are not taken into account; those required to increase the penetration from 15 cm to 45 cm constitute the N-value.

**Note:** We use SPT if soil, sand or clayey layers are encountered during boring.

The SPT test results are shown in the following table

BH.01		BH.02	
Depth (m)	N Value (Blows)	Depth (m)	N Value (Blows)
0.5-0.95	>50	1.0-1.45	34
1.5-1.95	>50	2.0-2.45	50
2.5-2.95	>50	3.0-3.45	42
3.5-3.95	>50	4.0-4.45	48
4.5-4.95	>50	5.0-5.45	>50
5.5-5.95	>50	6.0-6.45	>50
		7.0-7.45	>50
		8.0-8.45	>50
		9.0-9.45	>50

The corrected (N) value is:

$$N_{cor} = C_N \cdot N$$

$C_N$  = is correlation factor.

N: SPT (blow counts) value in the field (in our case N=48).

Using correlation of Liao and Whitman (1986):

$$C_N = 9.78 \sqrt{\frac{1}{\sigma_o}}$$

$\sigma_o$  = effective stress at the tested depth

$$\sigma_o = 4.5 \cdot 18 = 81 \text{ KN/m}^2$$

$$C_N = 1.09$$

$$N_{cor} = (1.09) \cdot (48) = 52 \text{ used } N_{correct} = 52$$

This value can be described as (stiff – dense) sandy lean clay with gravel (CL) according to USCS.

### 5.3 Allowable Bearing Capacity

Based on the results of SPT ( $N_{correct}$ ) the bearing capacity value is estimated as:

$$N_{correct} = 52 \text{ Blows}$$

By using thumb rule;  $q_{all} = 10 N$

$$q_{all} = 10 N = 520 \text{ KN/m}^2 = 5.2 \text{ Kg/cm}^2$$

Note: the test is performed on dry soil, if the soil is saturated the value will be less, so as a safety we will consider  $q_{all} = 2.5 \text{ Kg/cm}^2$

Or by using Skempton's formula:

$$q_{unc} = N/10 = 52/10 = 5.2 \text{ Kg/cm}^2$$

( $q_{unc}$ : Unconfined compressive strength)

So the undrained cohesion  $C_u=2.5 \text{ Kg/cm}^2$

$$q_{all} = \frac{C_u \cdot N_c}{F.S} = \frac{2.5 \cdot 5.14}{6} = 2.1 \text{ Kg/cm}^2$$

Note: high value of factor of safety is used to account for the saturation effect.

**We recommend using a value of 2.0 Kg/cm<sup>2</sup> as allowable bearing Capacity.**

## 6. **Laboratory test**

After carrying out the geological description of the obtained samples, a laboratory test program was issued; this program contained the required tests on the samples in order to determine the physical and mechanical properties of the ground materials. The following standards and specifications of the **American Society for Testing and Materials (ASTM)** were used when applicable to the foundation type:

Soil Laboratory Tests Used in Geotechnical Engineering

Type of condition (1)	Soil Properties (2)	Specification (3)
<b>Index Tests</b>	Classification Particle size distribution Atterberg limits Water (or moisture) content Specific gravity	ASTM D 2487-11 ASTM D 422-07 ASTM D 4318-10 ASTM D 2216-10 ASTM D 854-14
<b>Expansive Soil</b>	Free Swell	ASTM D 4546-14 IS 2720 part 40-1972
<b>Shear strength of slope</b>	Unconfined compressive	ASTM D 2166-13

### 6.1 Grain size distribution & Atterberg Limits:

Based on the results of sieve analysis, Atterberg limits and index properties, the soil layer closed to mosaic floor can be described as: “**sandy lean clay to gravelly lean clay with sand**”.

### 6.2 Water content:

The result of water content test is in the range of (0.3-11.1) %.

### 6.3 Specific Gravity:

Results of specific gravity test are in the range of (2.630-2.670)

### 6.4 Free swell:

The encountered layers are **sandy lean clay to lean clay with sand and gravel material** with free swell range from **(8-24%)** which indicates **low to moderate swell potential**.

## 7. Detailed Soil Analysis:

Ten samples were taken under the mosaic floor, where the mosaic floor was damaged, for each (20) cm up to (2.0) m, the moisture content and electrical conductivity tests were performed for each sample, and the test results are summarized in the following table:

Sample Depth (cm)	Moisture Content %	Electrical Conductivity dS/m
0.0-20	3.4	
20-40	4.5	2.876
40-60	4.2	1.964
60-80	4.7	1.844
80-100	6.1	2.245
100-120	6.6	1.333
120-140	6.6	2.225
140-160	6.8	1.613
160-180	7.4	0.882
180-200	9.1	1.234

On the other hand, one representable sample was taken under the mosaic floor to conduct the ion chromatography analysis; the sample was grinded and then sent to the Birzeit University Laboratory to chemical testing.

The results of ion chromatography analysis are shown in the following table:

<i>Ion</i>	<b>Concentration</b>	<b>Method</b>
<i>Na<sup>+</sup></i>	1.53 g/kg	ICP
<i>Ca<sup>+</sup></i>	254.04 g/kg	ICP
<i>Mg<sup>+</sup></i>	6.7 g/kg	ICP
<i>Cl</i>	922 (PPM)	CIA
<i>S<sup>2-</sup></i>	1322.5 (PPM)	CIA

## 8. **Plate Bearing Test (PLT):**

It is an in-situ test in which a rigid plate (2.5) cm thick is statically loaded up to two or three times the allowable bearing capacity.

The load is applied to the plate in cumulative increments of not more than one-fifth of the estimated ultimate bearing pressure. At each load increment the settlement is measured by means of dial gauges and the average of reading is considered in the calculation.

Two PLT tests were conducted in predefined locations; these locations are near to boring locations. The tests were performed at depth 0.5m from natural ground level.

### 8.1 **Result of Plate Bearing Test:**

#### 8.1.1 **Bearing Capacity:**

Pressure settlement curve is plotted, from which the ultimate bearing capacity for the plate  $q_{u(p)}$  is: 5.5 Kg/cm<sup>2</sup>

$$Q_{u(F)} = q_{u(p)} * (B_F/B_P) \quad \text{in sandy soil}$$

$$Q_{u(F)} = q_{u(p)} \quad \text{in clay}$$

Where:

$q_{u(F)}$  : ultimate bearing capacity of the footing

$q_{u(p)}$  : ultimate bearing capacity of the plate used in the test

$B_F$ : the width of the footing (assumed 1.0 m)

$B_p$ : width of the plate (0.30m)

Bearing capacity in sandy soil,



$$q_{u(F)} = (5.5) * (1.0/0.3) = 18.3 \text{ kg/cm}^2$$

### **Bearing capacity in clay**

$$q_{u(F)} = q_{u(p)} = 5.5 \text{ kg/cm}^2$$

Since the material at the site is a mixture of sand and fine material, so we will use an average value  $q_{u(f)}$  as:

$$q_{u(F)} = (18.3+5.5)/2 = 11.9 \text{ Kg/cm}^2$$

Using a factor of safety = 6 because these test results are performed on dry soil, if it is saturated due to seasonal variation the value will be less.

$$q_{u(F)} = 11.9/6 = 2.0 \text{ Kg/cm}^2$$

### **8.1.2 Settlement:**

The settlement of the actual footing under the same stress intensity on the plate can be approximated from the following equation:

In sandy soil,

$$S_{e(\text{footing})} = S_{e(\text{plate})} \left[ \frac{2B_{(\text{footing})}}{B_{(\text{footing})} + B_{(\text{plate})}} \right]^2$$

Where:

$S_{e(\text{footing})}$ : Settlement for footing

$S_{e(\text{plate})}$  : settlement for plate

$$S_{e(\text{footing})} = 10 \left[ \frac{2 * 1.0}{1.3} \right]^2 = 23.66 \text{ mm}$$

In clay,

$$S_{e(\text{footing})} = S_{e(\text{plate})} \left[ \frac{B_{(\text{footing})}}{B_{(\text{plate})}} \right]$$

$$S_{e(\text{footing})} = 10 \left[ \frac{1.0}{0.3} \right] = 33.3 \text{ mm}$$

PLT No.	$Q_{u(plate)}$ Kg/cm <sup>2</sup>	$Q_u$ (footing) sandy soil Kg/cm <sup>2</sup>	$Q_a$ (footing) sandy soil Kg/cm <sup>2</sup>	$Q_u$ (footing) clay Kg/cm <sup>2</sup>	$Q_a$ (footing) clay Kg/cm <sup>2</sup>	$S_{e(plate)}$ mm	$S_e$ (footing) sandy soil mm	$S_e$ (footing) Clay mm
PLT.01	5.5	18.3	3.05	5.5	0.92	10	23.67	33.3
PLT.02	7.3	25.67	4.28	7.7	1.28	2.8	6.63	9.33

## 9. Foundation under the existing columns

To assess the foundation material under pillars, three inclined cores were extracted to inspect the foundation soil and material. From our findings, the following is revealed:

### 9.1 The foundation base:

From our inspection and analyses, we consider that the pillar foundation was artificially made and prepared from natural sandstone blocks built in alteration layers with stiff clay.

Three core samples from inclined core drillings were tested to determine the unconfined compressive strength and two samples were tested to determine the splitting tensile strength for foundation material, the following table summarized the results:

Sample no.	Unconfined compressive strength, $q_{unc}$ (Mpa)	Splitting tensile strength (Mpa)	Cohesion, $C_u$ (Mpa) <sup>1</sup> $C_u=0.25*q_{unc}$
C1	4.2	-	1.05
C2	8.2	-	2.05
C3	5.6	-	1.4
S1		0.52	
S2		0.48	

<sup>1</sup>: J. E. Bowels, "Foundation analysis and design" – page 278- fifth edition- 1996

## **10. Suggestion and recommendation for foundation design**

As from our site investigation, we can conclude the followings

1. The foundation soil around the hall and under the pillars is considered with moderate bearing capacity where the allowable bearing capacity is recommended to be taken as  $2.0 \text{ kg/cm}^2$ .
2. The foundation under pillars will be enough to bear  $(2.2*2.2) \text{ m} * 20 \text{ ton} = 96.8$  Ton service load.
3. From our previous investigation, the existing pillars are too weak to withstand horizontal forces such as wind and seismic loads, thus, any design should considers fixing and providing rigidity to the pillars to be used for bearing.
4. Light weight structural (such as Aluminum or steel) is highly recommended, where proper bracing are withstand lateral loads is the big concern to be resolved.
5. The parameters for seismic and wind load designs are shown in this report according to UBC and IBC codes.

## **11. Summary of framework for structural design in Palestine**

### **11.1 Site Seismicity:**

In order to take the effect of earthquakes on the proper structure the seismic factor concept (factor of intensity) or peak ground acceleration (PGA) had been introduced into building design. This concept means that the building should be strong enough to resist a horizontal force equal to a certain proportion of the weight of the building.

### **Our reference is:**

The *Seismic Risk Map* is shown in **Figure no (1)**, which divides the region into six zones depending on the expected horizontal ground acceleration coefficient ( $0.075g$ –  $0.3g$ ).

The site of the project lies in zone 3 with an acceleration coefficient (GPA) of **(0.3g)**, is usually used for analyses and design.

According UBC Code the soil profile is classified as **S<sub>C</sub>, Very Dense Soil**.

# Seismic Zone Factor, Z

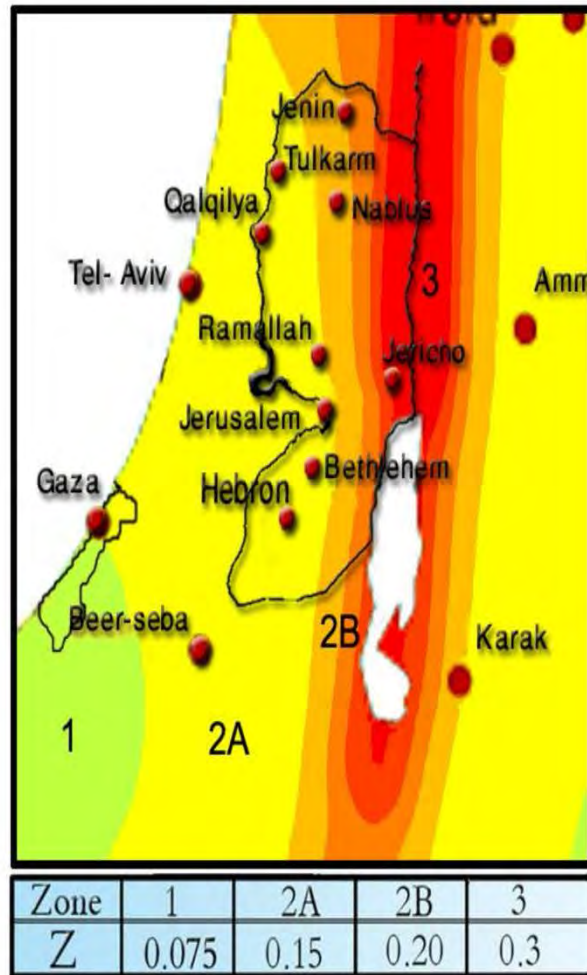


Fig.1. Seismic Risk Map

## 11.2 Wind load

The following parameters referred to UBC – 1997, can be used in the design

Code	Parameter	Reference table	Value
UBC -1997	Wind speed	Table 16-F	70 mph
	Exposure	Table 16-G	C
	Pressure coefficient	Table 16-H	According to geometry
	Wind important factor	Table 16-K	1.15

## 11.3 Applicable standards and Codes:

- ACI-318
- AISC-Lrfd
- ASTM Standard
- UBC-1997
- IBC - 2013

## 11.4 The Necessary information to determine the structural condition

The mean temperature, humidity and rainfall quantity in the Jericho city according to Palestinian Central Bureau of Statistics (2007) are shown below:

جدول 1: معدل العام لحرارة الهواء في الأراضي الفلسطينية حسب السنة وموقع المحطة، 1995-1975، 1997-2007 (م°)  
Table 1: Mean of Air Temperatures in the Palestinian Territory by Year and Station Location, 1975-1995, 1997-2007 (C°)

Station Location	السنة												موقع المحطة
	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1995 -1975	
Jeniri	20.3	..	20.3	20.1	20.2	..	21.7	20.2	21.0	21.1	19.1	..	جاني
Meithalun	..	..	20.5	20.7	20.7	..	18.8	20.3	19.8	18.5	16.6	..	ميتالون
Tulkarm	18.9	..	23.1	22.8	..	..	21.8	22.3	21.9	21.3	18.9	19.8	طولكرم
Nablus	17.8	..	18.0	18.1	18.4	..	18.7	17.5	18.5	19.0	16.8	17.8	نابلس
Ramallah	17.1	..	..	..	17.0	..	17.1	..	..	..	17.7	16.0	رام الله
Jericho	22.4	..	23.4	23.5	23.6	..	24.0	23.2	23.8	23.9	21.3	22.7	أريحا
Hebron	15.5	..	16.7	16.6	16.3	..	16.5	14.6	16.4	16.6	14.5	15.4	الخليل
Gaza	19.8	..	21.0	20.8	20.8	..	21.1	20.5	21.0	21.1	18.9	20.6	غزة

جدول 2: معدل حرارة الهواء العظمى في الأراضي الفلسطينية حسب السنة وموقع المحطة، 1995-1975، 1997-2007 (م°)  
Table 2: Mean of Maximum Air Temperatures in the Palestinian Territory by Year and Station Location, 1975-1995, 1997-2007 (C°)

Station Location	السنة												موقع المحطة
	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1995 -1975	
Jenin	27.1	..	25.6	25.8	26.6	..	25.6	25.5	26.5	26.3	23.8	..	جنين
Meithalun	..	..	25.3	25.0	25.7	..	25.2	24.5	25.4	25.0	22.8	..	ميتالون
Tulkarm	22.3	..	26.3	26.3	..	..	26.9	25.6	26.7	26.6	24.1	25.7	طولكرم
Nablus	22.3	..	22.9	23.0	22.1	..	23.7	22.8	23.8	23.4	21.0	21.6	نابلس
Ramallah	17.1	..	..	..	21.8	..	21.7	..	..	22.6	19.3	21.1	رام الله
Jericho	29.6	..	30.3	30.3	30.5	..	30.8	30.1	30.9	30.8	27.5	29.6	أريحا
Hebron	19.9	..	21.0	20.9	20.8	..	20.9	19.7	20.7	22.3	18.2	19.6	الخليل
Gaza	23.6	..	23.6	23.6	23.5	..	24.0	23.4	24.1	24.7	22.1	27.2	غزة

جدول 3: معدل حرارة الهواء الدنيا في الأراضي الفلسطينية حسب السنة وموقع المحطة، 1975-1995، 1997-2007 (°م)

Table 3: Mean of Minimum Air Temperatures in the Palestinian Territory by Year and Station Location, 1975-1995, 1997-2007 (C°)

Station Location	Year											السنة 1995-1975	موقع المحطة
	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997		
Jenin	13.5	..	16.0	15.7	14.1	..	16.5	15.7	16.2	16.4	14.4	..	جنين
Meithalun	..	..	12.9	12.5	12.7	..	12.3	11.9	12.1	12.1	10.4	..	ميتلون
Tulkarm	15.6	..	16.0	15.8	..	..	16.7	16.0	16.2	16.1	14.4	..	طولكرم
Nablus	13.3	..	14.3	14.1	14.1	..	14.8	14.0	14.3	14.6	13.4	..	نابلس
Ramallah	13.1	..	..	..	14.4	..	13.4	..	..	12.9	13.6	..	رام الله
Jericho	15.3	..	16.2	16.5	16.9	..	16.8	16.4	16.9	17.0	15.9	..	أريحا
Hebron	11.1	..	12.3	12.3	12.6	..	12.7	11.8	12.7	12.6	11.5	..	الخليل
Gaza	16.1	..	17.7	17.5	17.4	..	17.9	17.0	17.5	17.5	16.8	..	غزة

جدول 4: كمية المطر السنوي في الأراضي الفلسطينية حسب السنة وموقع المحطة، 1997-2007 (ملم)

Table 4: Annual Rainfall Quantity in the Palestinian Territory by Year and Station Location, 1997-2007 (mm)

Station Location	Year											السنة 1997	موقع المحطة
	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997		
Jenin	232.5	..	431.1	424.8	649.3	..	311.8	477.6	237.4	388.0	653.6	..	جنين
Meithalun	494.4	..	519.2	521.3	788.2	..	451.4	673.3	273.3	559.3	741.2	..	ميتلون
Tulkarm	581.9	..	585.8	547.3	770.2	..	557.9	784.4	290.0	531.3	918.4	..	طولكرم
Nablus	574.0	..	790.5	638.5	942.7	..	605.0	835.3	343.2	556.7	828.3	..	نابلس
Ramallah	543.9	..	..	..	654.2	..	364.8	..	..	302.2	596.7	..	رام الله
Jericho	115.2	..	117.0	128.5	194.0	..	148.4	152.8	48.7	90.1	224.6	..	أريحا
Hebron	447.8	..	475.9	570.8	538.7	..	520.1	681.8	243.4	328.2	586.8	..	الخليل
Gaza	405.1	..	280.5	408.3	524.8	..	436.7	563.3	196.5	241.1	353.8	..	غزة

جدول 6: معدل الرطوبة النسبية في الأراضي الفلسطينية حسب السنة وموقع المحطة، 1969-1983، 1997-2007 (%)

Table 6: Mean Relative Humidity in the Palestinian Territory by Year and Station Location, 1969-1983, 1997-2007 (%)

Station Location	Year											السنة 1983-1969	موقع المحطة
	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997		
Jenin	69	..	65	65	65	..	64	67	63	63	57	..	جنين
Meithalun	..	..	59	64	64	..	62	61	58	61	55	61	ميتلون
Tulkarm	69	..	60	62	..	..	66	67	64	63	64	63	طولكرم
Nablus	61	..	60	61	62	..	63	64	61	61	55	61	نابلس
Ramallah	57	..	..	..	70	..	68	..	..	59	51	57	رام الله
Jericho	52	..	53	53	55	..	52	53	51	55	51	52	أريحا
Hebron	62	..	60	66	66	..	58	61	57	59	51	62	الخليل
Gaza	71	..	66	67	67	..	69	70	71	69	61	..	غزة





#### **7-4. Policies of conserving Hisham Palace and its Surrounding (English Translation)**

### **Policies of conserving Hisham Palace and its surroundings**

Hisham Palace is one of the most important tourist sites in Palestine. The site is considered as one of the sites of world-cultural characteristic value and was built by the Umayyad Caliphate Hisham Ibn Ábd al-Malik between 724-743 AC, where the Caliphate had taken it as headquarters, preferring desert life to urban city life.

Because of the significance of this tourist attraction, the Ministry of tourism and antiquities suggested the formation of a global complete vision to be adopted in a way to guarantee the preservation of the site and to make particular protection areas which prevent creeping toward the site, which will also conserve the surrounding cultural landscape and the skylight according to strategic provisions and policies to determine using the land within the requirement of the future improvement of site, and within technical standards matching its status as one of the sites registered on the world heritage list. The vision would also ensure providing all facilities in a long term for the rehabilitation of the site, and would give the opportunity for the private sector to invest in tourism services.

Therefore, the Ministry formed a committee to determine these policies, which in turn held several meetings in the site, and it was agreed on the following:

- 1- The site Zone positioned as the area of the Palace it self was determined as (Zone 1). This zone is identified by the walls as the actual archaeological site area in red, amounting to 37 dunums. This area has to be treated as the archological area according to the antiquities law of 1966.
- 2- The buffer zone around the Palace is considered as (Zone 2), specifically at a distance of 60 linear meters from the northern and southern and south-western sides, and 130 linear meter from the eastern side, where it reaches to 90 linear meter in the north-western side as mentioned in the plan. It's a green buffer zone, in which construction is completely prohibited, and it's an area of 100 dunums in which any acts or activities in the site or the use of these lands for other purpose than agriculture is prevented, wherefore it's permissible to cultivate the area all with maintaining the landscape of this archaeological site.
- 3- The ministry of Tourism is working on the acquisition of this zone of 100 dunums in all possible means so as to include this zone to the main zone of the site; otherwise the provisions of article 2 shall remain.
- 4- Every space and all the surrounding areas of the buffer zone are submitted to the laws governing construction works just like in specific areas such as agricultural areas, reserves, areas of diversity vital and archaeological sites, By reference to the antiquities law, the national development plan approved by the Council of Ministers

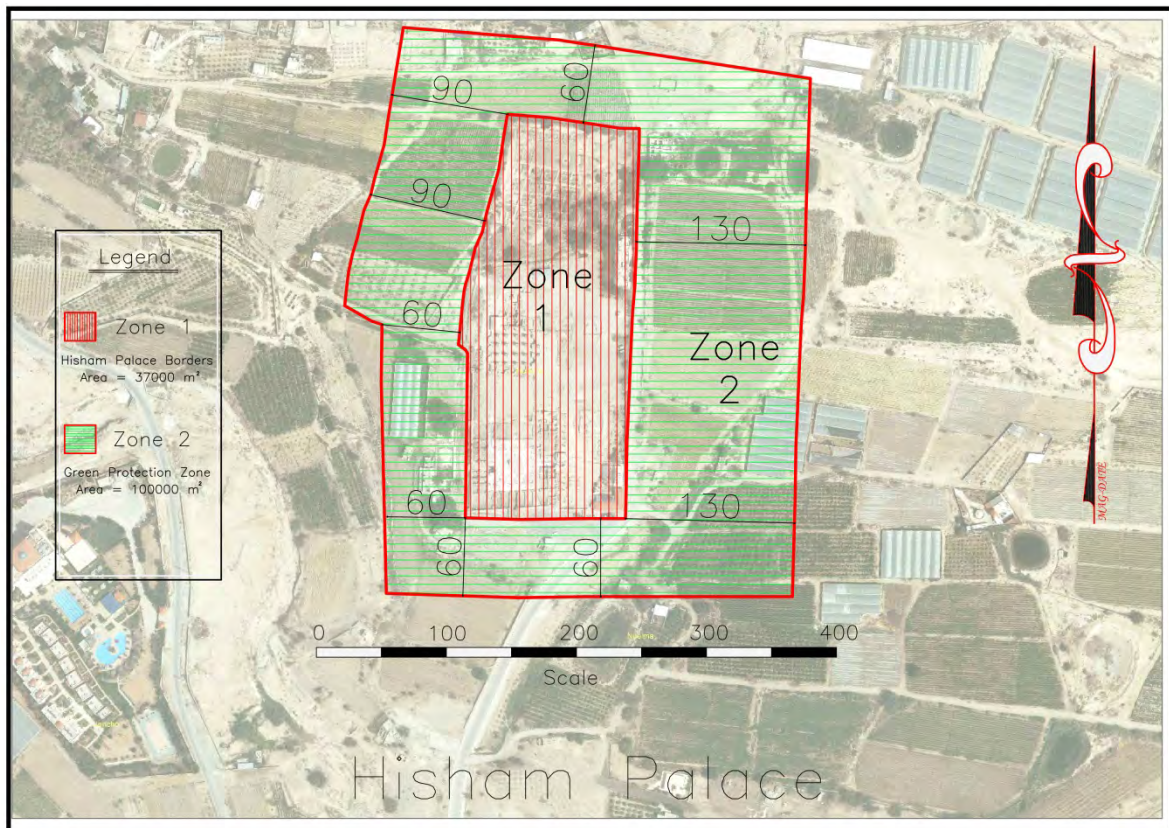


in 2014, the preservation planning, the legislation for urban planning in Palestine (law 79 of 1966) and all other preservations laws issued and approved by the competent authorities.

- 5- All activities or interventions in the areas surrounding the buffer zone are subject to full examination by the ministry of Tourism and Antiquities, and could be allowed only if it doesn't conflict with the principles of the policies provided for the conservation of the site, all in accordance with the conditions and procedures taken by the Ministry or determined by the Antiquities law.

The Minister of Tourism and Antiquities: (Ms.) Rula Ma'ayah

Date: 28 February, 2015



## 7-5. Scoping Matrix

Category of Impacts	Items of Impacts	Degree of possible adverse impacts		Reason of the assessment
		before/during construction	after construction (in-service)	
Pollution Control	1 Air Quality	B-	D	<b>Before Construction/ During Construction (BC/DC):</b> Dust and pollutant gas (SOx and Nox) to be emitted from construction vehicle and machines need to be controlled. <b>After Construction/ In-Service Period(AC):</b> No pollution source exists in service period.
	2 Water Quality	D	D	<b>BC/DC:</b> No pollutant source exists in relation to the Project. <b>AC:</b> No pollutant sources exist in relation to the Project.
	3 Wastes	B-	C-	<b>BC/DC/AC:</b> Wastes of construction, used material and excavated soil need to be properly managed. <b>AC:</b> Wastes and garbage by increased visitors will require proper treatment and management. Its impact level are not known, requiring further analysis.
	4 Soil Contamination	B-	D	<b>DC:</b> Soil contamination by oil spill of construction vehicles and machines need to be avoided.
	5 Noise and Vibration	B-	D	<b>DC:</b> Special cares need to be taken for construction machines such as compacter and drills around the mosaic floor and archaeological remains during construction works.
	6 Subsidence	D	D	
	7 Odor	D	D	<b>BC/DC/AC:</b> No source of smelling pollutants exists in relation to the Project.
	8 Sediment	D	D	
Natural Environment	9 Protected Areas	D	D	
	10 Ecosystem	D	D	
	11 Hydrology	D	D	
	12 Topography and Geology	D	D	
Social Environment	13 Resettlement	D	D	
	14 People in poverty	D	D	
	15 Ethnic Minorities and Indigenous Peoples	D	D	
	16 Local economies, such as employment, livelihood	B+	B+	<b>BC/DC/AC:</b> Job opportunity for local workers will be created on preparation and construction stages, as well as for maintenance work. <b>AC:</b> Business with increased visitors may provide positive impact on local economies.
	17 Land use and utilization of local resources	B+	B+	<b>BC/DC/AC:</b> Local resources of local skilled workers as mosaic craft workers, stonemason, and other related workers will be utilized for preparation and protection and maintenance of mosaic floors and relic stones.. <b>AC:</b> Mosaic floor, the precious resources as historical heritage, will be utilized for appreciation of the historic culture.
	18 Water usage	D	C-	<b>AC:</b> The impact on water requirement in the site for the maintenance work of shelter and for increased visitors need further examination.
	19 Existing social infrastructure and services	D	D	
	20 Social structure and local decision-making institutions	D	D	
	21 Uneven distribution of benefits and damages	D	D	
	22 Local conflicts of interest	D	D	
	23 Heritage	B-	B/A+	<b>DC:</b> The construction of shelter will disturb the current conditions of mosaic floor and its underground conditions in exposure to UV and IR radiation, moisture content, soil mineralization, risk of damage by small animals and birds, and other weathering risks. <b>AC:</b> The risks above may also continue as negative aspects, but with proper protective and conservation measures those risks are expected to be avoided or minimized and carefully controlled protection and rehabilitation measures for the existing relics (mosaic floor, pillars and relics around) are expected to improve the current heritage conditions.
	24 Landscape	C-	C-	<b>DC/AC:</b> The impact on the landscape is unknown. The Hisham site is located not in scenic area but in ordinary landscape of semi-arid agricultural field. However, the shelter might disturb the heritage landscape.
	25 Gender	D	D	
	26 Children's rights	D	D	
27 Infectious diseases such as HIV/AIDS	D	D		
28 Working environment	B-	D	<b>DC:</b> Workers safety and health need to be secured from injury, heat disorder and dehydration during construction.	
29 Accident	B-	D	<b>DC:</b> Accidental damage on the heritage need to be carefully avoided during construction.	
30 Climate Change/ Global Warming	D	D		

A+/-: Significant positive/negative impact is expected. B+/-: Positive/negative impact is expected to some extent.  
C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses).  
D: No impact is expected.

## 7-6. TOR for JICA IEE Study

Category of Environmental Impacts	Study Item	Method of the Study
Air Quality	(1) To take account types and amount of construction machines and vehicles that will be used in the construction work of the project (2) To refer to proper maintenance of those machines and vehicles, and proper work procedure on site	(1) Inquiry to the construction planner of the study team (2) Refer to maintenance manuals of those machines and vehicles and work procedure in similar types of works
Wastes	(1) To check assumed construction materials to avoid generation of construction wastes during construction work (2) To study current capacity and relative one in the future of waste treatment facilities, such as toilet and waste bins.	(1) Inquiry to the construction planner of the study team (2) On-site observation and inquiry to MoTA in charge of the facilities of Hisham Heritage Park
Soil Contamination	(1) As with 'Air Quality', to summarize proper work procedure on site to avoid soil contamination with construction materials, machines and vehicles	(1) Risk analysis in usage and treatment of hazardous materials, such as paint materials and lubricant oil for machines and vehicles
Noise and Vibration	(1) To summarize special cares that should be taken during construction works to avoid hazardous impacts of vibration on the mosaic floor and archaeological remains	(1) Risk analysis in construction work (2) Identification of reference data for structural vulnerability that can be referred to in planning construction work plan
Category of Social Impacts	Study Item	Method of the Study
Water usage	(1) To examine water requirement for the maintenance work of shelter and for to-be-increased visitors	(1) Baseline survey on water use conditions and supply facilities of/around Hisham Heritage Park
Heritage	(1) To examine possible mitigation measures in the project context for risk factors on the existing relics (mosaic floor, pillars and relics around) and its underground conditions, with respect to exposure to UV and IR radiation, moisture content, soil mineralization, risk of damage by small animals and birds, and other weathering risks	(1) Refer to heritage conservation assessment by heritage conservation expert of the study team (2) Refer to another case in Heritage Impact Assessment (HIS) (3) Refer to the discussions of Advisory Committee and Public Consultation meetings for this project
Landscape	(1) To consult with the local stakeholders about impacts on the heritage landscape, as well as the conformity with the surrounding landscape, of the prospective design of shelters	(1) Public consultation meetings with local community (2) Refer to Advisory Committee meetings
Working environment	(1) To summarize proper work procedure and measures that should be taken to avoid construction workers' injury, heat disorder and dehydration during construction.	(1) Site survey on the natural and physical conditions of the site and surroundings (2) Observation of general working environment in the locality by visiting local workshops
Accident	(1) To check proper work procedure for implementation of works on site from preparation through completion inspection	(1) Site survey on the physical conditions of the site and surroundings and on the traffic situation around the site



## 7-7. Result of the IEE Study

Category of Environmental Impacts	Study Item	Result of the Study
Air Quality	(1) To take account types and amount of construction machines and vehicles that will be used in the construction work of the project (2) To refer to proper maintenance of those machines and vehicles, and proper work procedure on site	It can be assumed that the construction machines and vehicles will use diesel oil for fuel, with a reference to Palestinian Authority MoT study <sup>(1)</sup> as Note (1) below. The main pollutants from diesel emission are CO, Non-Methane Hydrocarbons (NMHC), NOx and Particulate Matter (PM). The on-site operation of heavy machines and vehicles are estimated to be total 10 hours per day, around 3 hours per machine/vehicle, in a busiest day during construction period, which may consume 70 to 75 liters of diesel oil that day. With the limited work size in the site, the total emission of pollutants would be negligible.  However, Euro-0 emission standard was status quo for heavy-duty diesel vehicles in the West Bank until 2009 according to the MoT Report 2009, with Euro-III vehicles assumed to be in place currently. Therefore, abnormal emission of air pollutants from poorly maintained machines and vehicles should be carefully avoided in the construction work.
Wastes	(1) To check assumed construction materials to avoid generation of construction wastes during construction work (2) To study current capacity and relative one in the future of waste treatment facilities, such as toilet and waste bins.	Sand, gravel, cement, bricks, concrete block, steel, glass, wood materials, earthen ware, inlet/offlet water pipe, electrical apparatus, paint coating materials will be used as materials for construction. In this project, amount of surplus wastes of those materials will be very limited and most of them are not hazardous, except paint coating materials. There will be no need to dispose excavated soil outside of the site after construction work because the assumed excavation will be very limited, too.  It can be sighted in the heritage park, though a few waste bins are seen aside of entrance and in the site, that some garbage of plastics, PET bottles and cigarette butts are discarded in and around the historic relics and remains. On the other hand, the toilet facility with a septic tank of 60-plus m <sup>3</sup> in interior volume underground, which is set aside of the entrance area, is currently well-cleaned and has available capacity sufficient for ordinal increase, up to duplication, of visitors.
Soil Contamination	(1) As with 'Air Quality', to summarize proper work procedure on site to avoid soil contamination with construction materials, machines and vehicles	The only possibility of soil contamination will lie in the incidental spills of paint coating materials, or lubricant-oil spills and fuel-oil leaks from ill-maintained construction machines and vehicles.
Noise and Vibration	(1) To summarize special cares that should be taken during construction works to avoid hazardous impacts of vibration on the mosaic floor and archaeological remains	According to a geological ground survey (UNESCO, 2011.07), the ground around the mosaic floor and archaeological remains are mostly sandy clay, where the ground is especially weak to horizontal stress while its allowable bearing capacity of upper structure is 15 ton/m <sup>2</sup> vertically. The existing structures of remains, mosaic floor, walls, pillars, and other relics above surface as well as subsurface, all have fragile parts.
Category of Social Impacts	Study Item	Result of the Study
Water usage	(1) To examine water requirement for the maintenance work of shelter and for to-be-increased visitors	Currently, water needs in the Hisham heritage park are limited for the reception office, toilet facility and a mosaic center. The water is being supplied through the piped water of Jericho Municipality, where two pipelines reach the entrance gate and the mosaic center (3B, 2B respectively) and new one (1B) has been installed along the road west side of the Hisham Park reaching the Great Bath area. The supply of water in winter is through the piped water twice per week, but in dry summer season (May to October) water tanks on top of the toilet facility and the mosaic center eastside of the park are serviced by water wagon. Along the west side of the park, there is a small canal for irrigation for nearby farmland but this has not been and will not be used for the park operation.

(The table continued to the next page.)

Heritage	(1) To examine possible mitigation measures in the project context for risk factors on the existing relics (mosaic floor, pillars and relics around) and its underground conditions, with respect to exposure to UV and IR radiation, moisture content, soil mineralization, risk of damage by small animals and birds, and other weathering risks	<p>Observed current conditions and problems:</p> <ul style="list-style-type: none"> <li>- &lt;mosaic floor&gt; salt weathering was not observed with this study in summer. However, A further study in winter is recommended because the conditions of its conservation are assumed to be worse in winter.</li> <li>- &lt;mosaic floor&gt; being peeled off plaster layer, cavities are observed in the foundation of mosaic floor, which are supposedly due to plaster degradation and thermal expansion of mosaic stone. It requires filler reinforcement for the cavities since they would become a risk factor in maintenance and cleaning work.</li> <li>- &lt;diwan&gt; bird dropping are observed on the truss frame of roof and mosaic floor.</li> <li>- &lt;surrounding wall&gt; salt weathering are observed both for original sand stones at wall basement and new ones of the part up to 1 m above surface.</li> <li>- &lt;surrounding wall&gt; weeds, observed growing around wall, are nuisance to the beauty of surrounding scenery and the preservation of wall. Regular weeding work is necessary in daily management of the park.</li> </ul> <p>Observed advantageous effects of shelter on the heritage preservation, with reference to the existing shelter of 'Diwan'</p> <ul style="list-style-type: none"> <li>- its sandstone wall and clay-coated roof are keeping out incoming heat; the mosaic floor is protected from direct rays of solar radiation</li> <li>- it basically shuts out the weathering by rain though some roof leaks are found; adequate ventilation through the metal-gauzed window and door controls temperature and moisture inside diwan; any damage by dew drop is not observed</li> <li>- little blown-in sand are observed</li> <li>- it is useful for protection of mosaic floor from disruption by humans</li> </ul>
Landscape	(1) To consult with the local stakeholders about impacts on the heritage landscape, as well as the conformity with the surrounding landscape, of the prospective design of shelters	<p>The Hisham site is located not in scenic area but in ordinary landscape of semi-arid agricultural field. But, beyond the field it has the view of mountain range in the background landscape. So, it is important that the prospective shelter should be in harmony with the background mountainous scenery. On the other hand, the shelter might disturb the heritage landscape internally. With a reference criteria of World Heritage Convention, the appearance of shelter should not disturb the authenticity and integrity of the entire outlook of Hisham Heritage Park. In Advisory Committee Meeting 1 (ACM1) on 8/3/2015, the harmony of shelter design with the surrounding environment, with consideration on a minimized visual outlook of structure and historical context, was emphasized as important. In ACM2 on 8/19/2015, the integrity of shelter design with the materials unique to the site and with the original form of shelter was indicated to take into consideration. After discussion, most attendees supported for 'cut-off dome' shelter, comparing with 'suspended roof' and 'suspended arch' ones and assuming less impacts on the landscape. In ACM3 on 9/15/2015, the focal points of discussion was mostly about details of shelter materials and visitor trail while the 'cut-off dome' shelter was supported by a majority again. In Public Consultation with Jericho Community on 9/8/2015, the attendees endorsed the project and the cut-off dome design of shelter after having background background explanation and sub-group workshop discussion.</p>
Working environment	(1) To summarize proper work procedure that should be taken to avoid construction workers' injury, heat disorder and dehydration during construction.	<p>The Hisham site is located on a planar tableland with very gradual slope, surrounded by semi-arid agricultural field on the outskirts of Jericho town. No tall building stands in and around the Hisham Heritage Park, and the project site there is not narrowed by buildings except the scattered remains of relics and excavated hollows. Climatically, though the project area belongs to the mesothermal Mediterranean climate zone, it is very dry and hot in Summer from May to October. Especially in July &amp; August, the mean monthly maximum temperature exceeds 39 degrees C, with the maximum degrees at near 50 C, while both the total monthly rainfall and rainy days recorded zero in statistics of Jericho Meteorological Station for the period from 1969 to 2014.</p>
Accident	(1) To check proper work procedure for implementation of works on site from preparation through completion inspection	<p>Crane truck, iron frame and scaffold, and heavy materials for shelter-roof will be used in and around relics and excavated hollows in construction works. Hazardous materials, a small intake or exposure to which would cause serious health risks, will not be used in this project. Congestion of traffic and vehicles has not been observed in preparatory survey and will not be assumed, considering the current conditions at the parking area, access roads and surrounding space of the Park. Utility lines are not congested inside and around the project site. The risk of accident with utility lines in construction works can be assumed to be low.</p>

Note (1) Palestinian Authority Ministry of Transport, Strategic Assessment on Energy Efficiency and Security for Public Transport in the West Bank Final Report, p38, October 2009. Available at: [https://www.esmap.org/sites/esmap.org/files/P110209\\_West%20Bank\\_Strategic%20Assessment%20on%20Energy%20Efficiency%20and%20Security%20for%20Public%20Transport\\_Dajani.pdf](https://www.esmap.org/sites/esmap.org/files/P110209_West%20Bank_Strategic%20Assessment%20on%20Energy%20Efficiency%20and%20Security%20for%20Public%20Transport_Dajani.pdf)

## 7-8. Result of IEE in comparison with Scoping

Category of Impacts	Items of Impacts	Impacts Evaluation at Scoping		Impacts Evaluation by IEE		Reason of the assessment
		before/during construction	after construction (in-service)	before/during construction	after construction (in-service)	
Pollution Control	1 Air Quality	B-	D	B-	D	<b>During Construction (DC):</b> With the limited work size in the site, the total emission of pollutants would be negligible. However, since the site is located in the precious heritage site, abnormal emission of air pollutants from poorly maintained machines and vehicles should be carefully avoided.
	2 Water Quality	D	D	N/A	N/A	
	3 Wastes	B-	C-	B-	B-	<b>DC/AC:</b> Though the amount of construction wastes will be limited, those should be properly collected and disposed at proper places (registered places if any) after construction work, considering the project site located in heritage park. Especially, paint coating materials, hazardous if not treated properly, should be managed properly not to spill or scatter around during work and not to leave the remains over the site after work. <b>AC:</b> Current conditions of wastes and garbage treatment are not badly serious but already require the improvement of waste management. Assuming increased visitors after the project, an improved waste management plan should be planned and executed regularly. Available capacity of the existing toilet and septic tank should be sufficient for a mild increase of visitors, however its capacity and conditions should be monitored continuously in case for the future acute increase of visitors.
	4 Soil Contamination	B-	D	B-	D	<b>DC:</b> Risks of soil contamination are very small and temporary, and would be localized on a spot of oil or paint spill. However, considering the project site is in the historic heritage park, such incidents as oil or paint spill should be controlled to almost zero cases during construction work.
	5 Noise and Vibration	B-	D	B-	D	<b>DC:</b> Special cares need to be taken for construction machines such as compacter and drills around the mosaic floor and archaeological remains during construction works.
	6 Subsidence	D	D	N/A	N/A	
	7 Odor	D	D	N/A	N/A	
	8 Sediment	D	D	N/A	N/A	
Natural Environment	9 Protected Areas	D	D	N/A	N/A	
	10 Ecosystem	D	D	N/A	N/A	
	11 Hydrology	D	D	N/A	N/A	
	12 Topography and Geology	D	D	N/A	N/A	

Category of Impacts	Items of Impacts	Impacts Evaluation at Scoping		Impacts Evaluation by IEE		Reason of the assessment
		before/during construction	after construction (in-service)	before/during construction	after construction (in-service)	
Social Environment	13 Resettlement	D	D	N/A	N/A	
	14 People in poverty	D	D	N/A	N/A	
	15 Ethnic Minorities and Indigenous Peoples	D	D	N/A	N/A	
	16 Local economies, such as employment, livelihood	B+	B+	B+	B+	BC/DC/AC: Job opportunity for local workers will be created on preparation and construction stages, as well as for maintenance work. AC: Business with increased visitors may provide positive impact on local economies. However, its impacts on the social environment in front of the Hisham Park should be monitored to keep proper atmosphere as a historical heritage..
	17 Land use and utilization of local resources	B+	B+	B+	B+	BC/DC/AC: Local resources of local skilled workers as mosaic craft workers, stonemason, and other related workers will be utilized for preparation and protection and maintenance of mosaic floors and relic stones.. AC: Mosaic floor, the precious resources as historical heritage, will be utilized for appreciation of the historic culture.
	18 Water usage	D	C-	D	D	AC: Water requirement in the site for the maintenance work of shelter and for increased visitors may be increased. But significant increase in water use will not be required for the purpose since the amount of water currently being used for maintenance and visitors is very limited. Further, it will not cause any impacts on external water use and flow in the environment and community surrounding the Hisham Park while the change of internal water needs inside the Hisham Park will be settled in the project design.
	19 Existing social infrastructure and services	D	D	N/A	N/A	
	20 Social structure and local decision-making institutions	D	D	N/A	N/A	
	21 Uneven distribution of benefits and damages	D	D	N/A	N/A	
	22 Local conflicts of interest	D	D	N/A	N/A	
	23 Heritage	B-	B/A+	B-	B+	DC: The construction of shelter will disturb the current conditions of mosaic floor and its underground conditions in exposure to UV and IR radiation, moisture content, soil mineralization, risk of damage by small animals and birds, and other weathering risks. AC: The risks above may also continue as negative aspects, and more specifically exposure of mosaic floor may cause degrade to the relic due to solar radiation, rains and winds, and facilitated underground mineralization. However, with proper protective and conservation measures those risks are expected to be avoided or minimized, and carefully controlled protection and rehabilitation measures for the existing relics (mosaic floor, pillars and relics around) are expected to improve the current heritage conditions.
	24 Landscape	C-	C-	B-	C-	DC/AC: The view of shelter should be in harmony, for outer landscape with the view of mountain range surrounding the Hisham site, and for inner landscape with the authenticity and integrity of the entire Hisham Heritage Park. However, whatever its view might be, the emergence of shelter should change or disturb the current local scenery wherein the Hisham Heritage stands. Therefore, it is important that the local stakeholders be consulted with the issue and form a good consensus on the prospective design of shelter. Advisory Committee was held three times and Public Consultation once up to September, 2015. The consultation with local stakeholders should continue through public consultation, accompanied with professional advise of advisory committee.

Category of Impacts	Items of Impacts	Impacts Evaluation at Scoping		Impacts Evaluation by IEE		Reason of the assessment
		before/during construction	after construction (in-service)	before/during construction	after construction (in-service)	
Social Environment	25 Gender	D	D	N/A	N/A	
	26 Children's rights	D	D	N/A	N/A	
	27 Infectious diseases such as HIV/AIDS	D	D	N/A	N/A	
	28 Working environment	B-	D	B-	D	DC: Workers safety and health need to be secured from injury, heat disorder and dehydration during construction. Precautionary measures for construction workers should be taken against those risks.
	29 Accident	B-	D	B-	D	DC: The damages on existing relics and humans there, with the fall and collapse of machines and structures should be avoided with proper measures.
	30 Climate Change/ Global Warming	D	D	N/A	N/A	
<p>A+/-: Significant positive/negative impact is expected. B+/-: Positive/negative impact is expected to some extent.  C+/-: Extent of positive/negative impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses),  D: No impact is expected.</p>						



## 7-9. Mitigation Measures

### Mitigation Measures (in Design and Construction)

Category of Impacts	Items of Impacts	Project Stage	Key Mitigation Measures to be taken	Implementing Agency	Responsible Agency	Undertaking Cost
Pollution Control	1 Air Quality	At Construction	- Regular maintenance of construction vehicles and machineries - Sprinkle water for prevention of dust spread (in dry season), if necessary - Prohibition of combustion of solid waste	Construction Contractor	MoTA with support of Consultant for construction phase	in general construction cost with no significant extra cost
	3 Wastes	Before Construction	- Preparation of the work plan that will indicates temporary storage locations of construction materials and temporary wastes, respective to type of materials and wastes, and detailed construction phases	Construction Contractor	MoTA with support of Consultant for construction phase	in general construction cost with no significant extra cost
		At Construction	- Practicing waste segregation properly - Daily management, especially at end of each work day, of construction materials into proper locations designated by the work plan - Complete removal of all temporary stockpiles of spoils and debris from the construction site at the end of respective construction phases - Prohibition of combustion of solid waste	Construction Contractor		
	4 Soil Contamination	At Construction	- Regular maintenance of construction vehicles and machineries to avoid incidental oil spill during operation in the Hisham Heritage Park - Precautional protective measure by making it a rule to use undercover infiltration-proof sheet in use or temporary storage on site of paint coating materials	Construction Contractor	MoTA with support of Consultant for construction phase	in general construction cost with no significant extra cost
	5 Noise and Vibration	At Construction	- Preparation of precautionous work plan for the excavation and compaction in the foundation work and for the usage of machines and heavy vehicles, with reference to the assumed damage assessment map (refer to '23. Heritage' as below) - Special instruction of skilled workers to pay due-cares and constant observation to the conditions of the existing structure of relics, especially in usage of construction machines such as compacter and drills - Avoidance of using compacters and drills around the fragile parts to be indicated by the assumed damage assessment map	Construction Contractor	MoTA with support of Consultant for construction phase	in general construction cost including proper Man-Months cost of work for making specific work plan and instruction concerned
Social Environment	23 Heritage	At Design	- Application of prerequisite conditions into shelter design; 1) reversibility to status quo; 2) protecting mosaic floor and its basement from direct solar rays, blowing-in rains and winds and drained water of precipitation; 3) enabling good ventilation and heat insulation; 4) controlled dew drops on the roof and structural materials; 5) keeping off sands, birds, small animals and vegetation; 6) maintenance-friendly structure	JICA Preparatory Survey Team	MoTA with support of Consultant for construction phase	covered by JICA Preparatory Survey
		Before Construction	<Survey> - Excavation survey and recording of hidden relics under the shelter basement - Preparation of <b>damage assessment map (DAM)</b> before construction; which is necessary for the mosaic floor and recommended for associated facilities of the audience and bath hall, in order to make the plan for avoiding incidental damage and curing the already degraded parts	MoTA/JICA	MoTA/JICA	Man-Months cost of engaged workers
			<Preparatory work> - Curing the already degraded parts of relics and remains, especially around the foundations of the prospective shelter	MoTA	MoTA	Man-Months cost of engaged workers
		At Construction	<As method of construction> - Avoiding putting heavy load on the existing pillars and mosaic floor for sustaining structure, such as foundation and scaffold, during construction of the shelter - Placement of building foundations off from the locations of known relics or high-risk of hidden ones, and use of shallow-depth foundation in low-risk locations of hidden relics	Construction Contractor	MoTA with support of Consultant for construction phase	in general construction cost with no significant extra cost
		At end of Construction	<Acceptance inspection> - Restoration of damages, if any, of the mosaic floor, with reference to the damage assessment map			in general construction cost
	24 Landscape	At Design and Planning	- Proper consultation with stakeholders, including local community of Jericho, on the appearance of the prospective shelter, through Advisory Committee and Public Consultation - Reaching agreement with stakeholders, including local ones, on the Shelter appearance in style, shape, colour and texture of used materials	MoTA	MoTA with support of JICA Preparatory Survey	covered by MoTA Project appropriation and JICA Preparatory Survey

Social Environment	28 Working environment	At Construction	For safety measures for construction workers - Preparation of advance safety management plan and giving thorough instruction of safety routines to workers - Use of proper safety signs, measures and protective gears - Especially for work at heights, preventive measures should be taken against the fall of workers and tools or other objects or materials, such as guard-rails and toeboards, safety harnesses, safety nets or platforms; and safe means of access and egress such as stairs, ramps or ladders should be provided; complying with Palestine Authority laws and regulations and with International Standard Guidelines as well. - Preparation and implementation of proper welfare management plan for an adequate supply of wholesome drinking water, sanitary facilities, and specifically for protective measures against heat effect during work period. (Refer to ILO Code of Practice 'Safety and health in construction' <sup>(1)</sup> )	Construction Contractor	MoTA with support of Consultant for construction phase	in general construction cost with no significant extra cost
	29 Accidents	At Construction	For safety-first operation of vehicles and machineries - Employment of skilled operators who are capable and trained to construct scaffolds and ladders, or to operate heavy machines, such as a tower crane - Preparing safety manuals, in consideration of the operating requirements proper to the site and surroundings, wind loads factor and bearing capacity of the ground, with reference to ILO Guidelines above, as well as to Palestine Authority laws and regulations	Construction Contractor	MoTA with support of Consultant for construction phase	in general construction cost with no significant extra cost

Note (1): The Code of Practice can be accessed at URL: [http://www.ilo.org/safework/info/standards-and-instruments/codes/WCMS\\_107826/lang--en/index.htm](http://www.ilo.org/safework/info/standards-and-instruments/codes/WCMS_107826/lang--en/index.htm)

### Mitigation Measures (during Operation)

Category of Impacts	Items of Impacts	Project Stage	Key Mitigation Measures to be taken	Implementing Agency	Responsible Agency	Undertaking Cost
Pollution Control	3 Wastes	at operation (in-service period)	- Preparation of improved waste management plan for the Hisham Park - Upgrading instruction to visitors on the rule of no disposal of garbage on ground in the Hisham Park - Daily waste management activities in the Hisham Park, according to the waste management plan - Regular monitoring of the conditions of waste management in the Park	MoTA Jericho Office/ Hisham Park Office	MoTA	in general operation cost of MoTA Jericho Office with no significant extra cost
	16 Local economies, such as employment, livelihood	after the project	- Recommended are continuous monitoring of visitors and tourists, and newly opened shops and vendors around entrance of the Hisham Park after the project  - Proper regulatory rules and management plan should be prepared for control of traffic and parking area, and management and placement of shops and vendors before significant increase are expected	MoTA Jericho Office/ Hisham Park Office	MoTA Jericho Office  MoTA Jericho Office with Authorization of Municipality of Jericho	in general operation cost of MoTA Jericho Office with no significant extra cost  Planning cost, mainly fees for professional planners
Social Environment	23 Heritage	at operation (in-service period)	<Restoration of damaged parts after construction> - Restoration of degraded parts (sand stone and bricks) of relics and remains associated with the mosaic floor <Organizational setup> - Strengthening organizational framework for restoration and maintenance scheme of Hisham Heritage Park  <Regular maintenance> - Preparation of the restoration plan and regular maintenance plan - Capacity building or upgrading of technical staff for restoration and maintenance work - Regular maintenance: 1) Blocking of direct rays of the sun; 2) Air ventilation and circulation inside shelter for proper temperature and moisture; 3) Clearance of sands, birds, small animals and vegetation; 4) Demineralization of decayed parts of mosaic floor and associated relics and remains, due to salt weathering (or mineralization); 5) Other proper remediation and maintenance work for mosaic floor	MoTA	MoTA	General Operation Cost of Hisham Heritage Park, not limited to the Project impacts
	24 Landscape	at operation (in-service period)	- Provision of follow-up instruction to local stakeholders on the significance of the shelter for the Hisham Heritage	MoTA Jericho Office	MoTA	

## 7-10. Monitoring Plan

### Environmental Monitoring Plan

Phase	Item	Indicator	Location	Method / Frequency	Reference Standard	Implementer/ Responsible Agency / Cost	Reporting interval to JICA office	
Construction Phase	Air Quality (exhaust gas of construction vehicles and heavy machines)	Abnormal emission of NOx and PM (dust, soot)	At construction site in Hisham Heritage Park  At garage yard of construction machines and vehicles	Daily site inspection of exhaust of construction machines and vehicles at the operation site  Periodical inspection (daily prestart inspection, monthly, half-yearly maintenance) of machines and vehicles at the garage yard of contractors	Daily observance on site NO2: Abnormal rust colour  Periodical -Inspection checklist for machine maintenance	Site manager of the Contractor,  under supervision of MoTA  in general construction cost with no significant extra cost	Quarterly reporting (once every 3 months)	
	Wastes	- Proper segregation of temporary wastes - Proper placement of construction materials - Complete removal of spoils and debris	At/Around construction site in Hisham Heritage Park	Daily site inspection at end of work day Site inspection at end of respective construction phases	The work plan prepared by the contractor, indicating temporary storage locations of construction materials and temporary wastes			
	Soil Contamination	- Incidents of oil spill - Incidents of paint spill	Around construction site in Hisham Heritage Park	Daily site inspection	- Daily prestart inspection at the garage yard (for oil spill incident), - Use of infiltration-proof sheet at paint work and storage on site (for paint materials)			
	Vibration	-	At construction site in Hisham Heritage Park (Especially around fragile parts indicated in the DAM)	Constant observation at operation of machines for any damage on the existing structure of mosaic and relics	- Assumed damage assessment map (DAM) to be prepared before the implementation of the project; - Proper work plan for the excavation and compaction			
	Heritage	- Damages/degradation of the mosaic floor - Damages of associated facilities of the audience and bath hall - Damages of known or hidden relics around the shelter basement	At/Around construction site in Hisham Heritage Park	Constant observation of any damage on the mosaic and relics around operation site  Daily site inspection at end of work day, especially around fragile parts and around the basement  Monthly inspection of any damage/disturbance(s) to the mosaic, relics and ground	- Assumed damage assessment map (DAM) to be prepared before the implementation of the project			Heritage conservation specialist and Site manager of the Contractor,  under supervision of MoTA  in general construction cost with no significant extra cost
	Working environment	- Use of proper safety measures and gears - Proper welfare management for workers	At work site in Hisham Heritage Park	Daily site inspection of workers, Monthly inspection of working conditions, referring to safety and welfare management plans	ILO Code of Practice: safety and health in construction, 1992 - Safety management plan - Welfare management plan			Site manager of the Contractor,  under supervision of MoTA
	Accident	- Incidents of accident - Use of skilled operators - Proper operation according to the safety manual	At construction site in Hisham Heritage Park	Daily review of operation at end of work day Monthly review of operation	ILO Code of Practice: safety and health in construction, 1992 - Safety manual of the contractor for this project			in general construction cost with no significant extra cost

## Environmental Monitoring Plan

Phase	Item	Indicator	Location	Method / Frequency	Reference Standard	Implementer/ Responsible Agency / Cost	Reporting interval to JICA office
Operation Phase	Wastes	- Amount of garbage (plastics, PET bottles and cigarette butts, etc.) discarded in the park - Remaining available capacity of toilet and septic tank of the park - Increase of visitors	In Hisham Heritage Park	Periodical inspection of the conditions pertinent to the indicators/  Twice every year (once respectively on-season of visitors and off-season of visitors)	(To-be-revised) waste management plan for the Hisham Park	MoTA Hisham Park Office/  MoTA Jericho Office/  in general management cost of Hisham Heritage Park with no significant extra expenditure	Semi-annual reporting (once every 6 months)
	Local economies, such as employment, livelihood (with respect to atmosphere around entrance of the Hisham Park )	- Increase rate of visitors - Increase rate of newly opened shops and vendors around entrance of the Hisham Park	At Hisham Heritage Park (around the entrance and the parking lot of the Hisham Park)	<for visitors> - Daily recording of visitors - Quarterly summary and review of visitor statistics	Significant change from the current state, resulting in disturbance and degradation of the atmosphere around entrance of the Hisham Park	MoTA Hisham Park Office/ MoTA Jericho Office/ in general management cost of Hisham Heritage Park with no significant extra expenditure	
				<for shops and vendors> - Quarterly check of conditions			
	Heritage	<Inspection of mosaic> - Mineral precipitation - Crack or disintegration - Wearing with sand - Rain leak, dew drop - Intrusion of birds, small animals and vegetation - Other troubles, such as litter and trash, human invasion, and aged device & facility	On the mosaic floor	Daily inspection from the trail over mosaic  Closer inspection at the time of cleaning of mosaic floor	DAM revised at the end of construction  Baseline conditions at the beginning of the operation phase	MoTA Hisham Park Office/  MoTA Jericho Office/  in general management cost of Hisham Heritage Park with no significant extra expenditure	
<Monitoring & data recording> - Meteorological data (wind direction & speed; rainfall amount; insolation amount; temperature; humidity) - Soil water content - Water evaporation amount from the mosaic surface - Temperature, humidity, light intensity inside the shelter	- At a monitoring station set around the shelter in Hisham Heritage Park  - Beneath the ground beside the mosaic floor - On the mosaic surface - Inside the shelter	- Continuous monitoring and data collection of meteorological indicators for years  - Periodical measurement of hourly change in a day; of monthly change in a year	- Stability of conditions in observed data, compared with the first year, the average year or the local standard, if any - Emergence of abnormal values or change in observed data, compared with the average year or the local standard, if any	MoTA Jericho Office/  MoTA HQ/  Procurement cost for the installation of monitoring station and measuring devices (Approximately \$ ***)			

## 7-11. Example of Monitoring Form

### 1. Monitoring of Construction Activities

The latest results of the below monitoring items shall be submitted to JICA as part of Quarterly Progress Report throughout the construction phase

#### 1.1 Overall Monitoring for Construction Activities

Monitoring Item	Monitoring method	Measures taken and to be taken	Frequency
General performance of mitigation plan and monitoring plan  Any abnormal incidents to be specifically noted	Check the monitoring results, based on the plan, from the contractor of the construction work  Listing unexpected issues or the comments from the third party to be taken measures that are not identified in the original mitigation and monitoring plans		Shortly before start of construction  Quarterly during construction  and Shortly before end of construction

#### 1.2 Respective items of Air Quality, Wastes, Soil Contamination, and Vibration

Items	Indicator	Monitoring Results during Report Period	Measures to be taken
Air Quality	Abnormal emission of NOx and PM (dust, soot)	- Summary of performance in mitigation measures based on monitoring report by contractor  - Any unexpected or abnormal incidents on respective indicators to be noted or to be taken measures	
Wastes	- Proper segregation of temporary wastes - Proper placement of construction materials - Complete removal of spoils and debris		
Soil Contamination	- Incidents of oil spill - Incidents of paint spill		
Vibration	(vibration)		

#### 1.3 Heritage

Items	Indicator	Monitoring Results during Report Period	Measures to be taken
Heritage	- Damages/degradation of the mosaic floor - Damages of associated facilities of the audience and bath hall - Damages of known or hidden relics around the shelter basement	- Summary of performance in mitigation measures based on monitoring report by contractor - Any unexpected or abnormal incidents on respective indicators to be noted or to be taken measures	

#### 1.4 Working environment and Accident

Items	Indicator	Monitoring Results during Report Period	Measures to be taken
Working environment	- Use of proper safety measures and gears - Proper welfare management for workers	Summary review of monitoring report by contractor	
Accident	- Incidents of accident - Use of skilled operators - Proper operation according to the safety manual		

## 2. Monitoring during Operation Activities or In-Service Period

The latest results of the below monitoring items shall be submitted to JICA on biannual basis for the first two years of operation.

### 2.1 Overall Monitoring for Operation Phase

Monitoring Item	Monitoring Results during Report Period	Frequency
Number and contents of formal public comments		Upon receipt of comments
Response or guidance or action made/taken by MoTA		

### 2.2 Wastes

Items	Indicator	Monitoring Results during Report Period	Measures to be taken
Waste	- Amount of garbage discarded in the park - Remaining available capacity of toilet and septic tank of the park - Increase of visitors	Summary of performance in mitigation measures based on monitoring report by MoTA local office	

### 2.3 Local economies (with respect to conditions around entrance of the Hisham Park )

Items	Indicator	Monitoring Results during Report Period	Measures to be taken
Local economies	- Increase rate of visitors - Increase rate of newly opened shops and vendors around entrance of the Hisham Park	Any rapid change of concerned conditions from the previous report period	

## 2.4 Heritage

Items	Indicator	Monitoring Results during Report Period	Measures to be taken
Heritage	Performance of mitigation measures at operation phase	Any problems or matter of specific concerns in organizational setup, restoration activities of damaged remains and regular maintenance activities	
	Performance or progress of activities in the monitoring plan	- Any problems or matter of specific concerns in inspection results of mosaic Any problems or matter of specific concerns in meteorological and ambient monitoring	



## 7-12. Environmental checklist

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(a) N (b) N (c) N/A (d) N	(a) EIA is not required for the project. IEE is being prepared (will be prepared officially by MoTA (implementing agency) by end of November) (b) On submission of IEE report to Environmental Authority (EQA) from MoTA, it will take about one month for the approval of IEE and issuing Environmental Approval in EQA approval process. (c) (d) No other type of environmental permit is required. Only IEE suffices.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) Project and its impact has been explained, at a scoping level, to Professional Advisory Committee 3 times and to local stakeholders of Jericho (community of the project site) through 1st Public Consultations Meeting in September. In November, those after IEE will be explained to Jericho Community through second PC meeting. So far, general support and understanding to the project and its design has been obtained. (b) Stakeholders comments has been reflected in preparing the outline design.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) The main component of the project is the construction of a protective shelter of the mosaic floor unearthed, which is located in Hisham heritage park. Mainly on landscape impact, 3 types of shelter and their variations are examined technically and socio-environmentally. For other aspects of social and environmental considerations, there are no significant differences among different alternatives.
2 Pollution Control	(1) Air Quality	(a) Do air pollutants, (such as sulfur oxides (SO <sub>x</sub> ), nitrogen oxides (NO <sub>x</sub> ), and soot and dust) emitted from the proposed infrastructure facilities and ancillary facilities comply with the country's emission standards and ambient air quality standards? Are any mitigating measures taken? (b) Are electric and heat source at accommodation used fuel which emission factor is low?	(a) N/A (b) N/A	(a) There exists no source of air pollution in the project facilities. (b) There exists no such accommodation in relation to the project.
	(2) Water Quality	(a) Do effluents or leachates from various facilities, such as infrastructure facilities and the ancillary facilities comply with the country's effluent standards and ambient water quality standards?	(a) N/A	(a) There exists no such facilities discharging effluents or leachates in relation to the project.
	(3) Wastes	(a) Are wastes from the infrastructure facilities and ancillary facilities properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) The project does not contain facilities that discharge hazardous-level wastes in quality and in amount. Proper waste management plan for park visitors during operation and for used materials during construction will be prepared.
	(4) Soil Contamination	(a) Are adequate measures taken to prevent contamination of soil and groundwater by the effluents or leachates from the infrastructure facilities and the ancillary facilities?	(a) Y	(a) There exists no such facilities discharging effluents or leachates in relation to the project. However, during construction, proper protective measures from oil and paint leachates from construction machines and vehicles or paint materials will be properly taken.
	(5) Noise and Vibration	(a) Do noise and vibrations comply with the country's standards?	(a) Y	(a) There are no noise and vibration emitting facilities in relation to the project. Vibration effect by construction machines will be carefully controlled during construction to avoid any damage on the mosaic floor and archaeological remains of the project-related structure. Construction works will be conducted inside the Hisham Park, sufficiently distant from any residential facilities and social infrastructure outside of the park.
	(6) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N/A	(a)
	(7) Odor	(a) Are there any odor sources? Are adequate odor control measures taken?	(a) N/A	(a) There is no such source in relation to the project.
3 Natural Environment	(1) Protected Areas	(a) Is the project site or discharge area located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The project site is not located in or near any protected area.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions? (c) Is there a possibility that changes in localized micro-meteorological conditions, such as solar radiation, temperature, and humidity due to a large-scale timber harvesting will affect the surrounding vegetation? (d) Is there a possibility that the amount of water (e.g., surface water, groundwater) used by the project will adversely affect aquatic environments, such as rivers? Are adequate measures taken to reduce the impacts on aquatic environments, such as aquatic organisms?	(a) N (b) N (c) N (d) N	(a) (b) (c) (d) Project will use not surface water and groundwater, but only small amount of municipal-supplied water for maintenance and cleaning of facilities.
	(3) Hydrology	(a) Is there a possibility that hydrologic changes due to the project will adversely affect surface water and groundwater flows?	(a) N	(a)
	(4) Topography and Geology	(a) Is there a possibility the project will cause large-scale alteration of the topographic features and geologic structures in the project site and surrounding areas?	(a) N	(a)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement? (c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement? (d) Is the compensations going to be paid prior to the resettlement? (e) Is the compensation policies prepared in document? (f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples? (g) Are agreements with the affected people obtained prior to resettlement? (h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan? (i) Are any plans developed to monitor the impacts of resettlement? (j) Is the grievance redress mechanism established?	(a) N (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A	(a) (b) (c) (d) (e) (f) (g) (h) (i) (j)



4 Social Environment	(2) Living and Livelihood	(a) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?	(a) N	(a)
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) Y	(a) The project site is inside the very archeological, historical and cultural heritage site. The project objective is to utilize unearthed cultural remains (mosaic floor) and build a shelter to protect and conserve it. Proper protective measures are planned and will be executed for the cultural remains of the project site, in accordance with the Palestine Authority laws and regulations.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken? (b) Is there a possibility that landscape is spoiled by construction of high-rise buildings such as huge hotels?	(a) Y (b) Y	(a) The proposed shelter may have possibility of adversely affecting the local landscape. In avoiding or minimizing the negative impact on landscape, the optimal shelter design has been discussed in advisory committee and local public consultation meeting, referring to harmony with the background landscape and standard criteria on world heritage, namely authenticity and integrity. Outline design will reflect the result of those discussion. (b) Same as above.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N/A (b) N/A	(a) The project is not relevant to this issue. (b) The project is not relevant to this issue.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials? (c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) Y (b) Y (c) Y (d) Y	(a) Proper measures will be observed and taken, with reference to ILO Code of Practice, safety and health in construction. (b) It is required in environmental management plan for mitigation measures. (c) It is required in environmental management plan for mitigation measures. (d) It will be ensured by the management of MoTA Hisham Office.
	5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts? (c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?	(a) Y (b) N/A (c) N/A
(2) Monitoring		(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) What are the items, methods and frequencies of the monitoring program? (c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)? (d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?	(a) Y (b) - (c) Y (d) N/A	(a) The proponent will do. (b) Control of emission gas and vibration of construction vehicles and machines, wastes, soil contamination will be monitored during construction, daily and periodically. Conditions of wastes management, local economy at entrance of the park, and the heritage of mosaic floor and surrounding remains will be monitored during operation, daily or quarterly or half-yearly. (c) Organization, personnel and adequate operational budget will be prepared for planned monitoring framework while meteorological and soil conditions monitoring apparatus will be procured by JICA. (d) No regulatory requirements from the proponent to any regulatory authority is identified while monitoring report system from the proponent to JICA will be indicated in the project's environmental monitoring plan.
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Roads, Railways and Bridges checklist should also be checked (e.g., projects including access roads to the infrastructure facilities). (b) For projects, such as installation of telecommunication cables, power line towers, and submarine cables, where necessary, pertinent items described in the Power Transmission and Distribution Lines checklists should also be checked.	(a) N/A (b) N/A	(a) (b)
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) N/A	(a)
1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, appropriate environmental considerations are required to be made. In cases where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).				
2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which the project is located.				

### 7-13. ACM Minutes of Meetings (ACM1–4)

ACM 1

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#### **The First Meeting for Advisory Committee (AC), regarding the Rehabilitation of Hisham's Palace, Jericho**

**Date:** 3<sup>rd</sup> August, 2015

**Time:** 11:00 - 14:30

**Venue:** Ramallah Museum, Ramallah, Palestine

**Goal:** The main goal of this meeting is to have important inputs of views and suggestions through discuss the Project for the Rehabilitation of Hisham's Palace (or the Protective Shelter for the Great Bath of Hisham's Palace) (hereinafter referred to as “the Project”) among Advisory Committee (AC), experts from MOTA and JICA mission team

**Attendees:**

Advisory Committee

Mr. Junaid SOROSH	UNESCO Office Ramallah
[Absence] Mr. Basel Hejazi	Head of Engineering Dept., Jericho Municipality
[Declination] Dr. Hamdan Taha	Cultural Heritage Expert
[Absence] Dr. Shadi Ghadban	The chief of the Architectural Department - Bir Zait University.
[Absence] Arch. Fida Touma	Old city of Jerusalem Revitalization Programme -Welfare Association.
Arch. Fawaz Ya'aish	MIDMAK – Architects, Engineers and Consultants
Arch. Rashad Jabi	MIDMAK – Architects, Engineers and Consultants

JICA Mission Team

Mr. Toshiyuki IWAMA	Leader/ Executive Technical Advisor, JICA Tokyo
Mr. Kazuya YAMAUCHI	Technical Advisor/ National Research Institute for Cultural Properties (NRICP), Tokyo
Mr. Shinichi YOSHIHARA	Project Coordinator/ JICA Tokyo

JICA Palestine

Ms. Eina UENO	Project Formulation Advisor/ JICA Palestine
Ms. Hiba Mesh'al	Representative, JICA Field Office in Jericho

### Consultant Team

Mr. Kenji KAWAZOE	Chief Consultant, Project Architect/ Matsuda Consultants Intl. Co., Ltd. (MCI)
Mr. Shigeo AOKI	Conservation Expert/ Former Researcher of NRICP, Tokyo
Mr. Ryozo UMEZAWA	Structural Designer/ Umezawa Structural Engineers
Mr. Masakazu TAKAGI	Assistant Chief Consultant/ MCI
Mr. Daigo TANABE	Quantity Surveyor/ MCI
Mr. Tsuyoshi SASAKA	Environmental and Social Considerations/ IC Net

### Ministry of Tourism and Antiquity

Mr. Ihab Haj Daoud	Vice Director General of Conservation and Sites Management - Architect
Dr. Ahmed Rjoob	Acting General Director of Southern Governorates – Site Management Expert
Mr. Abdulrahim Awad	Director of Development Department - Archaeologist
Mr. Mohamad Diab	Director of Conservation Department – Conservator
Mr. Bassam Hbaisheh	Director of Specification Department – Civil Engineer
Mrs. Manal Al-Helo	Conservation Department – Architect
Mr. Ziad Abu Odeh	Conservation Department - Architect

#### 1. Opening Remarks by MoTA

The Vice Director General of Conservation and Sites Management Mr. Ihab Haj Daoud opened the meeting by welcoming the attendees and thanking the Government of Japan (GOJ) and The Japanese International Cooperation Agency (JICA) for supporting the Palestinian people. He also thanked the Japanese Consultant Team which is formed with Matsuda Consultants Intl. Co., and other firms. He also welcomed the Advisory Committee (AC) and the importance of their inputs of views and suggestions on the project, while some of them apologized for urgent conditions. Mr. Ihab promised to keep them in touch of the meeting minutes.

Mr. Ihab also thanked the Japanese and the Palestinians experts for their participation which reflects the special relationship and cooperation between both nations.

Mr. Ihab left the floor to the attendees to introduce themselves and how they are in charge of this project.

#### 2. Welcome Remarks by JICA

Mr. Toshiyuki IWAMA Leader/ Executive Technical Advisor, JICA presents welcome remarks and express his expectation of the fruitful discussion in AC meetings.

#### 3. Purpose of AC, MoTA

Mr. Ihab continued and illustrated the importance of this project, the history of the previous three

attempts for the design of the shelter project, and finally the purposes of the Advisory Committee in this important and unique project.

#### 4. Presentation of Design Process, Consultant

Mr. Kenji KAWAZOE started his presentation on the design process by starting with the purpose and the objective of the project.

After that he talked about the requirements for the shelter in terms of clients, visitor's conservation of heritage, and other conditions concerning the site.

Mr. KAWAZOE continued his presentation of design process showing different design systems for the shelter and the differences between each system in addition to their advantages and disadvantages in terms of Shape, Material, lighting, Structure, size and feasibility.

#### 5. Discussion

Mr. Junaid SOROSH, UNESCO expressed his happiness to hear about such project, in addition to respecting the Government of Japan and JICA for the grant. He also thanked MOTA for invitation and he admired the Advisory Committee and welcomed being involved in it.

Mr. Junaid also appreciated putting this site on the Palestinian tentative list, and the importance of inscribing such archaeological site on the world heritage list according to the outstanding universal values and attributed that is very important to be conserved and protected to the upcoming generations.

Mr. Junaid also recommended studying the impact assessment of such project according to the World Heritage Center (WHC) guidelines. And he talked about preserving the authenticity and the integrity of the site.

Mr. Shigeo AOKI Conservation Expert – NRICP agreed with Mr. Junaid and he talked about the importance of environment assessment as well, and the importance to differentiate between Heritage Impact Assessment (HIA) and Environment Impact Assessment (EIA).

Mr. Junaid also emphasized the importance of sharing the design process with the stakeholders in wide-ranging field besides the professionals.

Dr. Ahmed Rjoob Acting General Director of Southern Governorates – MoTA assured that the project is in the beginning of its stages, and the design is still in progress, and so he invited all experts to feel free to share with their points of view because nothing finished until now, especially that we are talking about a very important site with a lot of challenges.

Mr. Abdulrahim Awad Director of Development Department – MOTA suggested using glass trails on the ground instead of using ramped trail in order to increase the ability to see the Mosaic floors closely which will clarify the view to the visitors.

Mr. KAWAZOE answered that MoTA and the Consultant has discussed the proposed option and found a technical problem related to protection of the mosaic.

Mr. Mohamad Diab Director of Conservation Department – MOTA agreed with Mr. KAWAZOE , he also added that using glass will affect the Micro climate of mosaic which may increase the

degradation of it slowly.

Mr. Abdulrahim Awad proposed that the shelter shall cover the northern bathrooms and the interpretation of the Great Bath shall be developed to show the whole story including the bath system.

Mr. KAWAZOE agreed that the proposal is essential and shall be discussed further.

Mr. Ziad Abu Odeh Conservation Department – Architect – MOTA suggested to start building a significant concept respecting Hisham's Palace and its history, he also suggested to avoid the Dome structure nor the truss system structure because both are bulky and very odd to the site and its context, rather than Mr. Abu Odeh preferred using the third option proposed using suspended roof design which in his point of view will decrease the intervention especially if we use light materials.

Dr. Ahmed Rjoob preferred the trails but at the same time he said that the height must be studied carefully to enable a continuous view and also he recommended the platform not to protruding from the mosaic floors.

Mr. Ziad mentioned that the design concept shall be agreed first.

Mr. KAWAZOE answered that the design shall meet lots of requirements first and also be feasible on the conditions.

Mr. Fawaz Ya'aish, Architect of MIDMAK, mentioned that the designed shall be maintained easily.

Mr. KAWAZOE answered that the suggestion is important and one of requirements which the design shall meets, and the materials to consist the shelter shall be carefully selected in terms of durability and economy.

Mrs. Manal Al-Helo Conservation Department – Architect – MOTA recommended the design to adapt the visitors needs especially children and she asked if it's safe to use levels in the design? And if it's possible to prevent visitors from harming the archaeological parts of the site?

Mr. KAWAZOE answered that the height and material of the handrail shall be designed to assure the safety of visitors, and also mentioned that it is impossible to avoid the accident by a drop of a camera or other belongings of visitors.

Arch. Rashad Jabi MIDMAK – Architects, Engineers and Consultants suggested the design to take seismic and wind calculations in consideration especially that the site was collapsed several time according to earthquakes happened in the past.

Mr. KAWAZOE assured that this point was already taken in consideration according to an international standard and he welcomed any local standards if there is.

Mr. Junaid emphasized the importance of not only seismic calculations but also to study the surrounding effects and he advised if we look at similar previous projects for world heritage sites using the shelter protection design as a case study.

Mr. Junaid raised the issue of the appreciation: Which is viewpoints? Which is more important close-look or overview? Mr. Junaid mentioned that the shape of the design shall be harmonized with the mountainous scenery and the design is considered for the disabled.

Dr. Ahmed mentioned that not only the conservation of the mosaic but also the issue of the

appreciation is important, and the trail design shall developed to attract visitors. Mr. Ihab also mentioned that the suggestions on the shape and consideration to the disabled are important and shall be considered in the design.

Mr. Junaid emphasize of the importance of capacity building of the maintenance staff. He also mentioned that the height of the shelter shall not be big and the entry to the trail might be better from the bath entrance.

Mr. KAWAZOE answered that the entry from the bath entrance for the rail option has been discussed among MoTA and MoTA found the problem that the trail hide the mosaic below the trail in this case.

Arch. Fawaz Ya'aish MIDMAK – Architects, Engineers and Consultants recommended that all the new structure which includes the shelter and the trails has to be structurally a complete system without depending on the old existing structure.

Mr. KAWAZOE answered that MoTA and the Consultant explored the supporting system depending the existing structure based on enough engineering analysis and survey to avoid the damage of the existing structure.

Mr. Toshiyuki IWAMA, Leader/ Executive Technical Advisor of JICA Tokyo suggested that the viewpoints and appreciation method shall be fixed first, the shelter design shall be developed based on the appreciation design.

## 6. Summarizing of Discussion

Mr. Rjooob summarized the discussion and confirmed the requirement for the shelter as follows were agreed:

The Client's requirement

- To be reversible
- To be light structure with simple design
- To be based on minimal intervention
- To be easy maintained and repaired
- To be in harmony with the surrounding environment
- To be respect environmental anti-seismic measures in the region

Requirement for conservation of heritage

- To block direct sunlight
- To keep appropriate temperature and humidity
- To block rain water and stormwater
- To prevent flying sand not to damage the mosaic
- To prevent birds' and bats' nesting
- Not to disturb activities for conservation and maintenance

Requirement for appreciation of visitors

- Circulation for visitor considering the characteristics of the mosaic
- Appropriate lighting for appreciation: illuminance and color

- Appropriate interior: ceiling height and microclimate
- Interpretation and presentation of the Bath site
- To be accessible to all the visitors including the disabilities
- To ensure the safety of visitors

Dr. Ahmed also mentioned that the design will be studied further based on the following principles for the shape of the shelter:

- Low edge of roof to make the volume of building look smaller
- High rooftop for interior space: the height shall be decided carefully.

Dr. Ahmed also mentioned that the design will be developed further with clarification of treatment of existing pillars, roof area or other relevant factors.

The structure shall be decided to realize the shape and the plan of roof to meet the following conditions:

- To find the possible foundation place in terms of archaeological remains.
- To try to minimize the weight and visual perception of structure
- To find the appropriate possible construction method

#### 7. Closing Remarks by MoTA

Mr. Ihab thanked the attendees for their active participation and opened the floor to receiving any other suggestions or points of view later using E mail, especially for those whom were unable to be there.

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ACM 2

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### **The second Meeting for Advisory Committee (AC2), Rehabilitation Project of Hisham's Palace, Jericho**

**Date:** 19<sup>th</sup> August, 2015

**Time:** 10:00 – 16.00

**Venue:** Hisham's Palace and Reception Hall of Jericho Resort Village

**Goal:** To have important inputs of views and suggestions through analyzing the design approach of the Protective Shelter for the Great Bath of Hisham's Palace in addition to the touristic trail suggested by the consultant team (Matsuda Consultants) with the Palestinian Experts presenting Governmental, NGOs, Local, and Private sectors.

**Attendees:**

Advisory Committee

[Absent] Mr. Junaid SOROSH	UNESCO Office Ramallah
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Mr. Basel Hejazi	Jericho Municipality
Dr. Zahra Zawawi	Urban Planning Unit-Al Najah National University
Eng. Mohammad Fetiani	Engineering Association, Jericho
Arch. Fida Touma	Old city of Jerusalem Revitalization Programme -Welfare Association.
Dr. Issa Barad'eya	Director General, Environment Quality Authority (EQA)
Arch. Rashad Jabi & Arch. Fawaz Ya'aish	MIDMAK – Architects, Engineers and Consultants

#### Ministry of Tourism and Antiquity

Mr. Ihab Haj Daoud	Vice Director General of Conservation and Sites Management - Architect
Dr. Ahmed Rjoob	Acting General Director of Southern Governorates – Site Management Expert
Mr. Jehad Yasin	Acting General Director of Museums and Excavations
Mr. Iyad Hamdan	Acting Director General of Ramallah and Jericho Governorates
Mr. Abdulrahim Awad	Director of Development Department - Archaeologist
Mr. Mohamad Diab	Director of Conservation Department – Conservator
Mrs. Manal Al-Helo	Conservation Department – Architect
Mr. Ziad Abu Odeh	Conservation Department - Architect

#### JICA Palestine

Mrs. Eina UENO	Project Formulation Advisor/ JICA Palestine
Mrs. Hiba Mesh'al	Representative, JICA Field Office in Jericho

#### Consultant Team

Mr. Kenji KAWAZOE	Chief Consultant, Project Architect/ Matsuda Consultants Intl. Co., Ltd. (MCI)
Mr. Masakazu TAKAGI	Assistant Chief Consultant/ MCI
Mr. Daigo TANABE	Quantity Surveyor/ MCI

#### Other Stakeholders and Local Community

Mr. Majed Fetiani	Jericho Governor
Mr. Mohammad Jalaita	Mayor, Jericho Municipality
Mr. Emad Salman	Member of Municipality Council - Jericho
Mr. Eisa Daraweesh	Member of Municipality Council - Jericho
Mr. Mohammad Es'eed	Engineering Department – Jericho Municipality
Mrs. Wiam E'raikat	Public Relation Department – Jericho Municipality
Mr. Marwan Samarat	Public Relation Department – Jericho Municipality
Mr. Najah Hammad	Jericho Heritage Tourism Committee (JHTC)



Mr. Mohammad Hawash	Jericho Heritage Tourism Committee (JHTC)
Mr. Amjad Ibrahim	Environment Quality Authority (EQA)
Mr. Ayman Abu Thaer	Environment Quality Authority (EQA)
Mr. Raed Saada	Masar Ibrahim organization

#### Record of Meeting:

#### 1. Site Tour

The Vice Director General of Conservation and Sites Management Mr. Ihab Haj Daoud invited the attendees to a site tour inside Hisham's Palace and he explained the project closely.

Mr. Kenji KAWAZOE the Chief Consultant of the Project from his side gave additional information of design and technical requirements for the shelter.

Mr. KAWAZOE also talked about the trail practically and how it must engage the needs to have the best view of the mosaic.

#### 2. Opening Remarks by MoTA

Mr. Ihab welcomed the attendees back after they moved to Jericho Resort Village , then he thanked the Government of Japan (GOJ) and The Japanese International Cooperation Agency (JICA) for supporting the Palestinian people. He also welcomed the Advisory Committee (AC) the experts from local community and other stakeholders as well.

#### 3. Introduction of AC members and their profile by MOTA

Mr. Ihab welcomed the AC members introduced them and their profiles and then he left the floor to all participants to introduce themselves.

#### 4. Purpose of AC, MoTA

Mr. Ihab continued and illustrated the importance of this project, the history of the previous three attempts for the design of the shelter project, and finally the purposes of the Advisory Committee in this important and unique project.

#### 5. Review of the previous meeting, Consultant

Mr. Kenji KAWAZOE started his presentation on the design process by starting with the previous meeting (AC1), and the other meetings with MOTA experts in which the team discussed the objectives, requirements, site conditions, and the design factors for the project.

Mr. KAWAZOE showed the progress of design in part 2 of his presentation of the Trail and the Shelter for Hisham's Palace, and how the design was developed after AC1 and what are the points need to be discussed during AC2 to determine the exact approach that expresses all requirements needed.

#### 6. Discussion

**Jericho Governor/majid Fityani / :** As an engineer the need of such intervention should meet the unique of the site materials should coupe of this part of design ,and taking in consideration the seismic issue and the height risk of seismic danger , the safety of visitors humidity temperature wind and coast of maintenance.

**Mayor / mohamad jalaita /** said that the technicians are the best to talk about the project adding

that the municipality is ready for any support cooperation.

**Eng . Basel Hijazi** / Jericho municipality: from my position and as a resident in Jericho we should be careful for such intervention at Hisham,s palace since it is a land mark, and study the materials that will be used at the shelter to be integrated with the site and original form of the roof taking in consideration the requirement and agreement of the municipality

**Fida Touma** / Welfare association: There is a new intervention statement at the site, the design is making sense, I am wondering if we can harvest solar energy and reuse it.

**Dr.Issa Barad`eya** /EQA: we should also study the migrated birds circulation and how it affect our country during the seasons.

**Dr.Ahmad Rjoub/MOTA**: Regarding to the regulations of municipality we did master plan for hisham,s palace and surrounding especially for sure we will respect the regulation of municipality No one can know the original shape of the bathroom therefore Hamilton has his imagination to the roof I agree we will have a new aspect new shape but it's anteed if we keep the site as it is we will limit the experience of the visitors , the shape we have now was constructed by Jordanian and we accepted it nowadays .

**Dr. Zahra Zawawi** / the construction that made by Jordanian is the same as the original one and that is why we accept it , she also agree with ne design and intervention, but at the same time she said that this design don't reflect the authenticity and integrity of hisham,s palace.

**Mr. Rashad jabi** / raised attention to the importance of studying the trails capacity of visitors, and also to study the relationship between inside and outside without isolating the mosaic from surrounding.

Mr. Ihab recorded Raed sada recommendations / as follows:

- **He recommends using solar energy system**
- **He recommends using movable platforms even hydraulic or manual.**
- **He recommends studying of ventilation carefully.**

**Abed Elraheem / Mota** : I am afraid of echo , the original drainage system and water system for the site it will be useful if we study it carefully

**Dr. Zahra zawawi**/ standards for people standing in platform should be taking in consideration ...

**Mr. Ziad Abu Odeh**/ The standard width of person needed is 60cm, and the design used 150 cm that means two persons moving (120cm) and the rest distance could be used for shooting or capturing photos.

**Dr. Issa Barad`eya** / we could use movable curtains to achieve fully enclosure of partially.

## **7. Summarizing and closing remarks, by Dr. Ahmad Rjoob**

Mr. Rjoob summarized the discussion and underlined the main suggestions; he also did a comprehensive review to the presentation and emphasized the final agreed points according to the discussion.

## **8. Agreement points**

- The attendees (except Dr. Zahra Zawawi) agreed the Cut Dome Design of the protecting shelter.
- The attendees agreed the trail design with recommendation to restudy the width, Material, and the possibility of using movable platforms.

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ACM 3  
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**The Third Meeting for Advisory Committee (AC3),  
Rehabilitation Project of Hisham's Palace, Jericho**

**Date:** 15<sup>th</sup> September, 2015

**Time:** 10:00 – 16:00

**Venue:** Reception Hall of Jericho Resort Village

**Goal:** To have important inputs of views and suggestions through analyzing the design progress of the Protective Shelter for the Great Bath of Hisham's Palace in addition to the touristic trail suggested by the consultant team (Matsuda Consultants) with the Palestinian Experts presenting Governmental, NGOs, Local, and Private sectors.

**Attendees:**

Advisory Committee

Mr. Mohammad Abu Hammad	UNESCO Office Ramallah
Eng. Hazem Bali & Mrs Tamara E'reqat	Jericho Municipality
Dr. Zahra Zawawi	Urban Planning Unit-Al Najah National University
Eng. Rana Al Ghool	Engineering Association, Jericho
(Absent) Arch. Fida Touma	Old city of Jerusalem Revitalization Programme -Welfare Association.
Eng. Khaled Salem & Akram Halaikah	Environment Quality Authority (EQA)
Arch. Rashad Jabi & Arch. Fawaz Ya'aish	MIDMAK – Architects, Engineers and Consultants

JICA Mission Team

Mr. Toshiyuki IWAMA	Leader/ Executive Technical Advisor, JICA Tokyo
Mr. Shinichi YOSHIHARA	Project Coordinator/ JICA Tokyo

JICA Palestine

Mrs. Eina UENO	Project Formulation Advisor/ JICA Palestine
Mrs. Hiba Mesh'al	Representative, JICA Field Office in Jericho

#### Consultant Team

Mr. Kenji KAWAZOE	Chief Consultant, Project Architect/ Matsuda Consultants Intl. Co., Ltd. (MCI)
Mr. Masakazu TAKAGI	Assistant Chief Consultant/ MCI
Mr. Daigo TANABE	Quantity Surveyor/ MCI

#### Ministry of Tourism and Antiquity

Mr. Ihab Haj Daoud	Vice Director General of Conservation and Sites Management – Architect
Dr. Ahmed Rjoob	Acting General Director of Southern Governorates – Site Management Expert
Mr. Jehad Yasin	Acting General Director of Museums and Excavations
Mr. Iyad Hamdan	Acting Director General of Ramallah and Jericho Governorates
Mr. Abdulrahim Awad	Director of Development Department - Archaeologist
(Absent)	
Mr. Mohamad Diab	Director of Conservation Department – Conservator
Mrs. Manal Al-Helo	Conservation Department – Architect
Mr. Ziad Abu Odeh	Conservation Department - Architect

#### Record of Meeting:

##### 1. Opening Remarks by MoTA

**Mr. Ihab** welcomed the attendees then he thanked the Government of Japan (GOJ) and The Japanese International Cooperation Agency (JICA) for supporting the Palestinian people and funding this project.

##### 2. JICA Mission Team

**Mr. IWAMA** from his side welcomed the attendees and he also brought to attention the importance of Hisham's Palace as a historical and cultural monument, in addition to the importance of discussing this project and putting opinions achieving the best results.

##### 3. Introduction of AC members and their profile by MOTA

**Mr. Ihab** welcomed the AC members again, and he left the floor to all participants introducing themselves.

##### 4. Public Consultation (PC), MoTA

**Mr. Ihab** talked about the PC and how it's important to engage the public community in the project, he mentioned the main questions prepared in the first workshop to the participants in different fields and sectors with spotlighting the results obtained according to this questionnaire.

**Mr. Ihab** also promised to implement the second workshop during November to have diversity and comprehensive point of views.

##### 5. Presentation for the design progress, Consultant

**Mr. Kenji KAWAZOE** started his presentation on the design progress starting with Time Run,

objectives, requirements, site conditions, and the design factors affecting the project.

**Mr. KAWAZOE** focused on the design of Trail and Shelter, and how it is developing according to the previous limitations in addition to the discussions and suggestions came up with the several meetings.

**Mr. KAWAZOE** also showed the updated design for the trail and the advantages and disadvantages of both designs (old and new).

**Mr. KAWAZOE** finished his presentation showing the different materials for the shelter, he rejected using Membrane to escape the huge illumination penetrating (10000 Lux) which will affect the mosaic, rather than he suggested an alternative materials in terms of (sun protection, weight, durability, and color).

## **6. Discussing the Trail Design.**

**Mr. Mohammad Abu Hammad** preferred using shorter and direct to entrance trail.

**Dr. Ahmad** agreed with Mr. Abu Hammad, he also emphasized the importance of making the visitor feel both the pool and the mosaic as presented in the first design of trail.

**Arch. Fawaz** raised attention to the importance of feeling the entrance experience itself as in the first design; he also rejected using additional foundations outside as suggested in the second design.

**Mr. Ihab, Mr. Abdulrahim, Dr. Ahmad, Eng. Rana** also agreed with Arch. Fawaz and the importance of feeling the original entrance for the visitor when he arrives there unlike starting from the net angle of the building.

**Dr. Ahmad and Dr. Zahra Zawawi** also agreed the simpler and lighter design of trail, **while Mr. Abu Hammad** highlighted the importance of seeing mosaic details by using lower platforms.

**Mr. KAWAZOE** : (The upper platform gives general overview).

**Dr. Zahra Zawawi** agreed the first design of trail without changing the entrance in order to feel the original axis of the building, she also recommended the minimum intervention, on the other hand she asked if it is easy to cope with the big mass of visitors within new design??

**Mr. Jehad Yasin** agreed the second design which enables a high level platform to attain a complete overview of the mosaic instead of viewing piece by piece.

**Dr. Ahmad Rjoob** agreed with Dr. Zawawi and added that the new trail is very heavy and affecting the open view of the mosaic negatively, he also agreed with Dr. Zawawi for the management of the visitors.

**Arch. Fawaz** recommended taking a look closed to the mosaic especially around the Dewan.

**Mr. Abdulrahim Awad** asked if the additional height of trail will affect the total height of the shelter.

**Mr. KAWAZOE** answered no, the shelter height is the same.

## **7. Discussing the Shelter Design.**

**Mr. Mohammad Abu Hammad** raised attention to the importance of the cost in addition to the reversibility of the design, he disagree the cut dome design nor the other two suggested designs, he considered the three options to be very heavy to his eye, rather than he recommended investing of

the existing pillars as supporters from inside not outside.

**Mr. KAWAZOE** said that there is no big difference between the three ideas technically, and the developing of any idea is possible according to the different factors and requirements as discussed before.

**Dr. Ahmad** assured that any intervention is intrusive but we also need to compromise between the protection of the mosaic and the new intervention.

**Dr. Zahra** didn't agree with the Cut Dome design nor the other two proposed designs, instead she recommended a new creative design to be harmony with the site as an important requirement.

**Eng. Rana** liked the Cut Off Dome design, and she also admired the shape which is very harmony to the mountains behind.

**Mr. Ziad Abu Odeh** agreed with Eng. Rana, he also appreciated the developing of the idea by the consultant from a very intrusive bulky mass (Big dome) into a lighter and smaller shape (Cut Off Dome) which is more friendly to the site and its surroundings.

#### **8. Presentation of the Materials, Consultant**

**Mr. KAWAZOE** presented the three materials suggested to be used for the shelter and he also showed the advantages of it. The materials are (1.PVDF, 2.PVF, 3.Stainless steel). Mr. KAWAZOE also gave the samples of the materials to be recognized closely.

#### **9. Discussion of the Materials.**

Most of the attendees agreed the second choice (PVF) according to its advantages; they also preferred a suitable color with the surrounding environment.

**Mr. Abdulrahim** recommended taking color durability in consideration in addition to the material itself to avoid the short time maintenance as possible.

#### **10. Presentation of the Cladding Design, Consultant**

**Mr. KAWAZOE** presented the design proposed for the cladding using louver to attain the requirements needed, at the same time he emphasized the ability to use different materials (steel, aluminum, timber, .. etc).

#### **11. Discussion of the Cladding Design**

**Dr. Zawawi** recommended using timber as a cultural and traditional friendly – material which is also very beautiful and natural material.

**Mr. Abdulrahim** raised attention to the probable dangers expected especially the fire and environment, he also reminded of timbers heavy weight.

**Dr. Ahmad** emphasized the importance of visual continuity from inside to outside and the contrary.

**Mr. Ihab** said that the visual continuity is already achieved by the design proposed but the problem of birds is not solved yet.

**Arch. Rashad Jabi** suggested using mesh in between louvers to prevent birds or by making additional layer of mesh.

**Mr. KAWAZOE** explained the technical difficulty of this suggestion, at the same time he emphasized the impossibility to have 100% solution, but he said it's possible to use louver with

mesh as a second layer.

**12. Summarizing and closing remarks, by Dr. Ahmad Rjoob**

**Mr. Rjoob** summarized the discussion and underlined the main suggestions; he also did a comprehensive review to the meeting and emphasized the final agreed points according to the discussion.

**13. Agreement points**

- **Most of the attendees agreed the first design of the trail(old design).**
- **Most of the attendees agreed the cut off dome design for shelter while Dr. Zawawi and Eng. Abu Hammad recommend having an alternative design rather than the three proposed.**
- **Most of the attendees agreed using (PVF) material for the shelter with choosing suitable color.**

**14. disagreement points**

- **Although attendees recommended lover design for cladding to solve sand, sun, rain, and ventilation, they emphasized the importance of preventing birds which need to be solved.**
- **The materials of claddings need additional study.**

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ACM 4  
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**The Fourth Meeting for Advisory Committee (AC4),  
Rehabilitation Project of Hisham's Palace, Jericho**

**Date:** 08<sup>th</sup> December, 2015

**Time:** 10:00 – 14:30

**Venue:** Caesar hotel - Ramallah

**Goal:** To discuss the advanced design progress of the Protective Shelter for the Great Bath of Hisham's Palace in addition to the touristic trail suggested by the consultant team (Matsuda Consultants) with the Palestinian Experts presenting Governmental, NGOs, Local, and Private sectors.

**Attendees:**

**Advisory Committee**

Mr. Mohammad Hammad	Abu	UNESCO Office Ramallah
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Eng. Mohammad Fitiani	Jericho Municipality
	Engineering Association, Jericho
Dr. Zahra Zawawi	Urban Planning Unit-Al Najah National University
Arch. Fida Touma	Old city of Jerusalem Revitalization Programme -Welfare Association.
Absent	Environment Quality Authority (EQA)
Arch. Rashad Jabi & Arch. Fawaz Ya'aish	MIDMAK – Architects, Engineers and Consultants

### **JICA Palestine**

Mrs. Eina UENO	Project Formulation Advisor/ JICA Palestine
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### **Consultant Team**

Mr. Kenji KAWAZOE	Chief Consultant, Project Architect/ Matsuda Consultants Intl. Co., Ltd. (MCI)
Mr. Masakazu TAKAGI	Assistant Chief Consultant/ MCI

### **Ministry of Tourism and Antiquity**

Mr. Ihab Haj Daoud	Vice Director General of Conservation and Sites Management - Architect
Dr. Ahmed Rjoob	Acting General Director of Southern Governorates – Site Management Expert
Mr. Mohamad Diab	Director of Conservation Department – Conservator
Mrs. Manal Al-Helo	Conservation Department – Architect
Mr. Ziad Abu Odeh	Conservation Department - Architect

### **Record of Meeting:**

#### **1. Opening Remarks by MoTA**

**Mr. IHAB** welcomed the attendees then he thanked the Government of Japan (GOJ) and The Japanese International Cooperation Agency (JICA) for supporting the Palestinian people and funding this project.

**Mr. IHAB** also talked about the last meeting (Public Consultation 2) and how it was important to engage the local community in this project, and then he abstracted the main results.



**Mr. IHAB** presented the Agenda for AC4 meeting and asked Mr. KAWAZOE to start his presentation.

## **2. Presentation for the design progress, Consultant**

**Mr. Kenji KAWAZOE** presented the design progress starting with Time line, project components and objectives, requirements, design policy, environmental & social considerations, mitigation measures, and the design proposed with sort of details and technical explanations.

**Mr. KAWAZOE** also talked about the draft report prepared by the consultant team showing the comprehensive study of the project and the logical stream proposed to design, implement and maintenance after finishing the project.

**Mr. KAWAZOE** focused on the design of Trail and Shelter, and how it was developed according to the previous limitations in addition to the discussions and suggestions came up with several meetings.

**Mr. KAWAZOE** also showed some of the materials proposed especially for the shelter covering and insulation materials, with additional details for systems needed (lighting, power, ventilation, water supply, firefighting, etc).

## **3. Discussion**

**Mr. IHAB thanked Mr. KAWAZOE and opened the discussion.**

**Dr. AHMAD** suggested that the starting trail might affect the view and landscape and asked if it is possible to start from the entrance itself?

**Mr. KAWAZOE** explained that the trail needs to start from outside of the entrance in consideration of the difference of the levels and the suitable slope; however we can decrease it by filling the ground.

**Dr. AHMAD** also asked if the entrance platform could be capable with the capacity especially with presence of interpretation panels which could be confusing.

**Dr. Zahra ZAWAWI** suggested the panels to be moved to another place or removed.

**Eng. Mohammad FITIANI** asked how we can fix the walls of the shelter that carries cladding and glass.

**Mr. KAWAZOE** answered it will be fixed on continuous beam.

**Mr. FITIANI** asked if we need to consolidate the columns before digging.

**Mr. KAWAZOE** answered that the platform will be installed on pillars and the boring for reinforcement will be executed on this platform.

**Arch. FAWAZ** raised attention to the bottleneck section of the trail on the north wall which needs to be expanded a little bit to avoid jam.

**Eng. Mohammad ABU HAMMAD** recommended further studying of the lighting to evade the shadow on the mosaic. He also asked how we can fix the foundation for the trail inside the pool.

**Mr. KAWAZOE** answered we have different methods to fix it but before we need to check the ground and its bearing capacity and strength.

**Mr. Ziad ABU ODEH** asked if it is possible to hide the huge truss system of the north-east elevation (angle) or any other addition to harmonize it with the Southern and eastern elevations of the shelter.

**Arch. Fida** suggested that this is a matter of taste and she preferred the design of exposure of the structures on corners.

**Eng. FITIANI** asked about the materials used for the shelter.

**Mr. KAWAZOE** showed the samples of the materials and explained their features.

**Dr. AHMAD** brought to attention what Eng. Basel HEJAZI said in the last meeting concerning the artificial lighting system and the special criteria needed in such site.

**Mr. IHAB** asked about the heat expansion of materials due to big difference in air temperature in Jericho.

**Mr. KAWAZOE** explained that the difference of air temperature in Jericho is not big compared to other harsh climatic regions like Mongolia and we don't need to care the heat expansion on this project.

**Arch. Fida TOUMA** suggested having an exhibition showing the previous attempts and the current design progress to be part of presentation for the site and also to have a showcase transferred to all people within a complete management plan because it's a new experiment.

#### **4. Summarizing and closing remarks, by Dr. Ahmad Rjoob**

**Mr. Rjoob** summarized the discussion and underlined the main suggestions; he also did a comprehensive review to the meeting and emphasized the final agreed points according to the discussion.

#### **5. Agreement points**

- **All of the attendees agreed the design of shelter.**
  
- **The design of trail is also agreed by the Advisory Committee with some recommendations regarding (entrance and platform without interpretation panels, widen the exit to avoid traffic jam, foundation of the poles, drilling inside pillars, the temporary platform lighting and shadow, insulation cover and temperature fluctuation).**
  
- **The attendees strongly recommended the maintenance importance.**

## 7-14. ACM Presentation Data (ACM1 - 4)

### Advisory Committee Meeting 1 for the Rehabilitation of Hisham's Palace, Jericho

#### Presentation of Design Process

August 3, 2015  
MoTA and JICA

#### CONTENS OF PRESENTATION

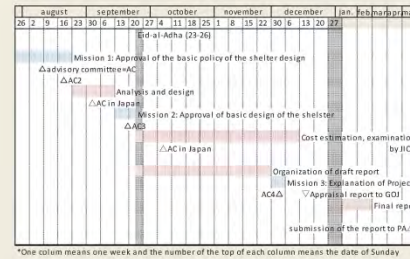
1. The purpose and the schedule of JICA mission
2. The objective of the Project
3. Requirement for the shelter
4. Site conditions
5. Design process
6. Options of the shelter
7. Study on progress

### 1. The purpose and the schedule of JICA mission

#### 1a. The purpose

- Confirmation of the background, objectives, and benefits of the Project.
- Evaluation of the Project from a technical, financial, social and economic point of view.
- Confirmation of components to be covered the Grant and the work by PA to implement the Project.
- Preparation of the Outline Design of the Project.
- Estimation of the cost of the Project.

### 1b. The schedule of the JICA mission



### 2. The objective of the Project

- Conservation of the mosaic on the floor of the Great Bath Hall of the Hisham's Palace and respect to the authenticity and integrity of the site
- Provision of appreciation of the mosaic to the visitors



### 3. Requirement for the shelter

#### 3a. The Client's requirement

- To be reversible
- To be light structure with simple design
- To be based on minimal intervention
- To be easy maintained and repaired
- To be in harmony with the surrounding environment
- To be respect environmental anti-seismic measures in the region

#### 3b. Requirement for conservation of heritage

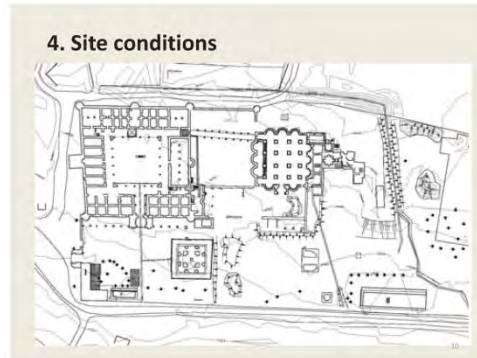
- To block direct sunlight
- To keep appropriate temperature and humidity
- To block rain water and stormwater
- To prevent flying sand not to damage the mosaic
- To prevent birds' and bats' nesting
- Not to disturb activities for conservation and maintenance

#### 3c. Requirement for appreciation of visitors

- Circulation for visitor considering the characteristics of the mosaic
- Appropriate lighting for appreciation: illuminance and color
- Appropriate interior: ceiling height and microclimate
- Interpretation and presentation of the Bath site
- To be accessible to all the visitors including the disabilities
- To ensure the safety of visitors

Fig. Requirements and design conditions

REQUIREMENT	DESIGN CONDITION
<b>Client's requirement</b>	
To be reversible	Light weight and removable steel or timber structure
To be light structure with simple design	Outside foundations of shelter and long-span structure
To be based on minimal intervention	Long-lasting and antifouling material and finish
To be easy maintained and repaired	Controlled natural lighting
To be harmony with the surrounding environment	Height, shape, texture and color of shelter
	Natural ventilation without machine
<b>Requirement for conservation of heritage</b>	
To block direct sunlight	Power and water supply, maintenance ladder
To keep appropriate temperature and humidity	Drainage system for rain and stormwater
To block rain water and underground water	Sand protection wall
To block sand not to damage the mosaic	Construction of cleaning method
To block bird and bee, their landing nest	No flat space for nesting inside of shelter
Not to disturb the conservation and maintenance	Lower wall to block light
	Height and shape of ceiling
<b>Requirement for appreciation of visitors</b>	
Considering the characteristics of the mosaic	No circulation over the mosaic
Appropriate lighting for appreciation	Close look at the mosaic and overview from perimeter
Comfortable interior	Interpretation panel and exhibition of mosaic
Interpretation of mosaic	Ramp or lift on circulation
To be accessible	



### 4a. Existing pillars

- There are seven concrete pillars and nine stone-covered pillars within the hall.
- These pillars have a risk to fall due to earthquake according to the past technical report.

- Two options for these pillars are considered : i) Reinforcement of these pillars, ii) Rebuilding of six concrete pillars and reinforcement using the rebuilt pillars.
- The solution shall be explored further.

### 4b. Foundations of the shelter

- The shelter needs foundation outside of the bath hall.
- The possibility of installation is shown as right.
- The investigation by MoTA is necessary on the proposed place.

### 4c. Scaffolding on the mosaic

- Scaffolding on the mosaic is necessary for the construction.
- Underground piping network exist below the mosaic.
- Some mosaic is apart the substrate and vulnerable.
- It is important to cure the mosaic, choose light-weight structure, repair the damaged mosaic after construction by MoTA.

### 5. Design process

### 5a. Design of circulation

Design policy which is confirmed through the discussion MoTA and JICA Team is follows:

- Circulation is one way.
- The main trail is installed around the perimeter of the bath hall.
- The trail is not installed Inside of the bath hall.
- Platforms where visitors can stay are installed on the Diwan and the center.
- Entry of trail is close to the hall entrance and exit is beyond bathrooms on the north.
- A circle trail above pillar top is option.



**Option 1: Basic plan**

- No obstacle in the hall.
- The platforms are rather far to the center
- Small platform with stairs down to the mosaic is option.

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**Option 2: Circle trail in center**

- Lots of view point inside
- Structural solution is necessary to support the trail

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**5b. Interior of the Shelter**

**5b-1. Type of Shelter**

**Type1: Open shelter**

- Only roof structure
- Direct sunlight and rainfall cannot be blocked completely
- No air-conditioned, only natural ventilation
- No control of entry
- Minimum maintenance

19

**Type2: Semi-enclosure**

- Roof and shade on sides
- Between open shelter and enclosure and wide range
- Direct sunlight and rainfall can be blocked completely
- No air-conditioned, only natural ventilation
- Control of entry and small security
- Small maintenance

20

21

**Type3: Enclosure**

- Roof and wall
- Direct sunlight and rainfall can be blocked completely
- Air-conditioned is available
- Tight security is available
- Maintenance is required

22

**5b-2. Lighting**

- There are two types of lighting: Obscure bright space by diffusion light, Dark space with spotlight on highlight.
- Diffusion light is popular for protecting shelter and spotlight is popular for museum.
- Spotlight emphasize the brilliant color of the mosaic but the control of light is rather difficult.

Sample of diffusion light

23

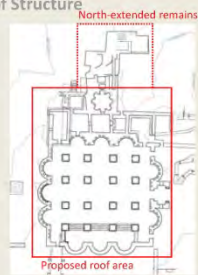
Sample photo of spotlighting

24

### 5c. Covering Area and Type of Structure

#### 5c-1. Covering Area

- The roof covers the hall and the Diwan.
- Additional roof over the discovered remains extending to the north needs further discussion.
- The reason to cover these remains are i) rainwater on these remains ,ii) its potential value.



25

### 5c-2. Type of structure

#### Type 1: Dome

- Very traditional structure with long history
- Dome doesn't almost create bending moment against gravity.
- Dome is applied to exhibition hall and sports arena.



26

#### Type 2: Truss

- Very popular and traditional structure
- Horizontal truss (below left) and sloped truss (below right) are optional depend on the interior.
- Horizontal truss creates stress of bending moment and sloped truss does small bending moment.



27

#### Type 3: Suspended Roof

- Modern structure to suspend girders from masts.
- Tension stress decrease the section of rods and girders.
- Interval supports aren't necessary during construction.
- Suspended roof system are applied on mall or factory because it save money.



28

### 5d. Material

#### 5d-1. Roof

	Top light	Translucent Roofing sheet
Material	Metal and cement formed roofing sheet	Membrane and Polycarbonate (PC) roofing sheet
Light	Indirect light, creating a shadow.	Diffusion light, no shadow.
Durability	- 20 to 30 years for zincalume color-coated steel sheet	- More than 40 years for PTFE membrane - PC sheet will get into yellow around 10 years.
Feature	- The installation is medium level work but has a risk of water leakage. - Thermal performance can be improved with heat insulation.	- The installation requires some special skill. - Some have thermal reflection and anti-fouling performance. - Low risk of water leakage due to monolithic membrane.

29

#### 5d-2. Shade Cladding

- There are wide options for shade claddings for ventilation: steel, aluminum, timber, ceramic, stone veneer, PC slat.
- Steel, aluminum and timber is prospective material in terms of light-weight.



30

- Green louver is environment friendly and might have cooling-effect but difficult to manage in hot climate.



31

### 5e. Other Building Factor

#### 5e-1. Security

- Semi-enclosure shelter is difficult for protection against burglar.
- Monitoring system might be installed based on 24-hours guard by the MoTA.
- External wall might be explored if necessary.



32



### 5e-2. Stormwater

- Stormwater from the surrounding area shall be drained away.
- The gutter will receive rainwater on roof also and be connected with the existing gutter.
- Sandy clay soil of the site tends to be low percolation rate.



33

### 5e-3. Birds and Bats

- Birds or bats have nest on the existing pillars.
- Birds droppings damage the mosaic and discomfort visitors.
- Flat space on structure shall be avoided or whole the structure shall be covered to prevent birds' nesting.



34

### 5e-4. Sand

- Flying sand will scratch the surface of the mosaic.
- It is important to block this flying sand with shade claddings suspended on perimeter.

### 5e-5. Utilities

- Water and power supply system are necessary for the operation of the shelter.
- City water cannot be provided during summer and water will be supplied by tank trucks.
- A water network shall be extended from the mosaic center based on the current system.

35

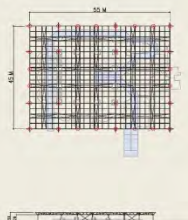
- The power demand for the shelter requires an amendment of contract with JDECO and it seems to be possible.
- Photovoltaic generation is an option in terms of energy saving and power interruption.
- A service house shall be necessary for those utilities and installed aside the shelter.
- A maintenance ladders and corridors for ceiling or fittings are necessary.

36

## 6. Options of the shelter

### Option 1: Truss System

- Two-direction horizontal truss beam system.
- Rectangular roof plan
- Options for roof material are membrane or metal, cement formed sheet.
- Roof set on the structure.



37

### Technical Information, Option 1

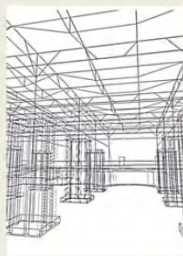
- Roof area: 2,475 sqm (55mx45m)
- Structure height: 9m
- Ceiling height: 7.2m
- Nos. of foundation: 16
- Wt. of structure: 201ton (81kg/sqm)



38

### Features, Option 1

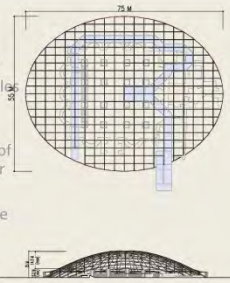
- Its production and erection on site is not so difficult but required large tower cranes.
- The structure is covered with roof and has less degradation due to UV and rain.
- Its exterior appearance consists with only flat roof and claddings and looks simple.
- Rebuilding of columns is required.



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### Option 2: Timber Dome

- Timber and steel joint are formed in a lattice basket.
- Rigidity of steel joint enables simple design without braces.
- Ring beam joint the edge of the dome together to bear thrust of dome.
- Roof material is membrane and set on the structure.
- Rising the dome enables entrance and ventilation



40

### Technical Information, Option 2

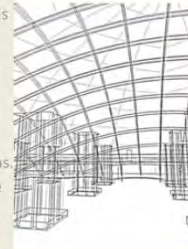
- Roof area: 3,238 sqm (75m x 55m)
- Structure height: 15m
- Ceiling height: 5.2 to 14.5m on center
- Nos. of foundation: continuous found.
- Wt. of structure: 192ton (59kg/sqm)



41

### Features, Option 2

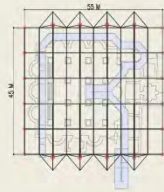
- Its production and the erection is rather easy using small cranes.
- Structure is covered with roof and less degradation due to UV and rain.
- Its shape looks a mountain and harmonized easily with the surrounding. However the roof looks large compared other plans.
- Its interior is impressed with the lattice-pattern curved surface. And timber structure is impressed warmly.
- Choice of roof material is limited.



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### Option 3: Suspended Roof

- Steel masts set outside the bath hall suspending girders. The masts are reinforced with tension rods.
- Girders are simple H-shape sections. Columns are reinforced with braces.
- Rectangular roof plan
- Roof material is metal sheet and membrane as option and set below the structure.



43

### Technical Information, Option 3

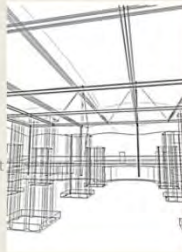
- Roof area: 2,475 sqm (55m x 45m)
- Structure height: 18m (mast)
- Ceiling height: 7.5m
- Nos. of foundation: 20
- Wt. of structure: 123ton (50kg/sqm)



44

### Features, Option 3

- Its production and the erection are rather difficult but doesn't need heavy crane.
- Structure is exposed and has more degradation due to UV and rain.
- Its masts with tension and suspension rods are very impressive and have more impact on its surrounding environment.
- In case of membrane roof, technical issues on joint and on supporting the visitors' bridge.
- The structure can be expanded to longitude direction in future.

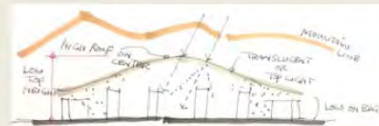


45

### 7. Study on progress: Option 4

The design will be studied further based on the following principles for the shape of the shelter:

- Low edge of roof to make the volume of building look smaller
- High rooftop for interior space: the height shall be decided carefully.



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The design will be developed further with clarification of treatment of existing pillars, roof area or other relevant factors.

The structure shall be decided to realize the shape and the plan of roof to meet the following conditions:

- To find the possible foundation place in terms of archaeological remains.
- To try to minimize the weight and visual perception of structure
- To find the appropriate possible construction method



47

Thank you for your attention.

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**Advisory Committee Meeting 2 for  
the Rehabilitation of Hisham's Palace, Jericho**

**Presentation of Design Process**

**August 19, 2015  
MoTA and JICA**

**CONTENTS OF PRESENTATION**

**Part 1. Review of the ACM1**

1. JICA program
2. The objective of the Project
3. Requirement for the shelter
4. Site conditions
5. Design factor

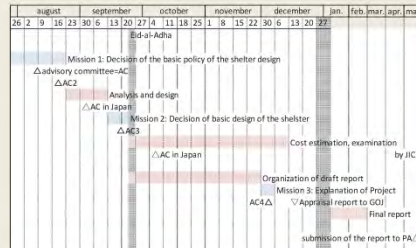
**Part 2. Presentation for ACM2**

6. Trail design
7. Shelter design

**Part 1. Review of the ACM1**



**1. JICA program**



\*One column means one week and the number of the top of each column means the date of Sunday

**2. The objective of the Project**

- Conservation of the **mosaic** on the floor of the Great Bath Hall of the Hisham's Palace and respect to the authenticity and integrity of the site
- Provision of **occasions of the appreciation** of the mosaic to the visitors



**3. Requirement for the shelter**

**3a. The Client's requirement**

- To be **reversible**
- To be **light** structure with **simple** design
- To be based on **minimal intervention**
- To be **easy maintained** and repaired
- To be in harmony with **the surrounding environment**
- To be a strong structure with anti-seismic measures in the region

**3b. Requirement for conservation of heritage**

- To block **direct sunlight**
- To keep appropriate **temperature and humidity**
- To block **rain water** and stormwater
- To prevent flying **sand** not to damage the mosaic
- To prevent **birds' nesting and droppings**
- Not to disturb activities for conservation and maintenance



**3c. Requirement for appreciation of visitors**

- Circulation for visitor considering **the characteristics** of the mosaic
- Appropriate lighting for appreciation: **illuminance** and color
- Appropriate interior: **ceiling height** and **microclimate**
- Interpretation and presentation of the Bath site
- To be accessible to all the visitors including **the disabilities**
- To ensure **the safety** of visitors

Design conditions shall be organized according to those requirement as below

REQUIREMENT	DESIGN CONDITION
<b>Client's requirement</b>	
To be reversible	Light-weight and removable steel or timber structure
To be left structure with simple design	Outside foundations of shelter and long-span structure
To be based on minimal intervention	Long-lasting and antifouling material and finish
To be easy maintained and repaired	Controlled natural lighting
To be harmony with the surrounding environment	Height, shape, texture and color of shelter
	Natural ventilation without machine
<b>Requirement for conservation of heritage</b>	
To block direct sunlight	Power and water supply, maintenance ladder
To keep appropriate temperature and humidity	Drainage system for rain and stormwater
To block rain water and underground water	Wind protection wall
To block sand not to damage the mosaic	Instruction of cleaning method
To block bird and bat, their building nest	No flat space for nesting inside of shelter
Not to disturb the conservation and maintenance	Cover wall to block light
	Height and shape of ceiling
<b>Requirement for appreciation of visitors</b>	
Considering the characteristics of the mosaic	No circulation over the mosaic
Appropriate lighting for appreciation	Close look at the mosaic and overview from perimeter
Comfortable interior	Interpretation panel and exhibition of mosaic
Interpretation of mosaic	Ramp or lift on circulation
To be accessible	

## 4. Site conditions

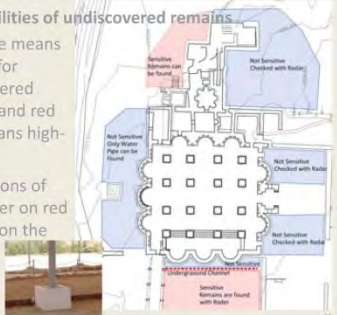
### 4a. Existing pillars

- The existing pillars have a **risk to fall** due to earthquake according to the past technical report.
- The method of the reinforcement of existing pillars is being explored.



### 4b. Possibilities of undiscovered remains

- Blue zone means low-risk for undiscovered remains and red zone means high-risk.
- Foundations of the shelter on red shall set on the ground.



### 4c. Vulnerable mosaic surface

- Some parts of the mosaic is vulnerable and have **risks of damages** even if you **just step on** them.
- The problem is where should the scaffolding for construction stand.



## 5. Design factor

### 5a. Type of Shelter

#### Type1: Open shelter

- Only roof structure
- Direct sunlight and rainfall cannot be blocked completely.
- No air-conditioned, only natural ventilation
- No control of entry
- Minimum maintenance



#### Type2: Enclosure

- Roof and wall
- Direct sunlight and rainfall can be blocked completely.
- Air-conditioned is available
- Tight security is available
- Maintenance is required



#### Type3: Semi-enclosure

- This type is between open shelter and enclosure.
- Direct sunlight and rainfall can be blocked completely.
- No air-conditioned, only natural ventilation
- Control of entry and small security
- Small maintenance





### 5b. Lighting

- Obscure bright space by diffusion light from **translucent membrane**
- There is **no shadow** and this type of lighting is applied to many protecting shelter



17

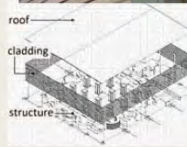
- Contrasting bright space with **roof light**
- There are **shadow and bright** part and this type lighting is applied to many museum.



18

### 5c. Cladding

- There are wide options for claddings for ventilation: steel, aluminum, timber, ceramic, stone veneer, PC slat.
- **Steel, aluminum and timber** is prospective material in terms of **light-weight**.



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## Part 2. Presentation for ACM2

20

## 6. Trail design

### 6a. First proposal

- Basic idea of circulation



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### 6b. Second proposal, small trail network on the mosaic

- Visitors can walk inside of bath hall.
- Trails on the hall disturb the view from outside trail and hide the mosaic

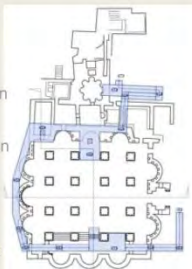


22

### 6c. Additional requirement

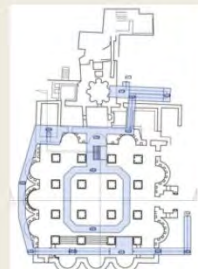
- The trail is installed only around the perimeter.
- Platforms where visitors can stay are important.
- Exit is beyond bathrooms on the north.

Third proposal option #1 based on those requirement is the right figure.



23

Option #2 is option #1 plus high level circle trail

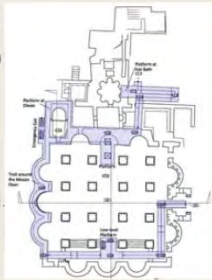


24

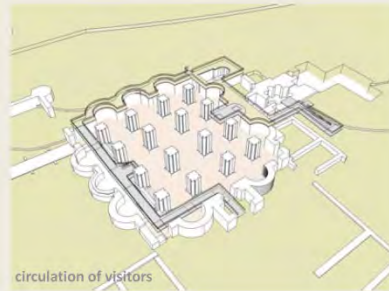
**6d. Additional requirements after ACM1**

- Winding trails bring a fun to the visitors.
- The views of the niches are important.
- High-level trail is NG in terms of safety.
- Fire escapes are required.

Fourth proposal based on those requirement is the right figure.



25



circulation of visitors

26

**material of trail**

- floor material: steel or FRP grating, timber and tempered glass
- handrail: timber
- balustrade: glass panel or steel



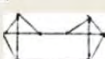


27

**7. Shelter design**

**7a. First proposal**

Three prototype of long span structures:

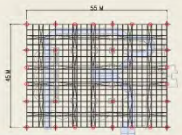
- Truss system 
- Dome 
- Suspension system 

First proposal was developed using these three structures.

28

**Option 1: Truss system**

- Traditional and popular system, easy-manufactured but erected by big cranes



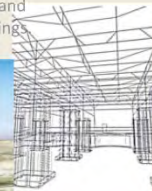
human eye view

29

- Box-shaped shelter looks simple and have a bit impact on the surroundings



bird eye view

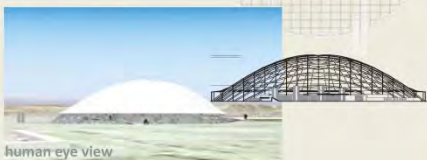


interior image

30

**Option 2: Dome**

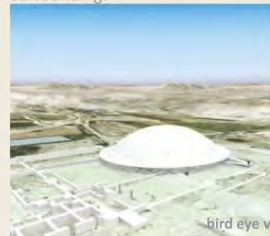
- Traditional but modern method using light-weight timber, erected with small cranes.
- Continuous foundation are required



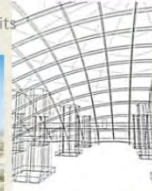
human eye view

31

- Mountain-shaped shelter looks simple and easy-harmonized with its surroundings



bird eye view



interior image

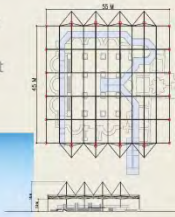
32

**Option 3: Suspended roof**

- Modern structure, light-weight and a few masts
- Structure is exposed to sunlight



human eye view

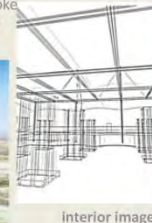


33

- A row of masts is impressive and evoke image of sail boat, a bit impact on the surroundings.



bird view



interior image

34

**7b. Second proposal**

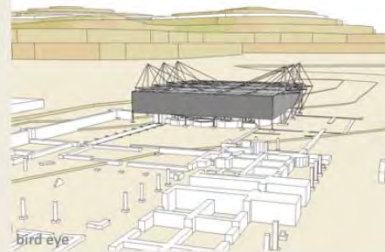
MoTA and the consultant have reached the following policies through a series of discussions

- **Low edge of roof** to make the volume of building look smaller and high rooftop for interior space
- **Light-weight** structure and adequate foundation setting and **construction method** for restrictions of the heritage site

Three plans have been designed based on the "Dome" and "Suspended roof" as follows:

35

**Option 1: Suspended roof**



bird eye

36



From entrance, human eye

37



Close look, human eye

38



- Building height: 18m (top of mast)
- Ceiling height: 9m
- Roof area: 2,298 sqm.
- Shading area: large

39

**Feature of suspended roof**

- Slightly bigger impact to the scenery and large shade area
- Structure to be exposed to sunlight
- Metal roofing sheet is available. Membrane roof is also possible.

40



Option 2: Suspended arch



bird eye

41



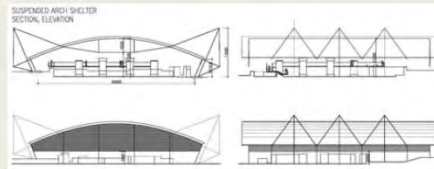
From entrance, human eye

42



Close look, human eye

43



SUSPENDED ARCH SHELTER  
SECTION, ELEVATION

- Building height: 14m (top of mast)
- Ceiling height: 11m (7m space below beam)
- Roof area: 2,322 sqm.
- Shading area : middle

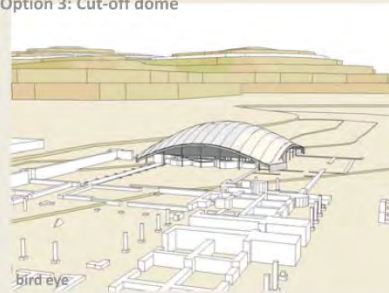
44

Feature of suspended arch

- Middle impact to the scenery and middle shade area
- Structure to be partially exposed to sunlight
- Membrane roof and metal roofing sheet are available.

45

Option 3: Cut-off dome



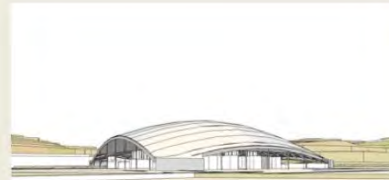
bird eye

46



From entrance, human eye

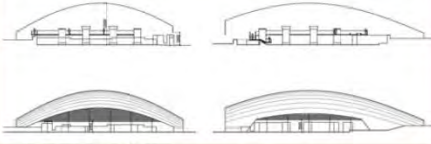
47



Close look, human eye

48

CUT-DOME SHELTER  
SECTION, ELEVATION



- Building height: 12m
- Ceiling height: approx. 12m
- Roof area: 2,490 sqm.
- Shading area: small

#### Feature of cut-off dome

- Low impact to the scenery and small shade area
- Structure to be hidden from sunlight
- Membrane roof is available and metal roofing sheet is also possible
- Internal support might be required

Thank you for your attention.





#### 4. Trail design

We have many opinions and suggestions as follows:

- To be one-way for control of visitors
- To provide optional route for visitor's fun
- To provide platform at some unique pattern of the mosaic
- To allow visitors for occasion of close look of the mosaic
- To control of the number of visitors within the shelter
- To minimize the trail over the mosaic
- To install a glass floor over the mosaic without shelter
- To provide movable platform over the mosaic for close look
- To set the entry of the trail on the bath hall's entrance
- To provide winding trial over the wall for look of thrones , and others

9

The trail layout shown on right figure has been proposed based on those many requirement.



10



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#### 5. Shelter design

##### 5a. Prototype of long span structures

Among three prototype of long span structures:

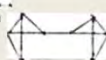
- Truss system



- Dome



- Suspension system



Dome and suspension system has been chosen because they have small impacts on scenery and light weight of structures.

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##### 5b. Basic Policy of shelter

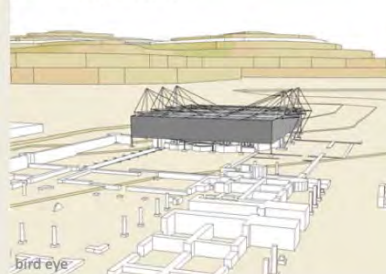
MoTA and the consultant have reached the following policy through a series of discussions

- **Low edge of roof** to make a volume of a shelter look smaller
- **Light-weight structure and construction method** for restrictions of the heritage site

Three plans have been designed based on the "**Dome**" and "**Suspended roof**".

13

##### Option 1: Suspended roof



14



From entrance, human eye

15



Close look, human eye

16

**Feature of suspended roof**

- Box-shaped and impressive masts, large shade
- Slightly bigger impact to the scenery
- Structure to be exposed to sunlight
- Simple interior: flat ceiling and no structure inside
- Small number of foundation

Close look, human eye

17



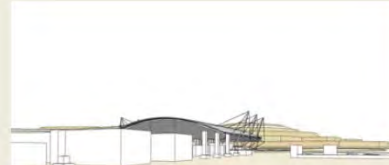
- Building height: 18m (top of mast)
- Ceiling height: 9m
- Roof area: 2,298 sqm.
- Shading area: 1,353 sqm

18

**Option 2: Suspended arch**



19



From entrance, human eye

20



Close look, human eye

21

**Feature of suspended arch**

- Vault roof and impressive masts
- Middle impact to the scenery
- Structure to be partially exposed to sunlight
- Vault ceiling and big truss beam inside
- Small number of foundations

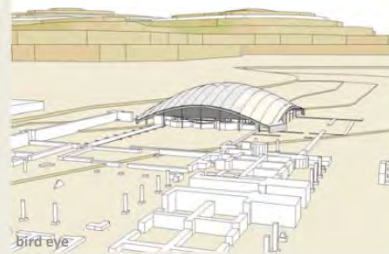
22



- Building height: 14m (top of mast)
- Ceiling height: 11m (7m space below beam)
- Roof area: 2,322 sqm.
- Shading area : 870 sqm.

23

**Option 3: Cut-off dome**

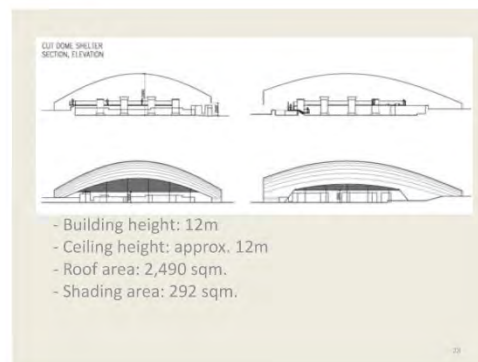


24



**Feature of cut-off dome**

- Mountain-like shape and small shade area
- Low impact to the scenery
- Structure to be hidden from sunlight
- Exposed structures inside and organic shape of ceiling
- Continuous foundation is needed



We have received wide range of opinions including **zero-option** and reconstruction of the **original dome**. Some of the opinions are shown as below:

- To be designed in consideration of **hot summer**, **energy-saving** and bird protection
- To have appropriate **volume** and proportion of shelter
- To be designed in terms of **acoustic** environment
- To be harmonized with mountainous **scenery** and Umayyad cultural **context**
- To have functional cladding for **natural ventilation** and bird protection, **open view from interior**

Lots of positive opinions have been gathered on **cut-dome options** at the end of meeting.

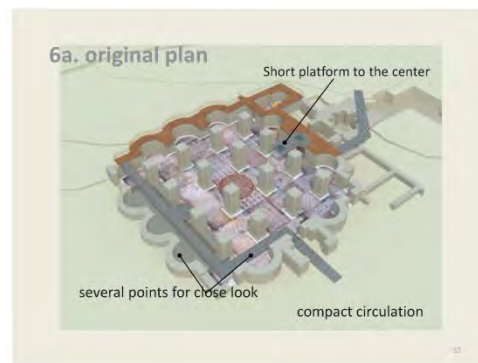
**Part 2. Presentation for ACM3**

**6. Trail Design**

We have got several opinions on the proposed trail layout from sightseers viewpoint as follows:

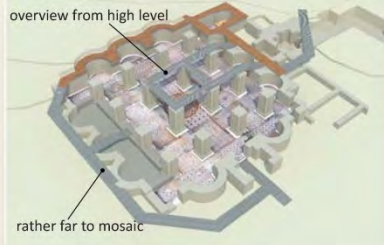
- The entry of trail on the bath hall might provide some effects on visitor's impression.
- The trail through the pool might hide valuable remains.
- The view from high-level trail can provide a bigger fun to visitors.

We developed alternative plan according to those opinions and show each features.



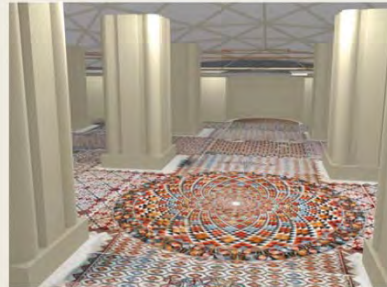
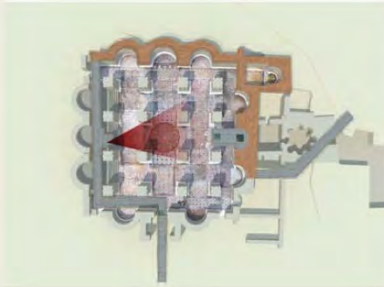
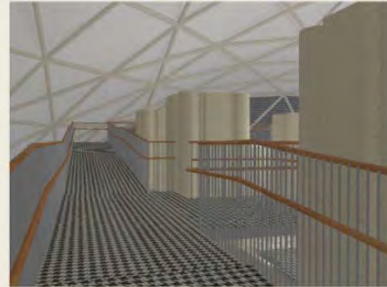
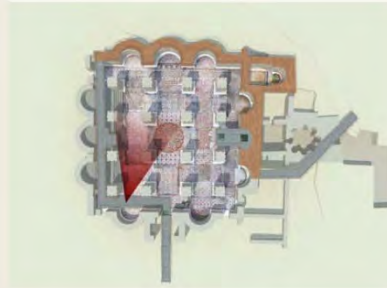
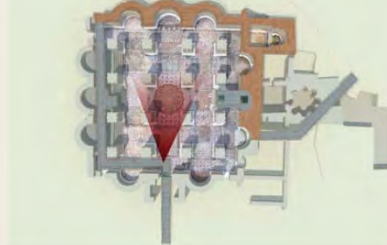


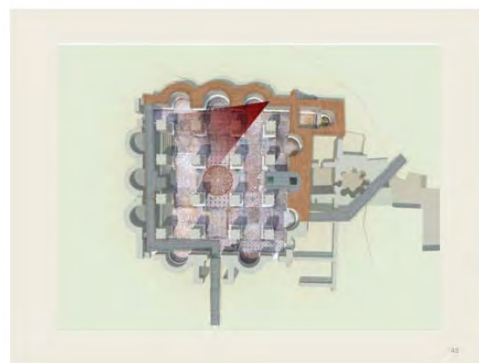
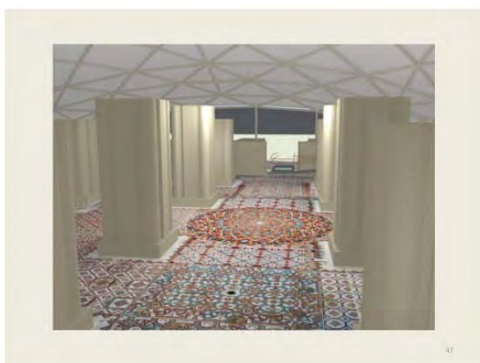
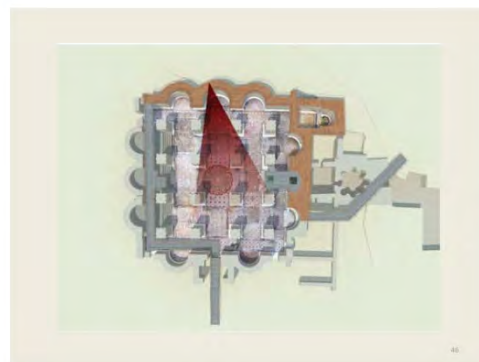
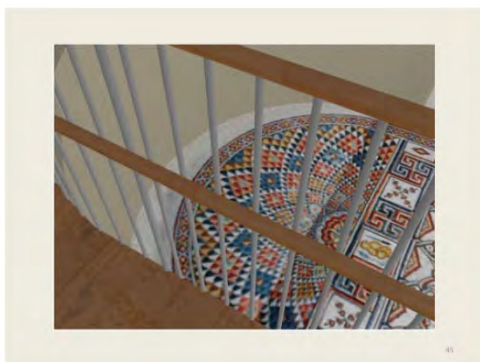
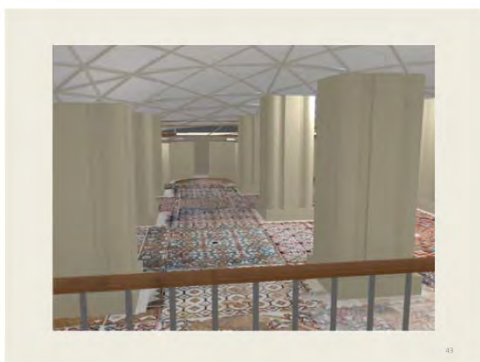
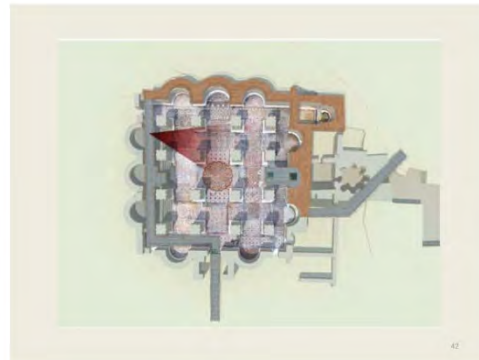
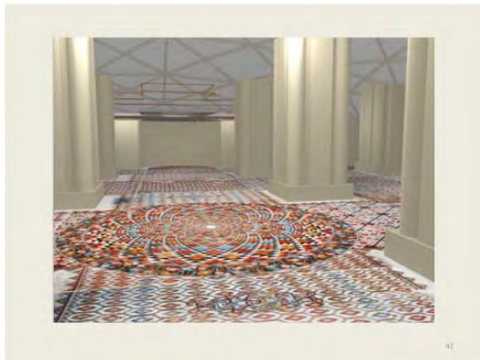
6a. alternative plan

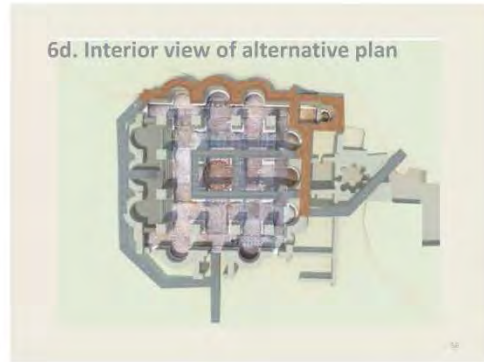
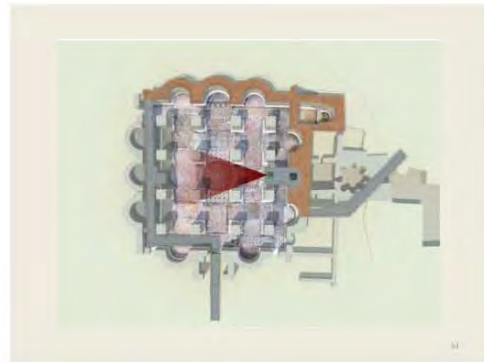
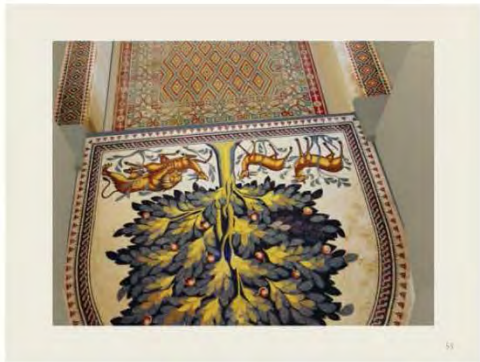
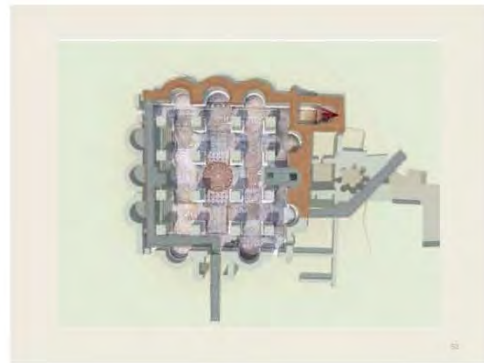
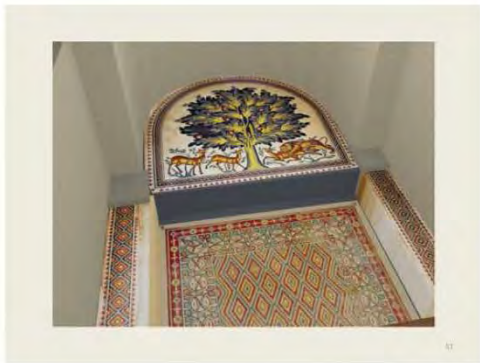
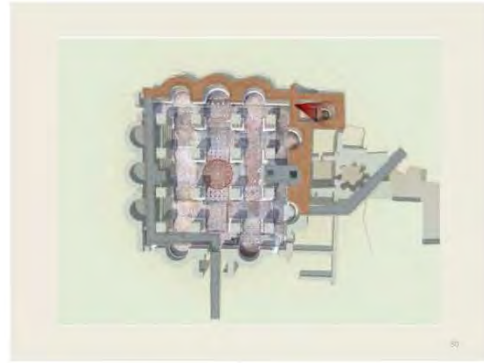


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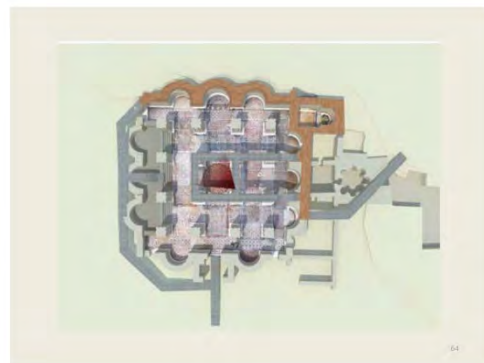
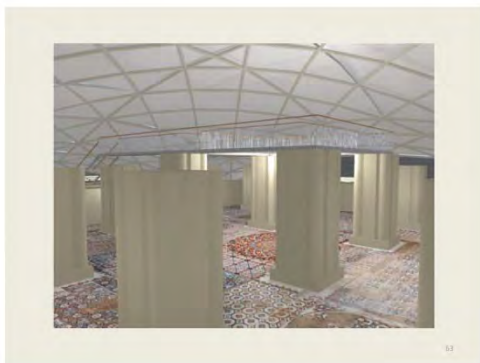
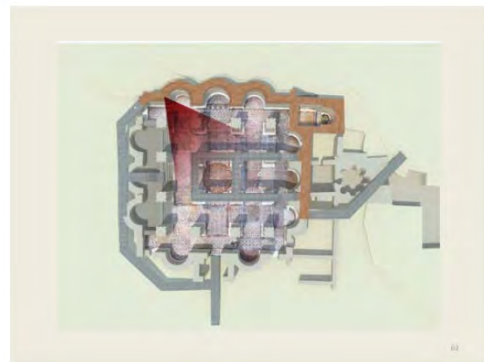
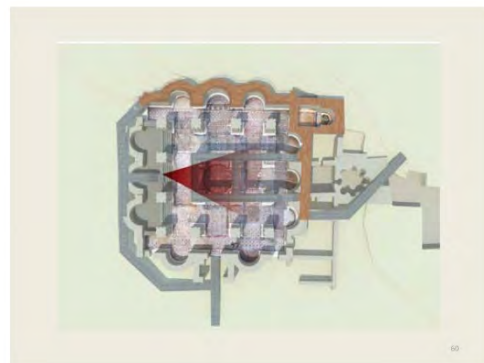
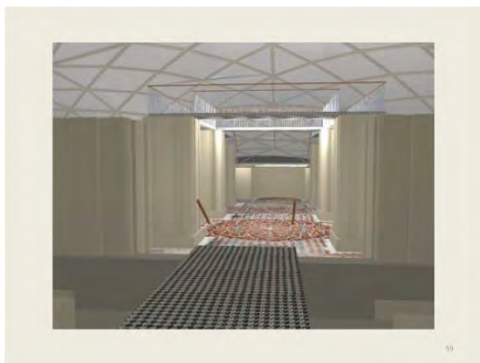
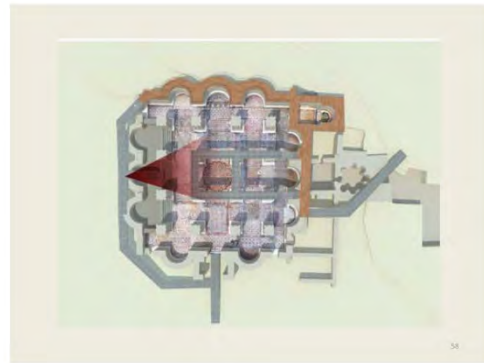
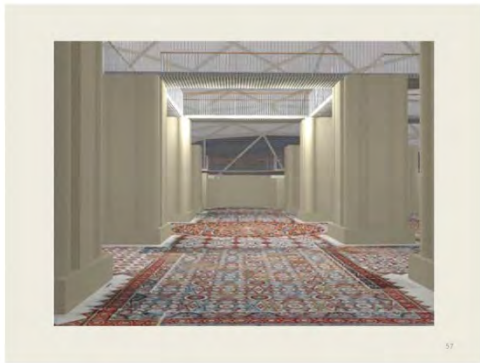
6c. Interior view of original plan

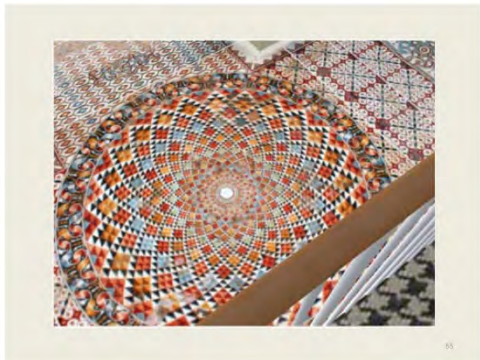












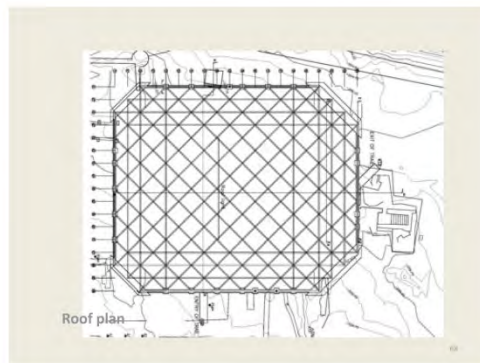
65



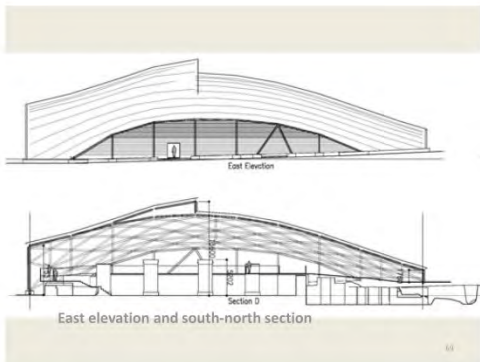
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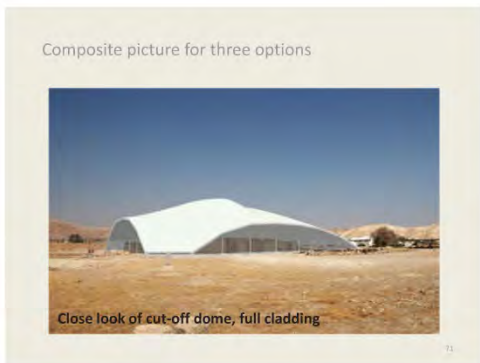
68



69



70



71



72





Close look of suspended roof, half cladding

73



View from entrance of cut-off dome

74



View from entrance of suspended arch

75



View from entrance of suspended roof

76

## 8. Interior environment and material

### 8a. Learning from the microclimate data of Diwan

Exposure to the sun, rain and other exterior environment will damage on mosaic. The protective shelter will minimize this damage and we can anticipate the effect of the shelter in the same level of Diwan.



77

The condition of mosaic in Diwan has been kept during more than 50 years within shelter which is made with stone wall and light-weight mud roof.

#### a) Illuminance

As the illuminance of Diwan is less than 370 lx, Our target illuminance shall be set at less than 500 lx.



78

#### b) Fluctuation of temperature and humidity

The microclimate data from 28th July to 5th August suggests that the shelter can reduce the difference of temperature and humidity of Diwan's interior and keep the condition of mosaic. We shall aim to reduce the difference of temperature in same level of Diwan.

	Average high temp.	Average low temp.	difference
exterior	45.9deg C	35.5deg C	10.4deg C
1.5m above of floor	39.8deg C	32.4deg C	7.4deg C
surface of floor	37.6deg C	32.8deg C	4.8deg C

	Average high humid.	Average low humid.	difference
exterior	60.0%	17.6%	43.3%
1.5m above of floor	56.5%	21.3%	35.2%
surface of floor	54.0%	23.0%	31.0%

79

#### 8b. Roof material

Exterior illuminance without cloud exceed 100,000 lx. As membrane let around 15% of sunlight through, the interior illuminance exceed 10,000 lx. This is not good for conservation of mosaic.



80

Two options for dome-shaped roof:

a) Traditional overlapping method of ceramic, timber and stone

b) Modern method of metal

Traditional material is heavy, low waterproof or bad thermal performance.



81

Among variety of metal, we have three options as follows in terms of cost and durability:

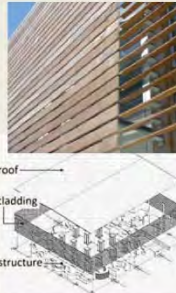
type	color	durability	remark
PVDF coat steel	wide range of color	less than 20 years	weak against sand scratch
PVF (polyvinyl fluoride) film steel	wide range of color	more than 20 years	
stainless sheet (SUS304)	metal color	more than 30 years	glittery



82

### 8c. Cladding

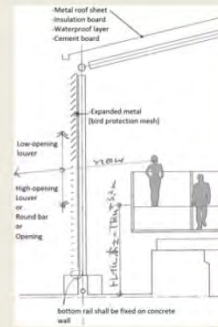
- Louver and bird protection mesh (expanded metal)
- Prospective material of louver are **steel, aluminum and timber** in terms of light-weight.



83

### Range and design of cladding

- Combination of above area and below area
- Entry and exit, underground-remain shall be protected with other method.
- Full closure decreases visibility.



84

Thank you for your attention.

85





### 3. Environment and social consideration

According to the environmental analysis by the collaboration with EQA, serious negative impacts by this Project are not expected except noise, exhaust gas and solid waste during the construction and impact on surrounding scenery.

sample of forms of IEE

### Mitigation measures for impacts

For impact during construction: **Safety management plan** and firm operation in compliance with this plan



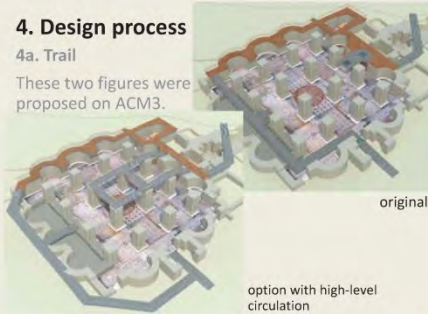
For impact on scenery: Design shall be **decided carefully according to opinions by professionals and stakeholders**



### 4. Design process

#### 4a. Trail

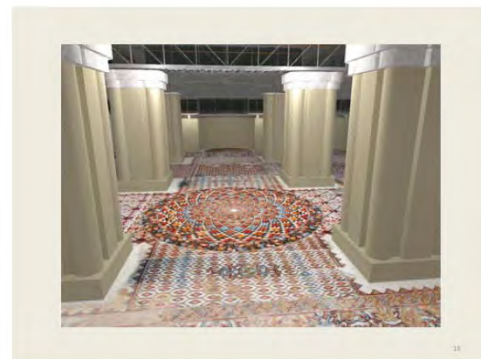
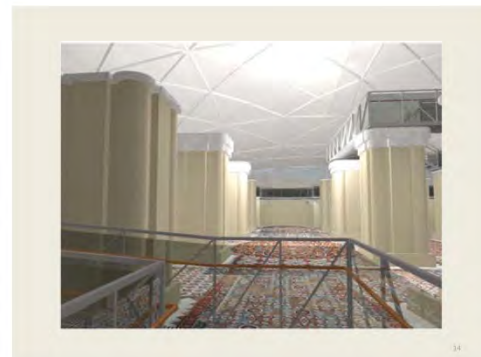
These two figures were proposed on ACM3.



### FINAL TRAIL CIRCULATION

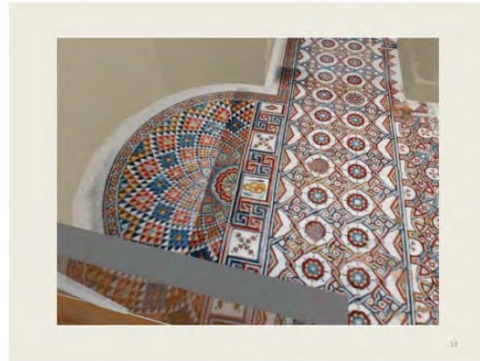
The trail design has been developed with the following idea:

- **High-level trail** is shortened not so as to be seen from the entrance.
- **The direction of entry** is aligned north-south axis so as to ease access from the mosque site.
- **Entrance stage** for information to visitors is added.
- **Exit trail** is not set aside remains.





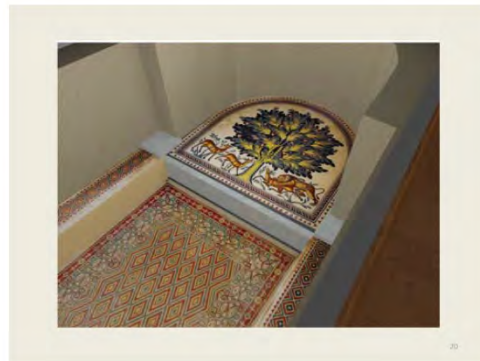
17



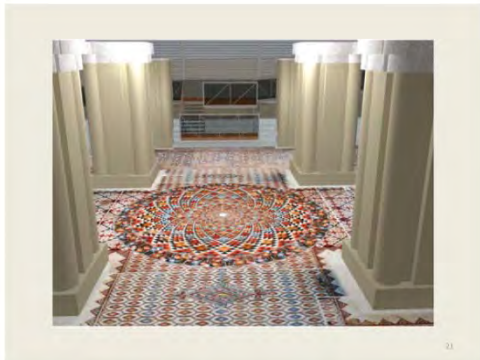
18



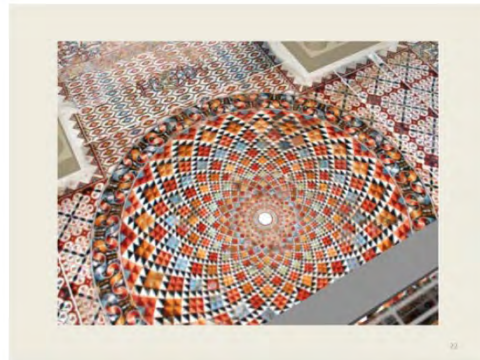
19



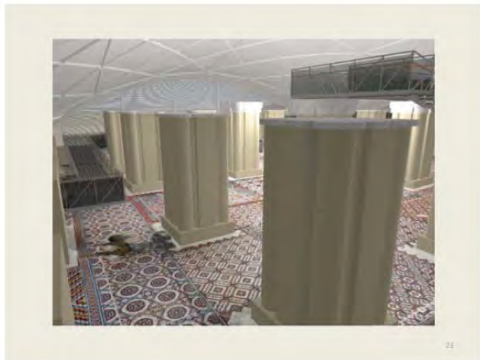
20



21



22



23

**4b. Shelter**

Since July we have had three advisory committees, two public consultations and four domestic committees in Japan. Through these committees and working discussion within the team of MOTA and consultants, many types of shelters have been created.

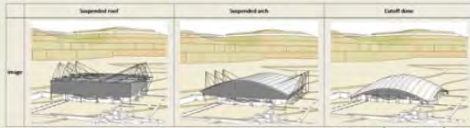
Truss	Dome	Suspended roof

first proposal

24

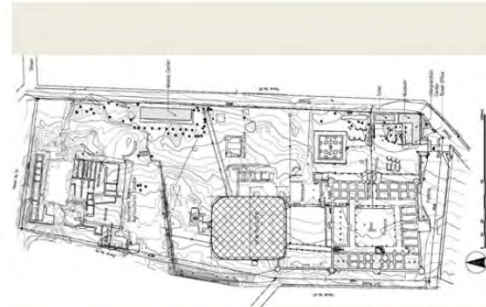


Shelter types have been checked in terms of shape, construction and cost and we found that a **round-shaped** shelter tends to be more acceptable than a boxed-shaped and a **small-volume** shelter than large-volume. And finally cut-off dome shelter has got major agreement.



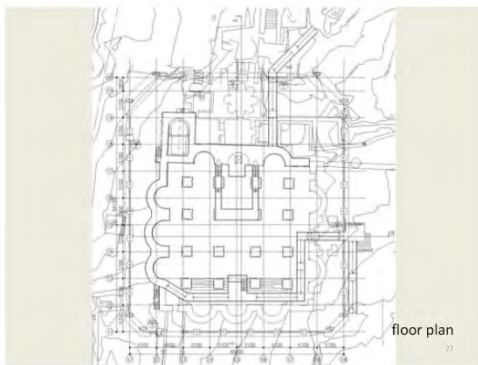
second proposal

25



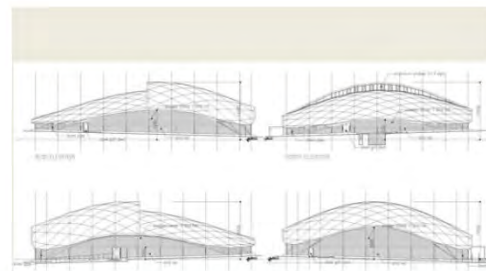
site layout plan

26



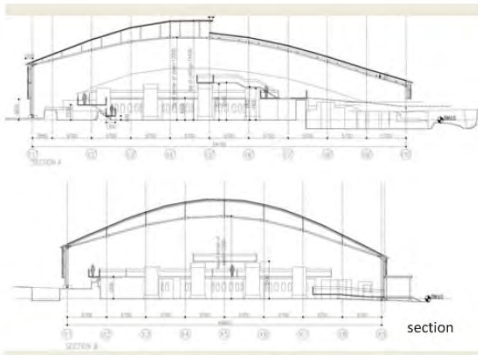
floor plan

27



elevation

28



section

SECTION 3



bird-eye view

30



view from the Palace

31



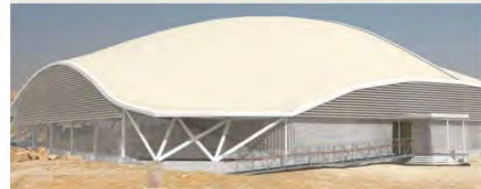
view from entrance

32



human-eye view

In response to the request to enable visitors look through the shelter outside and inside so that visitors can feel the connectivity between the bath and whole site, the edges of the roof are rolled up.



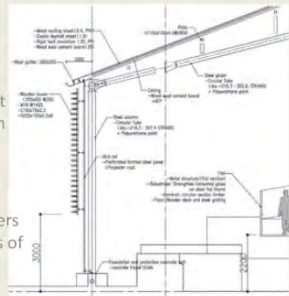
close look of side face

## 5. Material

### 5a. Exterior finish

Roof: **Light-weight metal roofing sheet** with heat insulation blocks the sun

Cladding: **Wooden louver** and **bird-protect screen** covers four-sides openings of the shelter.



Options for bird-protect screen are i) **expanded metal** on right picture and ii) **perforated formed steel** on left in terms of durability.

Expanded metals have higher opening ratio and transparency than perforated formed steels.



A low opening-ratio perforated steel can protect rain and flying sand at a certain level and has also an advantage that it needs fewer substrate steel.

On this outline design we have decided perforated formed steels for bird protect screen in consideration with these features.



### 5b. Trail

Frame : Small-section steel structure enables 10m-span bridge-like trail.

Balustrade: **Glass panel** doesn't block the visitors' view.

Floor: **Timber deck** as general and steel grating panel above mosaic are applied.

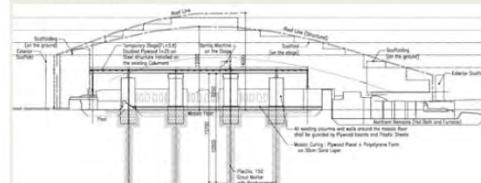


## 6. Prevention against damages on remains

In order to prevent damages, the following steps will be taken.

1. To record the current situation on a rectified digital map to be prepared on this Project
2. To repair current damages on the mosaic and remains
3. To cover the mosaic and sides of pillars with plywood panels
4. To install a temporary platform on pillars
5. To reinforce pillars with boring machines on the platform
6. To set scaffoldings on this platform
7. To demolish the platform and remove from a hole on the roof
8. To confirm the situation of the remains by comparison with the original situation and repair the damages due to the construction with MOTA's technical assistance

Temporary platform will be made with steel section and thick plywood panel on reinforced pillars shown as the below section. The live load of platform is 3.0kN/m<sup>2</sup> to bear the weight of small machines, scaffolding and steel structures.









2) Training of daily cleaning and maintenance activities in the shelter, in order to minimize the risk of degradation of mosaic due to exposure from the ground.

- How to record and find the problem using the damage map
- How to take first aid treatment

A manual in Arabic to illustrate the contents of this instruction will be developed.



91

Thank you for your attention.

92

## 7-15. PC Minutes of Meetings (PC1,2)

PCM1

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**Rehabilitation of Hisham Palace / Jericho**  
**Protective shelter project of the Great Bath Hall / Hisham Palace**  
**Meeting minutes**

Public Consultation Workshop

Ministry of Tourism and Antiquities in cooperation with the Japanese International Cooperation Agency (JICA)

**Date:** 08/09/2015

**Time:** 11:00-14:00

**Place:** interpretation hall / Hisham Palace / Jericho

**Meeting goal:** engaging the local community in the preparations of the protective shelter of the Great Bath Hall in Hisham Palace and listening to different views so as to bring out a perfect design convenient with the surrounding environment. The meeting aimed also to benefit from the comments of participants and to have their support to the project.

The attendees:

Name	Institution/sector
Zahi Barahmeh	Jericho Municipality
Khalil al-Walji	Tourist Guide
Moheisen Abu Rahmeh	Tourist Guide
Awad al-Yamani	Tourist information center
Mavsaa Barhameh	Directorate of education
Heba Meshaal	JICA- Jericho
Karima Drei'aat	Cooperative Association in Jericho and Jordan Valley
Maher Drei'aat	YMCA- UTC
Razan Khalil Awatleh	Nu'vmeh Cooperative Association for handicrafts development
Khalil Awatleh	Nu'vmeh Cooperative Association for handicrafts development
Wa'd Drei'aat	Nu'vmeh Cooperative Association for handicrafts development
Sahar Drei'aat	Nu'vmeh Cooperative Association for handicrafts development
Ahd Drei'aat	Nu'vmeh Cooperative Association for handicrafts development
Rusailah Husein	Nu'vmeh Cooperative Association for handicrafts development
Raja'i Saleh	Aqabat Jabr Camp
Nour Daraghmeh	Ministry of Tourism and Antiquities/Hisham Palace receptionist
Marvam Manasra	Ministry of Tourism and Antiquities/Hisham Palace receptionist

Welcoming:

Mr. Ihab Haj Daoud, Vice director general of Conservation and sites management/MoTA had welcomed the attendees, he also thanked the attendees, individuals and institutions.

He thanked the partners in JICA for adopting the project and for their continuous support for both

tourism and Antiquities sectors in Palestine.

He also highlighted the difference between the current project and other previous attempts, where the work is done by Matsuda consulting Co, a Japanese engineering consulting office, in cooperation and coordination with the staff of the ministry, as well as the formation of an advisory committee of experts representing a number of relevant institutions such as UNESCO, Jericho Municipality, Universities and other institutions working in the field of cultural heritage and Antiquities in order to keep up with the project and provide technical support and opinion to the working staff.

In addition to engaging the local community in the different phases of the project indicating that the Ministry and the Japanese team are looking forward to knowing the opinion and the view of the local community about the project and also knowing their expectations which will help pushing the project forward.

Finally, he invited the attendees to watch a documentary film about Hisham Palace.

The management of Hisham Place site and the developing projects:

Eng. Ihab Haj Daoud presented an introduction about the most important developing projects implemented in Hisham Palace where he emphasized the site management, the obstacles and the strengths, and the available opportunities for the project.

He also mentioned the projects implemented by the ministry such as the project of 2008; the rehabilitation of the reception hall, the interpretation hall, the site museum, canopies, seats, restrooms, the site gate.

The project included also installing tracks, directional and introductory panels, rehabilitation of the bridge, the road leading to the palace and rehabilitation of the parking for cars and busses.

In 2014-2015, because of discovering new remains through joint excavations between MoTA and Chicago university, the site museum was rehabilitated and the site was provided by directional, interpretation and caution signs. Furthermore, he referred to the ongoing project which is the project of uncovering and protecting the Mosaic of the Great Bath Hall in Hisham Palace.

The protective shelter project of the Great Bath Hall / Hisham Palace

Eng. Mohammad Diab, director of conservation department/MoTA presented the previous preservation process of the mosaic in Hisham Palace, and introduced a description of the site, its history, its facilities and the mosaic floors at the Hall. As well, he highlighted the magnificence and accuracy of these floors and gave an explanation about the mosaic school which was built up to graduate experts and qualified technicians to work on the preservation and the restoration of the mosaic, where the mosaic of the Great Bath was discovered later, then some of its parts had been restored, documented and recovered using special techniques till finding better solution to uncover it for visitors.

Besides, he listed the previous three attempts to cover the Great Bath Hall (by sheltering). None of

these projects had been executed because it didn't meet the preservation requirements, the vision of MoTA and the local community.

Currently, in 2015 we are aiming to reach an optimal solution to cover the Great Bath hall to protect and present the mosaic.

Then, he started presenting the ongoing project to be implemented by the Japanese team starting by describing the requirements of the design as the following:

- **Conservation requirements**
- **Owner requirements**
- **Visitors requirements**

The design components:

- **Visitors trail**
- **The shelter**

He finally presented the designs prepared by the Matsuda Company about the project.

Conclusion

Dr. Ahmad Rjoob, acting general director of the southern governorates, brought to attention the importance of the project and the importance of engaging the local community as one of the project most important pillars, where the real return is going to be for the benefit of the local community, where the site of Hisham Palace is a treasure of the city of Jericho having an international significance and will be nominated to be one of the world heritage sites in the future.

Till now, stockholders don't have the courage to uncover the mosaic because they fear not to be able to protect it, and the conservation is our first priority then the development of the site. So the cooperation between MoTA, JICA through Matsuda Company would help to shed the light on points of view of the attendees towards the above project description by answering the following questionnaire:

The attendees were divided in two groups to answer the questions and after an interactive discussion; both groups presented the results as the following:

- 1. Both confirmed that Hisham Palace is a human, historic and Islamic symbol, a valuable wealth and a source of pride.**
- 2. The first group clarified that two of seven knew about the existence of such a valuable mosaic in the palace and the second said that five of seven knew about the mosaic floor but they didn't know that it is the largest mosaic in the Middle East.**
- 3. Both confirmed their well to uncover the mosaic and protect it, one participant in the second team said that she prefers uncovering it for a while then recovering it again even if the optimal protection solution is not found yet. Another participant suggested a glass floor and a third one preferred the proposed dome shaped to be the final original shape for the covering.**
- 4. They both are for uncovering the mosaic**
- 5. Both of them are for the complete uncovering and not the partial as long as it's**

harmonious with the surrounding.

6. All of them expected the increase of the tourism especially the local tourism, and requested media promotion after executing the project to reach the international tourism.
7. The attendees confirmed that this project will have important economic returns for the local community.
8. All of them are for the participation of the local community in the project so as to benefit from the local vision and to reinforce their belonging to the site.
9. All of them are for participating in the upcoming meetings.
10. The attendees expressed their approval on the proposed design (cut-Dome) and suggested the upcoming meetings to be in the centre of the city because of the lack of transportations leading to the palace. They also suggested the announcement of these workshops in local radio stations to promote the attendance.

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PCM2  
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**Meeting Minutes**  
**The second Public Consultation (PC2),**  
**Rehabilitation Project of Hisham's Palace, Jericho**

**Date:** 19<sup>th</sup> November, 2015

**Time:** 10:00 – 12.30

**Venue:** Child Center - Jericho

**Goals:**

- To have important inputs of views and suggestions through analyzing the draft design approach of the Protective Shelter for the Great Bath of Hisham's Palace in addition to the touristic trail suggested by the consultant team (Matsuda Consultants) with the local community.
- Show the local community that the draft design will provide a best solution to all key requirements.
- To request the local's warm acceptance of the draft design.
- To inform them with the approximate time schedule of the project.

**Attendees:**

Mr. Mohammad Jalaita	Mayor, Jericho Municipality
Basel Hejazi	Jericho Municipality

Issa Jalaita	Jericho Municipality
Mohammad Fetiani	Engineer - Jericho Municipality/ representative of Engineering association in Jericho
Wiam E`raikat	Public Relation Department – Jericho Municipality
Ahmmad Hammad	Jericho Municipality
Zahi Barahmah	Jericho Municipality
Mohammad Azmeety	Jericho Municipality
Mohammad Isayed	Engineer - Jericho Municipality
Majdi al Ghouly	Engineer - Jericho Municipality
Ihab njoum	Engineer -Jericho Municipality
Hazem Bali	Engineer -Jericho Municipality
Major. Nizar Allan	Tourist police
Lotfi Ayoub	Tourist police
Najah Hammad	Jericho Heritage Tourism Committee (JHTC)
Hiba soweaty	Ministry of Agriculture – Jericho
Hanan Abu latefeh	Ministry of Agriculture – Jericho
Fawzeh Taher	Civil Affairs – Jericho
Naheel Sharyam	House wife
Maher Jaber	Ministry of Local Government- Jericho
Salam E`raikat	Ministry of Local Government- Jericho
Raghda Abu Roumi	Ministry of Local Government –Jericho
Hiba Mesh`al	Representative, JICA Field Office in Jericho
<b>MoTA</b>	
Ihab Haj Daoud	Vice Director General of Conservation and Sites Management - MOTA
Ahmed Rjoob	Acting General Director of Southern Governorates – Site Management Expert - MOTA
Iyad Hamdan	Acting Director General of Ramallah and Jericho Governorates - MOTA
Mohamad Diab	Director of Conservation Department – MOTA
Manal Al-Helo	Conservation Department – MOTA
Ziad Abu Odeh	Conservation Department - MOTA
Aza Abu Ghudeab	legal counsel - MOTA
Saeed Daraghmeh	MOTA – Jericho office
Suzan Safi	MOTA – Jericho office
Heyam Sider	MOTA – Jericho office
Ramy Hammad	MOTA – Jericho office
Mujahed Barakat	MOTA – Jericho office

### **Record of Meeting:**

#### **1. Opening Remarks, PC1 and the Purpose of PC2.**

Mr. Ihab welcomed the attendees, and then he thanked the Government of Japan (GOJ) and The Japanese International Cooperation Agency (JICA) for supporting this project, He also Thanked Jericho municipality for cooperation as a main partner in this project.

Mr. Ihab gave an abstract for the project and the previous Public Consultation (PC1) and what is expected from this workshop.

## **2. Rehabilitation and restoration of Hisham's Palace from 1995 - 2015**

Mr. Mohammad Diab started his presentation showing the cumulative works executed by MOTA for developing the site which included (Excavations, Lighting, restoration of Mosaic and walls, installing facilities, and promotion works).

Mr. Diab also talked in details about the most important project and the donors who participated in these projects and how these projects were significant in discovering antiquities, preserving architectural and structural members, developing the museum, documentation of the mosaic and producing the film showing the site, and adding the suitable infrastructure needed to the site as an important touristic site not only in Jericho but also in the middle east as well.

Mr. Diab Summarized the previous attempts for protective shelter of the big Bath and how eng. Roberto Sabelli started his design for the shelter in 2003 based on Eng. Hamilton's imagination for the design.

Mr. Diab discussed the reason for rejecting the design of Sabelli in addition to the designs of (Arch. Ammar Khammash 2006, Arch Peter Zimtor2010) subsequently.

Mr. Diab started expressing the new attempt by the Japanese Team in 2015 and how its different in the way of thinking for the project to involve not only the Palestinian experts in the process but also the local community and other stake holders to put their inputs side by side with the Japanese Consultant team which is also diverse and comprehensive to achieve the concept of participation unlike the previous attempts.

## **3. Review of the new design and the process of work**

Arch. Manal Al Helo started her presentation on the design process for the shelter and the trail and how Matsuda consultants team worked on solutions and ideas achieving the purpose of project, she discussed the proposed systems for the shelter in terms of its advantages and disadvantages and how the Advisory committee, MOTA team and the consultant team shared the discussions developing the final design (Cut off Dome).

Arch. Manal also talked about the Trail and the developing of the design until the final result to achieve the best view from different locations and levels using different materials as needed without harming the mosaic or cutting its view.

She also expressed the model done by the consultants and asked the attendees to look at the design and imagine the feeling.



#### 4. Discussion

**Dr. Ahmad Rjoob** opened the discussion assuring that some of ideas accepted while a little issues need to be discussed more and he also asked the attendees to feel free discussing the ideas shown.

**Mrs. Suzan** asked about the material proposed for the shelter.

**Arch. Ihab** expressed the three materials proposed by the consultant and some of its advantages and disadvantages and how the color is also important.

**Eng. Mohammad Fetiani** asked for additional details of structure works and lighting especially the night light.

**Eng. Diab** answered: we chose the least structure (Cut Dome), based on 4 angles externally and some supports without harming the mosaic, while the trail will depend on the existed wells mainly.

**Eng. Jalaita** asked about the materials for the inner side of the dome.

**Arch. Manal** replied using the model and how the design took in consideration the interior view.

**Arch. Ihab** raised attention to the insulation materials also and how it will be used.

He also replied to the question relating to the lighting and how the design took the natural lighting in consideration in addition to the night lighting, and for the structure of the trail **Mr. Ihab** expressed the way of fixing the trail depending on its weight on the walls while the high level trail will be fixed on the four columns.

**Mrs. Weam Emrekat** asked if the weather of Jericho took in consideration especially for having the comfortable heat inside the Bath.

**Arch. Manal** replied we will use insulations and also the colors will be not dark to reflect the heat in addition to evading the direct sunlight.

**Eng. Diab** raised attention to the upper opening (Malqaf) and the opened sides surrounding and how this idea will function as natural air condition.

**Eng. Basel Hejazi** asked if it is possible to see the samples of the materials proposed in the design and also the lighting fixtures to share opinions, and asked about the Handicaps

availability.

**Arch. Ihab** agreed Mr. Hejaze for the samples, and he assured that the handicaps are welcomed in all the parts of the trail except the upper high-level one according to the slope problems.

**Mrs. Najah Hammad** thanked MOTA and JICA and all of the team working on this project and asked about preventing birds.

**Eng. Diab** agreed her and the importance of preventing birds but he also said that this still challenge and we have some proposals from the consultant which need additional study even using siege or other materials.

**Mr. Maher Jaber** asked if this design is final and how if he don't accept the design.

**Mr. Ziad replied as an Architect** I think its impossible to have 100% design achieving all the criteria needed and agreed by all the people while this design at least is harmony with the surrounding nature using the least scale of huge and at the same time is an addition needed to uncover the mosaic which is essential for appreciating the visitors and raising the tourists coming to this important site.

**Eng. Fetiani** asked why don't we use the shape imagined by Hamilton.

**Dr. Ahmad Rjoob** said we can't build on imagination until its proved because this will be a world heritage site and the design must be reversible.

**Mrs. Naheel Sharbam** asked if the white ant effect took in consideration especially in Jericho to avoid harming wood of trails, she asked also to promote the site and the project using deferent language to increase the tourism and to benefit the local community.

**Dr. Rjoob** agreed her and added this site is on the tentative list for world heritage.

**Eng. Diab** thanked her for the note and assured taking this point in consideration by using treated wood resistant to ants and climate as well.

## 7-16. Environmental Approval

State Of Palestine



دولة فلسطين  
سلطة جودة البيئة

Environment Quality Authority  
سلطة جودة البيئة  
صادر عام  
No : 194-2016  
الرقم  
Date: 2-2-2016  
التاريخ

الرقم:-----  
التاريخ: 2016/2/2-----  
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To: Mr Arch.Ihab Haj Daoud

Vice Director General of Conservation and Site Management

Ministry of Tourism and Antiquities

**Environmental Approval for the Construction of the Protective Shelter and the Preservation of the Great Bath at Hishams Palace-Jericho**

Greeting,

Reference to above mentioned subject, and in Consideration to your request to get an environmental approval for your project, which will be construct in the Great Bath at Hishams' Palace – Jericho Governorate and based on the information and technical data mentioned in the Initial Environmental Evaluation (IEE) that submitted to Environmental Quality Authority (EQA) on January 2016, and according to internal technical committee recommendation, the EQA give its environmental approval for the intended project to proceed the activity.

And kindly be note that EQA have the right to reconsider this granted Environmental approval this if there is any violation to environmental requirements.

Regards,

Yaser K. Abu Shanab

Acting Deputy General/

Environment Protection General Directorate



المكلف  
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