



# Roman Nymphaeum in Amman Restoration and Rehabilitation

*Authors:*

*Nizar Issa Al Adarbeh, Dr. Mohammed Mousa El Khalili,  
Prof. Abeer F. Al Bawab, Prof. Ramadan Abdullah, and Prof. Carlo Bianchini*



The Hashemite Kingdom of Jordan  
The Deposit Number at the  
National Library (2019/3/1550)

352.56

**Roman Nymphaeum in Amman**

**Restoration and Rehabilitation/ Nizar Issa Al Adarbeh, .. [etc.al].-**  
**Amman: Deanship of Academic Research/ The University of**  
**Jordan , 2019**

(95) p.

**Deposit No.: 2019/3/1550**

**Descriptors: /Rehabilitation//Repair//Archaeological**  
**Sites//Amman//Amman (Jordan)/**

يتحمل المؤلف كامل المسؤولية القانونية عن محتوى مصنفه ولا يعبر هذا المصنف  
عن رأي دائرة المكتبة الوطنية.

**ISBN 978-9957-420-09-3**  
**ISBN (E-Book) 978-9957-420-15-4**

# **Roman Nymphaeum in Amman**

## **Restoration and Rehabilitation**

*Authors:*

*Nizar Issa Al Adarbeh, Dr. Mohammed Mousa El Khalili,  
Prof. Abeer F. Al Bawab, Prof. Ramadan Abdullah, and Prof. Carlo Bianchini*

## Acknowledgments

*Project Core Team members:*

*Dr. Abeer Al-Bawab, Project Manager,*

*Dr. Mohammad El-Khalili, Director of Restoration and Conservation*

*Mr. Nizar Al Adarbeh, Site Management and Tourism Development Expert*

*Dr. Ramadan Abdullah, Conservation Material and Lab Analysis*

*Thank you to the project team members who did amazing work during the different stages of the project from 2014 to 2018: Dr. Ayat Bozeya, Dr. Marwan Asmar, Dr. Yahya Al Shawabkeh, Dr. Carlo Bianchini, Ibrahim Al Barghothi, Khalaf Al Koor, Ghaleb Alshdaydeh, Khaled Ali Alkwara, Khalil Aljhran, Malek Oqla Al Ayasra, Mohammad Al Tamari, Omar Jaffar Altarteer, Sofian Mohammad Abd Allah, Naif Al Zaben, and Mahmoud Aljafari. On-job graduate and undergraduate trainees: Adel Mtawi, Muaad Khawaj, Mahmoud Al Arab, Arch. Alekos Diacodimitri, Arch. Martina Attenni, Dheeb Al Maharmeh, Ma'en Saeed Alhara, Lojain Alabdallat, Safaa Younes, Lama Alsharif, Rima Mansour, Thaer Al Shwabkeh, Dana Shweki, Dana Toukan, Amna Abu Zaina, Sultan Alfoqhaa, Tamara Abu Sarhan, Aseel Abu Hazeem, Aameena Alzawahra, Banan Khraisat, Zain Aljayosee, Sara Aljelani, Farah Alatiat, Shorouk Bilal, Dawlat Abu Ayash, Saida Abu Mallouh, Reham Awwad, and Yasmeen Hdaib*

*Also we extend our gratitude to the contributions of those who supported this project:*

*Department of Antiquities (DOA): Dr. Monther Jamhawi (DOA Director), Eng. Asma Shahaltog, Mrs. Hanadi Al Taher, Mr. Yazid Elayan, and Eng. Mohammad Al Absi*

*Greater Amman Municipality (GAM).*

*American Center of Oriental Research (ACOR):*

*Dr. Barbara A. Porter, Dr. Jack Green, Jihad Haron, and Shatha Abu Aballi.*

*The Institut français du Proche-Orient (IFPO) French Institute of the Near East*

*Tarmeem Center for the Preservation and Conservation of Cultural and Natural Heritage (TC) for their contribution on designing and production of the 3D site model and the interpretation signs.*

*This publication was produced under the Restoration and Rehabilitation of the Roman Nymphaeum in Amman Project 2014–2018, which was funded by the U.S. Ambassadors Fund for Cultural Preservation (AFCP) and implemented by the Hamdi Mango Center for Scientific Research at the University of Jordan.*

*We extend our sincere gratitude to the AFCP team at the US Embassy in Amman:*

*Dr. Adrienne B. Nutzman, Mrs. Hanan Ghannoum, Mr. Peter Neisuler,*

*Dr. Ragini Gupta, Mr. Ali Lejlic, Ms. Reem Abdelhadi, and Mr. Tobias Bradford.*

*The authors views expressed in this publication do not necessarily reflect the views of the Ambassadors Fund for Cultural Preservation at the US Embassy in Amman, Jordan.*

*Cover photo by: Aerial Photographic Archive of Archaeology in the Middle East (APAAME), archive accessible from: [www.humanities.uwa.edu.au/research/cah/aerial-archaeology](http://www.humanities.uwa.edu.au/research/cah/aerial-archaeology).*

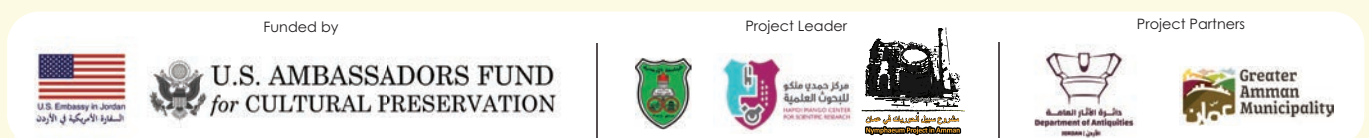
*Matthew Dalton (APAAME\_20181022\_MND-0849)*

*Cover, publication design, and layout by: Nizar Al Adarbeh*

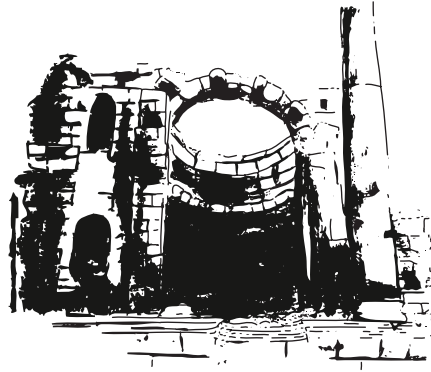
*Publisher: Deanship of Academic Research [1/2019]- The University of Jordan ©2019*

*Printed in Jordan*

*ISBN 978-9957-420-09-3, ISBN (E-Book) 978-9957-420-15-4*







**مشروع سبيل الحوريات في عمان**  
**Nymphaeum Project in Amman**

**2014-2018**





*Fig. 1: The Nymphaeum site before project interventions (25 July 2015). By Nizar Al Adarbeh*



# CONTENTS

<b>ACKNOWLEDGMENTS .....</b>	<b>4</b>
<b>LIST OF ACRONYMS AND ABBREVIATIONS.....</b>	<b>8</b>
<b>FORWARD: .....</b>	<b>9</b>
<b>OVERVIEW</b>	
At a Glance.....	10
<b>SECTION I: PROJECT BACKGROUND .....</b>	<b>12</b>
1.1. Brief Description of the Site.....	12
1.2. Project Purpose and Summary.....	14
1.3. Overall Project Objectives and the Desired Results.....	15
1.4. Project Significance and Urgency.....	16
<b>SECTION II: PROJECT IMPLEMENTATION .....</b>	<b>20</b>
2.1. Component I: Conservation and Restoration.....	22
2.2. Component II: Advanced Documentation.....	43
2.3. Component III: Capacity Building and Raising Awareness.....	59
2.4. Component IV: Site Management & Archaeological Park Establishment..	65
2.5. Component V: Tourism Development .....	79
2.6. Component VI: Dissemination and Visibility .....	87
2.7. Component VII: Project Management.....	91
<b>BIBLIOGRAPHY .....</b>	<b>93</b>



# LIST OF ACRONYMS AND ABBREVIATIONS

<b>ACOR</b>	American Center of Oriental Research
<b>AFCP</b>	U.S. Ambassadors Fund for Cultural Preservation
<b>AIJ</b>	Archaeology of Jordan
<b>APAAME</b>	Aerial Photographic Archive of Archaeology in the Middle East
<b>ASOR</b>	American Schools of Oriental Research
<b>DOA</b>	Department of Antiquities
<b>GAM</b>	Greater Amman Municipality
<b>GJU</b>	German Jordanian University
<b>HMCSR</b>	Hamdi Mango Center for Scientific Research
<b>HU</b>	Hashemite University
<b>ICHAJ</b>	The International Conference on the History and Archeology of Jordan
<b>ICOMOS</b>	The International Council on Monuments and Sites
<b>IFPO</b>	The Institut français du Proche-Orient [ <i>French Institute of the Near East</i> ]
<b>JTB</b>	Jordan Tourism Board
<b>JUST</b>	Jordan University of Science and Technology
<b>MOTA</b>	Ministry of Tourism and Antiquities
<b>MoU</b>	Memorandum of Understanding
<b>TC</b>	Tarmeem Center for the Preservation and Conservation of Cultural and Natural Heritage
<b>UJ</b>	The University of Jordan
<b>UNESCO</b>	The United Nations Educational, Scientific and Cultural Organization
<b>UoP</b>	University of Petra
<b>USAID</b>	United States Agency for International Development

# FORWARD

**Project Manager, Prof. Abeer Al Bawab**

*This book is an overview of the Restoration and Rehabilitation of the Roman Nymphaeum in Amman Project 2014–2018, which was funded by the U.S. Ambassadors Fund for Cultural Preservation (AFCP) and implemented by the Hamdi Mango Center for Scientific Research at the University of Jordan. The project could not have been successful without the dedication of mainly a national team of Jordanian renowned experts with first-hand knowledge and dedicated field team members. This is the fascinating story of the Roman Nymphaeum site in Amman and it highlights the great achievements of the project team and the project partners in preserving one of our outstanding archaeological monuments in Jordan.*

*I hope that this publication will contribute to shaping a new methodology for cultural heritage conservation and restoration in Jordan. I am very grateful to the active partnerships of the Department of Antiquities of Jordan and the Greater Amman Municipality in our project. I wish to thank the AFCP and their team members for the invaluable contributions that they have made to support our project in improving the state of conservation of the Nymphaeum. I am especially grateful to our project team members Dr. Mohammed El Khalili and Nizar Al Adarbeh,*

*whose commitment to safeguarding the Nymphaeum produced such impressive results. Their hard work and unrelenting dedication show what can be done to protect our culture heritage. This project is a clear example of how teamwork can produce such outstanding results and how we can improve the state of conservation of our cultural heritage sites in Jordan.*

*Prof. Abeer Al Bawab  
Project Manager*

*Chemistry Professor , Chemistry Department, The University of Jordan*

*Former Director the Hamdi Mango Center for Scientific Research (HMCSR) and Former Dean of the Deanship of Academic Research at the University of Jordan*

*Former General Director of Scientific Research Fund - Ministry of Higher Education*

# NYMPHAEUM PROJECT 2014-2018 AT A GLANCE

The Restoration and Rehabilitation Project of the Roman Nymphaeum in Amman provides an example of innovative management practice and applied methods in the revival of urban heritage and serves as an approach towards sustainable heritage preservation (also see Al Adarbeh et al. 2017 and El Khalili 2016).

The Roman period Nymphaeum in Amman, considered to be the largest monument of its kind in ancient Provincia Arabia, had suffered from different deterioration factors that affected its state of conservation.

This led to the monument being considered locally as an example of visual pollution in downtown Amman. Through a joint project with the Hamdi Mango Center for Scientific Research at the University of Jordan, the Department of Antiquities, and the Greater Amman Municipality, it was

**The project (August 2014–March 2018) had been supported by the Ambassadors Fund for Cultural Preservation at the US Embassy in Amman, Jordan.**

possible to preserve large areas of the site which needed urgent restoration and conservation.

Forty-seven workers, technicians, and experts from the fields of conservation, cultural resource management, archaeology, tourism, and architecture were involved in the project and fifty on-job field training opportunities were offered for university students from fields of conservation, cultural resource management, chemistry, biology, tourism management, architecture, and urban planning. Students were mainly from the University of Jordan, Hashemite University, University of Petra, and Jordan University of Science and Technology.

Advanced documentation for the site and surrounding area was undertaken using a 3D Laser Scanner, contributing to drawings of plans, elevations and sections used to document the monument's state of conservation. Scattered architectural fragments at the site were numbered, photographed and drawn, and reorganized and presented in the site.

A comprehensive cleaning of the whole monument was undertaken with different mechanical techniques using low pressure water pumps to remove deposits accumulated on the façade due to air pollution. Tools including small brushes were used to remove crusts and external crystalized



salts, as well as any plants and fungi on the stone surface. Chemical cleaning using wet bandages was used on some parts of the monument.

Consolidation included filling the joints in stone masonry with compatible mortar. In addition, chemical consolidation and suitable polymers were used for very fragile stones. For the first time in Jordan, nanotechnology was employed in the form of nano-calcium hydroxide injected in limited amounts into the stone. This penetrates and transforms the stone into calcium carbonate, consolidating delicate internal sections of the building. Some reconstruction of missing structural elements to safeguard the existing structure was carried out and enhanced its overall interpretation and presentation.

The project successfully safeguarded the internal environment of the site including removal of non-site related structures and visual pollution, cleaning the front area of debris, landscaping and installing terraces compatible with the site which proved to be effective during winter season. The open areas and part of the basin of the Nymphaeum were covered with gravel to provide a unified look, enhance visitor circulation, and limit the possibility of vegetation growth. Preparations were made for nine fully illustrated bilingual site interpretive panels, a 3D printed reconstruction model of the Nymphaeum, and both online and printed promotion materials. In summary, this project is a new model for downtown Amman in the way it revives and transforms urban heritage into an open public space and provides opportunities as a cultural forum.



*Fig.2: The Nymphaeum site after project interventions (2018).*



# SECTION I

## PROJECT BACKGROUND

### 1.1. BRIEF DESCRIPTION OF THE SITE

The Roman Nymphaeum in Amman is the biggest monument of its kind in the region and it was one of the main monumental buildings in the ancient city Philadelphia (modern Amman).

The Roman urban plan organized the city into two main parts; the upper part with the main Roman Temple of Hercules and the lower part, which follows a typical Roman city plan with two colonnaded streets (Cardo and Decumanus) along the two major valleys of the city. The Nymphaeum was located close to the point where the Cardo intersected with the Decumanus.

This monumental structure was built over a cave with a running water source for the city and standing directly upon the edge of the main stream oriented to northwest. Its back is near to the stream edge and the main façade looking toward the Cardo according to the main city plan. The Nymphaeum is a half octagonal building with symmetrical design. The elevation can be divided into two sections; The lower part is the foundation including the barrel vaults and the second part is the upper part (including the main façade of the building and its rear).

The monument suffered from different deterioration factors and forms that affected its durability and stability. Furthermore, the air pollution deposits caused disformation of the whole building surfaces, which used to be considered as a visual pollution in the downtown and thus it needed urgent solutions to restore and conserve the monument and to regenerate its role within the archaeological area.

Through the generous fund of the AFCP in supporting the preservation efforts of the monument it was possible to preserve the site. As a result of this support, the site was opened for the first time ever to the public on 24 October 2018.



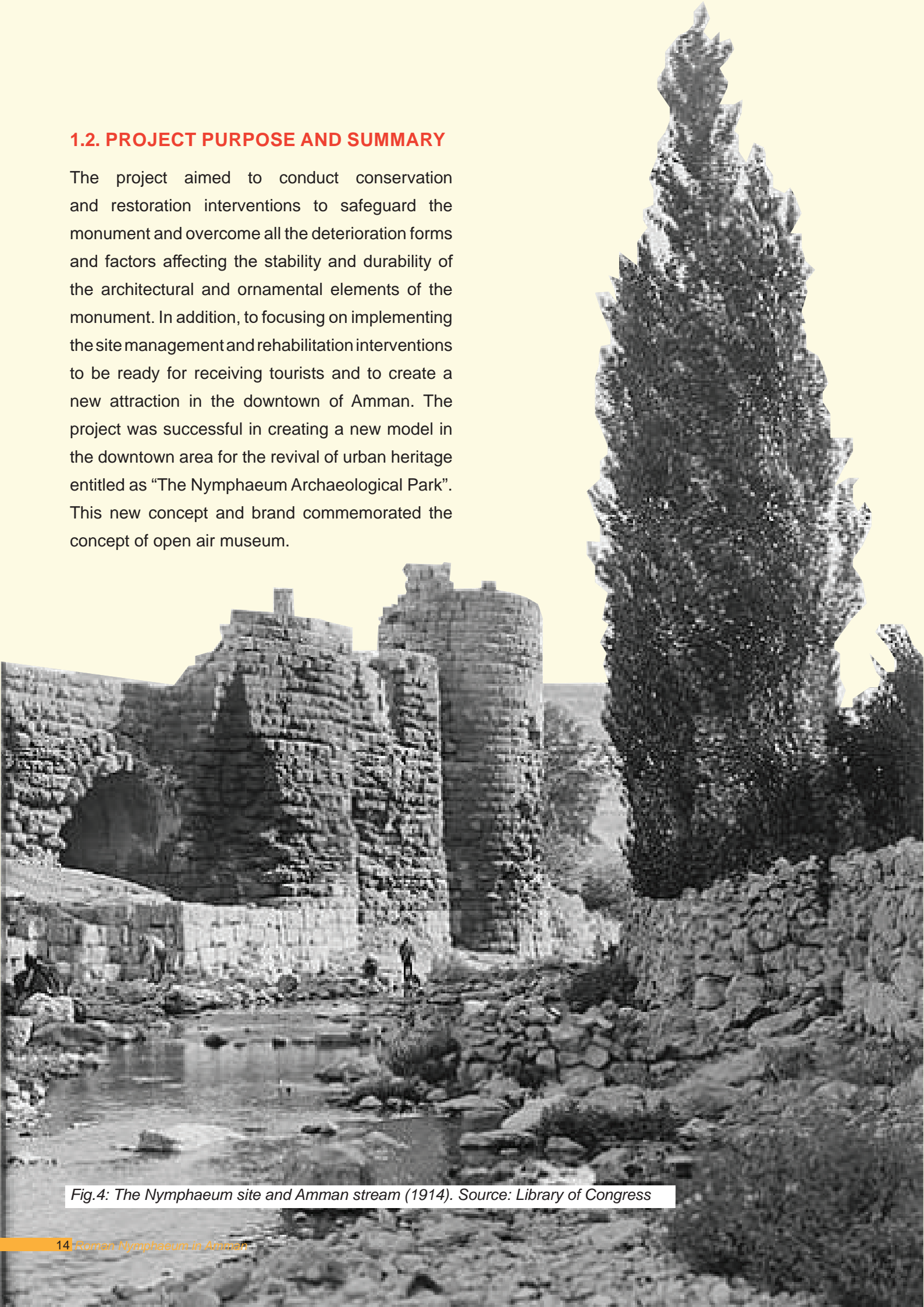


*Fig.3: The Nymphaeum site before project interventions (25 July 2015). By Nizar Al Adarbeh*



## 1.2. PROJECT PURPOSE AND SUMMARY

The project aimed to conduct conservation and restoration interventions to safeguard the monument and overcome all the deterioration forms and factors affecting the stability and durability of the architectural and ornamental elements of the monument. In addition, to focusing on implementing the site management and rehabilitation interventions to be ready for receiving tourists and to create a new attraction in the downtown of Amman. The project was successful in creating a new model in the downtown area for the revival of urban heritage entitled as “The Nymphaeum Archaeological Park”. This new concept and brand commemorated the concept of open air museum.



*Fig.4: The Nymphaeum site and Amman stream (1914). Source: Library of Congress*

### 1.3. OVERALL PROJECT OBJECTIVES AND THE DESIRED RESULTS

- To conduct conservation and restoration works to safeguard the Nymphaeum.
- To rehabilitate the Nymphaeum and its surrounding area to prepare it for feasible tourism utilization to benefit the community.
- To document the ornamental parts and important aesthetic components detached from the monument.
- To document the monument before and after conservation and restorations works of the project.
- To transform a neglected building to be a vital touristic attraction and to present a new concept and brand in the downtown of Amman called “The Nymphaeum Archeological Park”.
- To reconnect the Monument with its original Roman urban context to complement the Roman Theater, Odeon, and Amman Citadel in order to regenerate the image of ancient Philadelphia.
- To involve the specialists and research institutions in the project and enhance the knowledge sharing and exchange of experience in the field of conservation and restoration.
- To build the capacity of young graduate students in the majors of conservation, cultural resources management, and tourism development.
- To raise awareness about the importance of the Nymphaeum within the Roman urban context.
- Brand and market the site and enhance its presence as a major tourism attraction in downtown of Amman and to utilize it for cultural activities and events.



Fig.5: Project trainees during hands-on work at the site.



## 1.4. PROJECT SIGNIFICANCE AND URGENCY

### Historical Value:

The Roman Nymphaeum in Amman is the biggest monument of its kind in the region as compared to other Nymphaeum(s) in Jordan such as in Petra, Pella, Umm Qais and Jarash, the building was one of the main monumental buildings in the ancient city of Philadelphia (modern Amman). The significance of the monument was clear due to the many travelers and orientalists who visited and described the monument, such as Macdonald, Conder, Burkhardt, Merrill, Butler, Robinson, and

Seetzen. They all described its large size, architectural and ornamental features. Moreover, some parts were reused for building other structures especially during the Umayyad period as some bases, drums and capitals were reused in Umayyad walls and Abbasid rooms. The reusing of historic buildings continued especially after the arrival of the new immigrants to the region, including Caucasian groups and some Arabian tribes during the 17th century.



Fig.6: The Roman Nymphaeum in Amman (1914). Source: Library of Congress



### **Architectural Value:**

The monument was built over a cave with a running water source for the city and standing directly upon the edge of the main stream oriented to northwest, its back is near to the stream edge and the main façade looking toward the Cardo according to the main city plan.

The Nymphaeum is a half octagonal building with symmetrical design. The elevation can be divided into two sections; the lower part is the foundation including the barrel vaults, and the second part is the upper part (including the main façade of the building and its rear). The building was erected on a terrain that sloped down to the south west over a cave with streams of water running underneath and from its back. Therefore the foundation was built in a damp environment, and a series of vaults were

constructed to overcome the slope producing the level to erect the water basin of the Nymphaeum, with a façade of eleven niches. This solution was intended to enable the water of the south west stream to pass under the building without any damage to the monument and to join the south-east stream.

The whole structure was built mainly with limestone blocks. From the outer side they used rustic blocks and in the main façade square blocks were placed in alternate courses of headers and stretchers. The interior walls of the Nymphaeum and lower parts of the three large apses and the small niches are fitted with round and square holes sunk in the stones which indicate that the interior was dressed with marble.





### **Artistic Value:**

The monument still has a considerable number of decorative elements found during the excavations in the site. It is clear that the range of patterns employed in the building is quite wide, consisting of floral and geometrical designs, reels and beads. Blocks with decorative moldings in shallow relief were also used. From the available remains of capitals, architraves, and friezes it can be imagined how the Nymphaeum was elaborated and aesthetically modeled to be a place of rest and glory during the Roman Period.

*Fig.7: A view of the Corinthian Capital from the Nymphaeum site.*



### **Critical State of Conservation:**

Since the beginning of its construction in the the Roman Period, the Nymphaeum suffered different problems because of the weathering conditions due to the raising damp and the subsequent salt crystallization, erosion, and microorganism growth. Another major problem is its current location within the modern urban environment of the city of Amman with high concentration of air pollution, vibration, and urban infrastructural changes such as the installment of a sewage system which goes under the monument and the opening of main streets around the building. Several deterioration features were identified in the Nymphaeum before the project intervention, including stone weathering, rising damp, efflorescence, sub-florescence, erosion, staining, crumbling, chipping, cracking, detachment, flaking, peeling, and spelling.

During the period from 1996 to 2002, excavations were performed along with a few incompatible restoration actions in which inappropriate materials and techniques were used that caused further damage to the restored elements. Since this period no conservation or restoration projects were conducted. Therefore, through the AFCP grant, the project conducted urgent compatible restoration to safeguard the monumental remains.

Based on the previously mentioned severe conditions that affected the monument's stability and durability, the Department of Antiquities listed the monument on its priorities for urgent intervention in downtown Amman and in cooperation with the Greater Amman Municipality.



*Fig.8: A view of the Nymphaeum from the nearby hotel during project implementation.*



# Section II: Project Implementation



*Fig.9: Project trainees during hands-on work at the main facade of the Nymphaeum.*







# COMPONENT I: CONSERVATION AND RESTORATION



*Fig. 10: The Nymphaeum site after project interventions (2018).*



## Component I: Conservation and Restoration

Today the major achievements of the conservation results are very clear at the site and any visitor who knew the building before can express the huge difference because of the successful preservation and restoration works conducted by the project.

The following have been the systematic steps towards this achievement:

- Preparations for site intervention
- Cleaning process
- Consolidation works
- Reconstruction



Fig.11: Team members collecting samples from the site.

### Preparations for site intervention:

- Review the conservation plan with the DOA and receive the approvals needed including assigning a DOA representative to follow up and monitor conservation process at the site.
- The project team worked on preparing a detailed plan for the conservation and restoration of the Nymphaeum based on reviewing previous interventions at the site and through several site visits. Moreover, different samples were taken from the site to conduct scientific and non-destructive examinations and investigations.
- Based on the conservation plan prepared and based on the review of the literature and former

restoration project documents, the project team agreed on the detailed set of measures to be taken to conduct appropriate restoration for the site and focused on using non-destructive techniques. This was further elaborated based on the results of the analyses for the samples that had been collected from the site and analyzed at the Scientific Labs of the College of Science at the University of Jordan and the team prepared XRD-Technical Report, chemical characterization of building materials.

- A major achievement of the project is the cooperation with the project partners—the DOA and the Greater Amman Municipality (GAM) who worked on removing some buildings constructed at the borders of the site that blocked the view and created clear visual pollution to the site. This step, in addition to GAM efforts in reorganizing the streets and the traffic flow and directions, will enhance the results of the project and will attract tourists to visit the site when it is ready for visitation.
- The project team worked with GAM and the DOA to clean the site from the grass and plants as well as re-organize the drums, stone parts and remains scattered and piled in front of the Nymphaeum which were blocking the way to the upper level of the building.
- The site was cleaned totally from grass and plants.



Fig.12: Removal of previous structures from the site.

- Discovery of some important stone parts under the building demolished by the Greater Amman Municipality. The team documented them, organized and ordered them to be restored.
- Re-organization of the drums, stone parts, and remains scattered and piled in front of the Nymphaeum.
- Installation of scaffolds needed at the site and equipment mandatory for starting the process of cleaning and restoring the site. Different techniques and methods have been verified based on the best practices in conservation and on international charters, such as ICOMOS, UNESCO, and other related charters especially those focusing on masonry architecture.

### Cleaning process

- The cleaning was conducted first to the front façade of the monument and then to the rear façade through different mechanical techniques.
- Water pumps with low pressure were used to remove all the dirt and rust accumulated on the façade from the air pollutions; this was a mandatory procedure to start the conservation intervention.
- Use of different small tools including small brushes to clean the surface of the stone blocks including removing crusts and external crystalized salts, as well as removing any plants and fungi on the surface.
- Limited chemical cleaning technique by using wet bandages for some parts of the monument.



*Fig. 13: During the cleaning stage of the site with a clear view of a major crack.*





*Fig.14: Team members during the cleaning stage of the site.*



*Fig.15: Core-team members during the cleaning stage of the site.*



### **Consolidation works:**

- Filling the joints in the stone masonry with compatible mortar.
- Chemical consolidation and coating conducted using suitable polymers for the very fragile stones.
- Nano technology implemented, for the first time in Jordan, at the Nymphaeum with Nano-Calcium Hydroxide, which is injected in limited amounts, penetrates inside the stone, and transforms into Calcium Carbonate that consolidates the delicate internal building parts.

### **Reconstruction:**

- The reconstruction intervention was taken for the very critical parts of the monument which is an important measure to stabilize the very risky parts and to ensure better structure stability. This action also strengthened the vulnerable and exposed parts suffered from different deterioration features.
- The missing parts were carefully measured and then the stone was brought in for a total or partial replacement depending on the parts that had been deteriorated or lost. The preparation of stones was based on the traditional technique of stone cutting using a manual process to ensure better quality and better finishing of needed stone parts. The stones used mainly for this intervention were original unused stone blocks scattered at the site which had no function, and will ensure more compatibility and preservation of the Nymphaeum. The following presents interventions of reconstruction and replacement of different parts of the Nymphaeum:

### **Landscaping:**

A major flood of 5 November 2015 in Amman severally affected the downtown and the

Nymphaeum Site. The flood caused huge damage at the site and the project had to redo cleaning for several parts and for the entire site that worked as a sewer for all the water coming to the downtown. It was very clear that major landscaping was needed to prevent soil movement and land sliding.

This measure was taken at the last stage of the project by cleaning up the front area of debris and then installing some terraces and compatible landscape elements which proved to be effective during winter in the last quarter of 2016. Another purpose of this intervention was to open the view to connect to the entrance of the monument.

### **C1.1. Consolidation of some major vulnerable parts of the monument by reconstruction of some missing structural elements to safeguard the existing structure. This also enhanced the interpretation and presentation of the monument.**

The project had fully achieved the consolidation of all vulnerable parts of the monument and mainly accomplished the stabilization of the eastern part of the building through constructing the buttress. The construction intervention was taken for the very critical parts of the monument which was an important measure to stabilize the very risky parts and to ensure better structure stability. This action also strengthened the vulnerable and exposed parts suffered from different deterioration features. The following is a detailed progress narrative of the interventions during the project implementation:

- The main reconstructing work focussed on building a buttress to support the vulnerable parts of the monument (figs. 21 & 22).





Fig.16



Fig.17

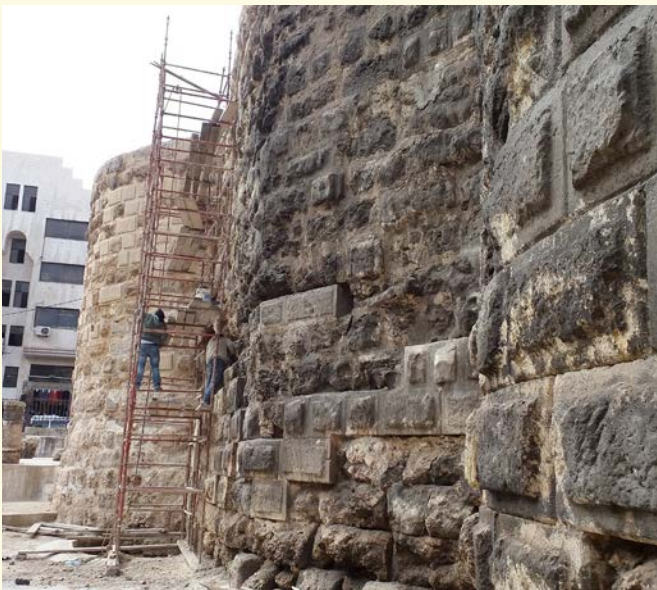


Fig.18

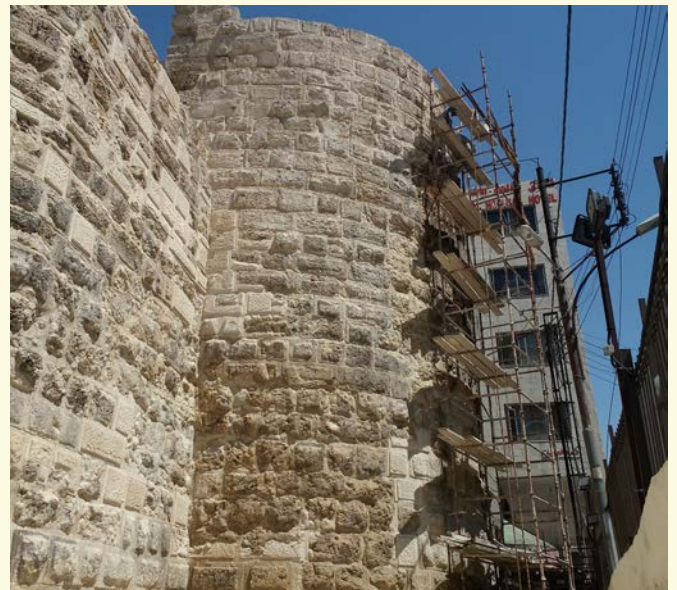


Fig.19



Fig.20

Figs.16-20: Views of the cleaning and consolidation stage at the site.



- Removal of the scaffoldings placed between the niche and the Saladin Hotel – adjacent to site (approx. 1 meters away only) (figs. 21 & 22).
- Work during this reporting period focused on removing the supporting column of the niche after careful consideration and research on how it was added and how much support offered for the monument and what are the risks of its removal, which was necessary because of the wrong position of such an addition and its useless function.
- The pile of unsorted stones at the site collected through the different phases of the project were dismantled, sorted and then documented for the reconstruction purposes at the site so these stones could be re-used at the site (figs. 23 & 24).
- The project conducted most of the interventions related to the buttress by reconstructing the eastern part of the monument using original stones from the site and new stones as needed.
- Building the buttress focused on recalling the original architectural design of the monument.



*Figs.21-22: During the reconstruction stage at the site.*



*Figs. 23 and 24: The pile of stones being dismantled*



- The final results of the project in this part highlight the success of the project in enhancing the architectural interpretation of the monument and the stability of the structure, in addition to minimizing the surrounding visual pollution

from the adjacent hotel. The following photos show the eastern part before and after the construction and consolidation interventions (figs. 25-36):



Figure 25: Reconstruction work at the area (A) as shown inside the red rectangle.



Figure 26: Buttress construction in progress





*Figure 27: Close-up photo of butress construction using scaffolding system and crane*



*Figure 28: Buttress after finishing the construction work which highlight the success of the intervention as it enhanced the architectural interpretation of the monument and enhanced the stability of the structure.*





*Figure 29: Eastern part before buttress construction*



*Figure 30: Eastern part after finishing the buttress construction*





*Figure 31: Eastern part before buttress construction*



*Figure 32: Eastern part after finishing the buttress construction*





Figure 33 and 34: Eastern part before (left) and after (right) finishing the buttress construction

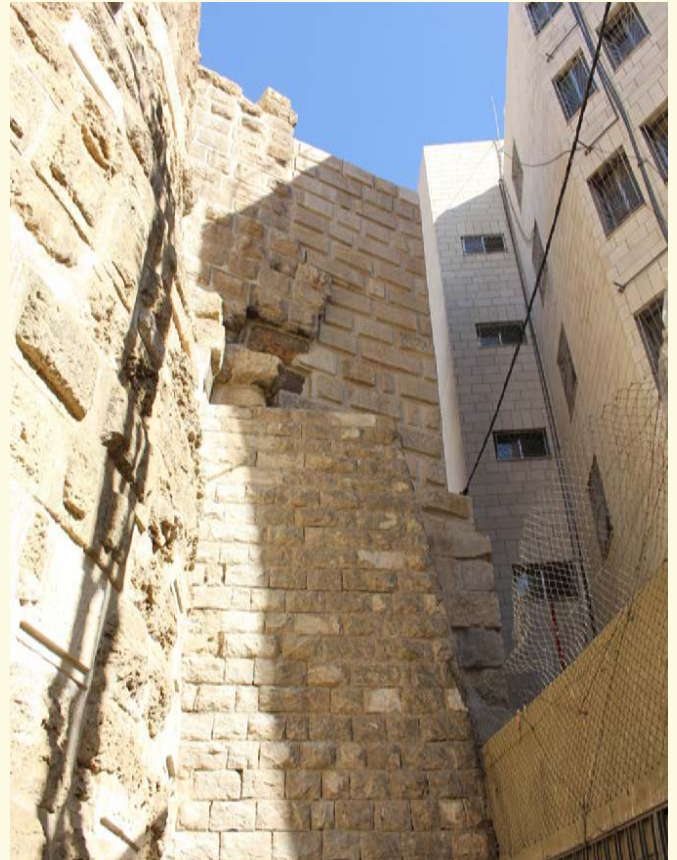


Figure 35 and 36: Rear of Eastern part before (left) and after (right) finishing the buttress construction



**C1.2. Continue the conservation and restoration work at the site and the ornamental parts detached from the monument. This will include anastylosis of some main parts and columns into the monument which will enhance its interpretation and contribute to further understanding of its majestic and aesthetic design.**

The project team accomplished the task conducting documentation and analysis of all stone parts scattered all over the site. The project followed the following key stages towards this major achievement that contributed to a better understanding of the site and enhanced interpretation and presentation for the visitors:

- The pile of unsorted stones at the site collected through the different phases of the project were dismantled, sorted and then documented for reconstruction purposes at the site and for these stones to be re-used there.
- Proper scientific documentation was made for the stones at the site either taken from the dismantled pile of stones or from scattered parts at the different areas.
- The documentation of the stones was made using different documentation tools and these stones were sorted into architectural and ornamental ones.
- Non-ornamental stone ashlar were assessed for use in the construction of the buttress.
- The stones were cleaned, numbered, photographed and sketched in a very detailed way (especially the decorative stones), and there is a matrix with the sorted and numbered stones on special forms to be used for the creation of the archeological park at the site toward the end of the project.

No.	Decorative Piece	Number of parts
1	Cornice	66+31
2	Capitals	36
3	Frieze	46
4	Drums	84
5	Base	38
6	Lintel	34
	<b>Total</b>	<b>335</b>

- Detailed sketches and photographs of the most important stones (Cornice, Capitals, Friezes, and Drums) were made (figs. 37-41).
- Re-organized the drums, stone parts, and remains scattered piled in front of the Nymphaeum. The project team conducted some interpretation and presentation focused on display of these stone parts to enhance the understanding of the monument (figs. 42-45).



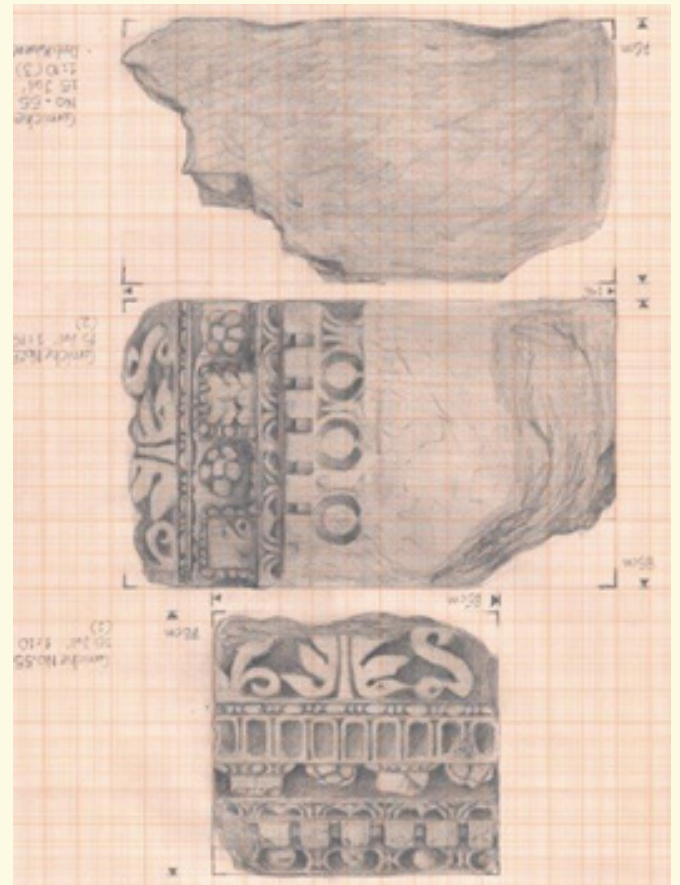
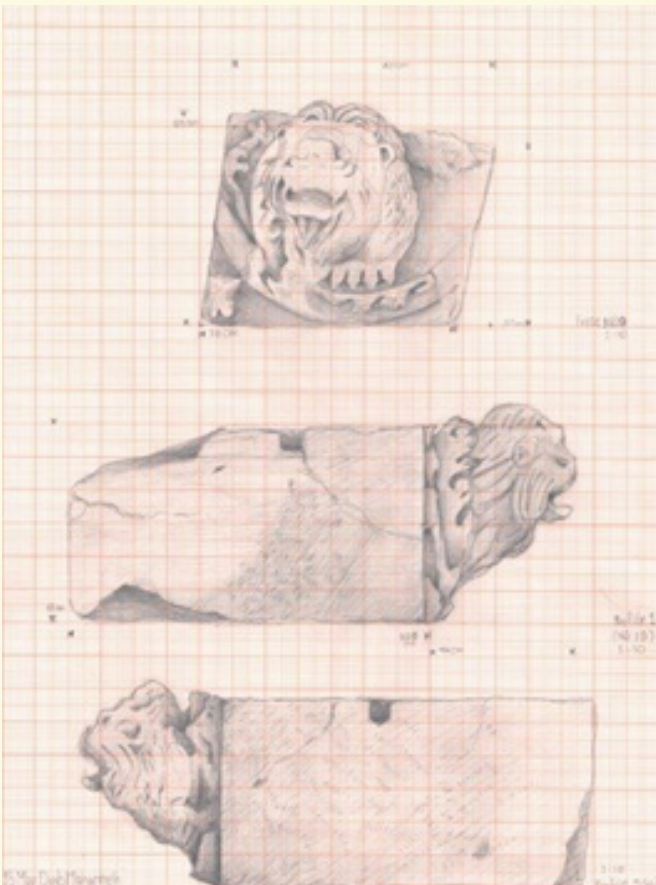
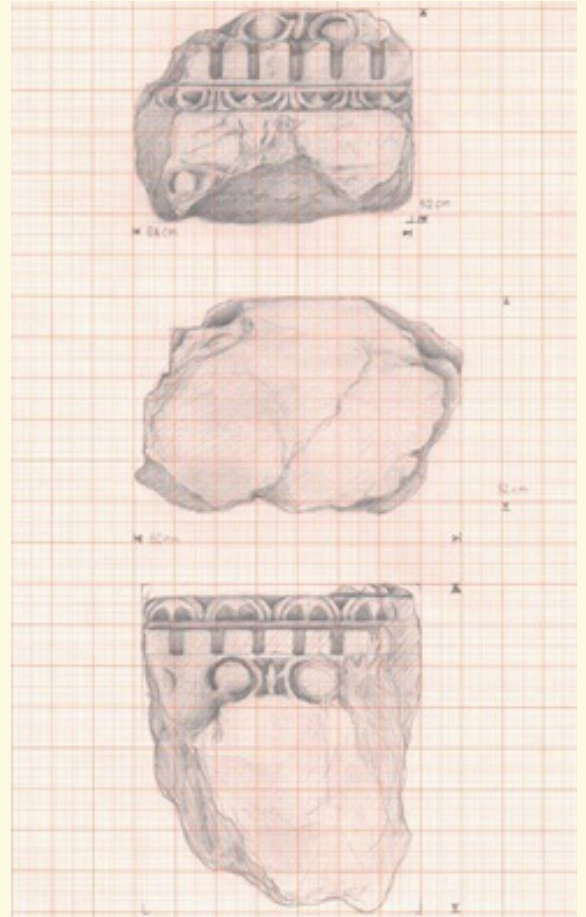


Figure 37-41: Detailed sketches of the ornamental stones





*Figure 42: Reinstalling one of the columns into its proper location in the monument*



*Figure 43: Reinstalling one of the columns into its proper location in the monument*





Figure 44: Anastylosis of a column at the site to present how the capital capped the top of the drums



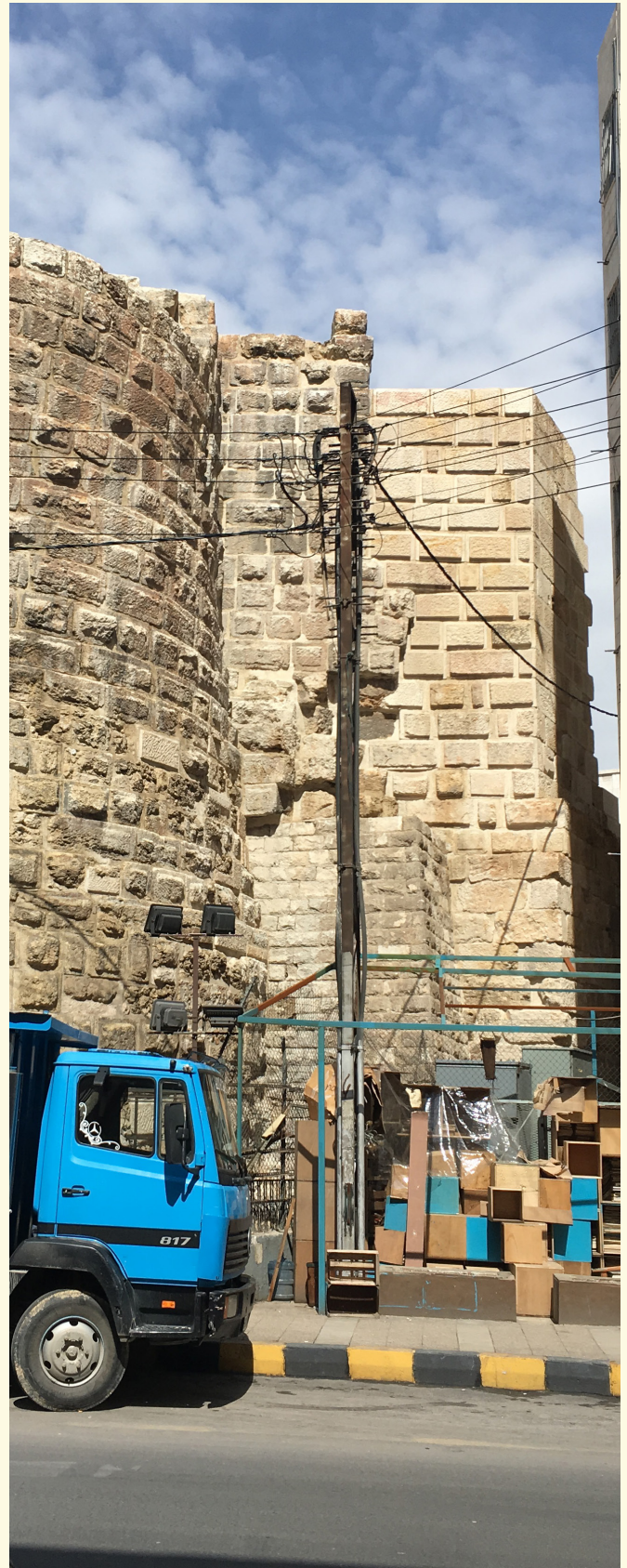
Figure 45: A computer generated drawing showing the location of the previous column with anastylosis. This drawing was used in one of the signs at the site



**C1.3. Continue the conservation and restoration in different parts of the monument based on compatible materials, techniques and according to international charters and ethics. Salt extraction from the building material, treatment of archaeological mortars and plasters, removing of foreign material and encrustation, treatment of high moisture content, biological treatment, etc.**

The project team continued implementing all needed procedures for conservation and restoration. The project finished this task across all parts of the monument. The following were the key steps in this process:

- The cleaning process continued for the rear façade of the Nymphaeum using different mechanical techniques (fig. 47)
- Water pumps with low pressure were used to remove all the dirt and rusts accumulated on the façade from the air pollution. This was a mandatory procedure to start the conservation intervention
- Use of different small tools including small brushes to clean the surface of the stone blocks including removing crusts and external crystalized salts, as well as removing any plants and fungi on the surface (figs. 51-53)
- Filling the joints of the stone blocks with compatible mortar
- The project accomplished full clearance, consolidation and stabilization of the rear façade with the buttress fully constructed (fig. 46)



*Figure 46: The rear façade after conclusion of cleaning and consolidation process and the full construction of the buttress from the back side*





Figure 47: The rear façade during the cleaning process



Fig 48: During consolidation at the rear façade



Figs. 49-50: During the major flood of 5 November 2015 in Amman





Fig.51



Fig.52



Fig.53



Fig.54



Fig.55



Fig.56

Figs. 51-56: During cleaning and consolidation activities at the site





Figs. 57-59: During reconstruction stage at the site







*Figs. 61: During the cleaning process at the site*



*Figs. 62: During re-organizing stone parts and remains scattered at the site*



# COMPONENT II: ADVANCED DOCUMENTATION



*Figs. 63: A view of the 3D rendered model for the Nymphaeum by the project team*



## Component II: Advanced Documentation

The documentation of the Nymphaeum followed the three main steps as follows:

### Site Preparation

The team discussed the details of the advanced documentation needs for the site and the methodology. This included the agreement with the DOA about the use of the 3D Laser Scanning and surveying Equipment with technical assistance from their own team specialized in this kind of work. However, the work that was mentioned in the first component left some obstacles including columns, drums and some architectural fragments and remains piled in a way that blocked the view for the 3D scanning and surveying efforts. However, the DOA worked with the project team in solving this problem and ensured proper documentation.

### Data Collection:

3D Laser scanning and advanced documentation were conducted in cooperation with the DOA. Several scanning stations were established and 3D scanning was performed in millimeter detailed scale.

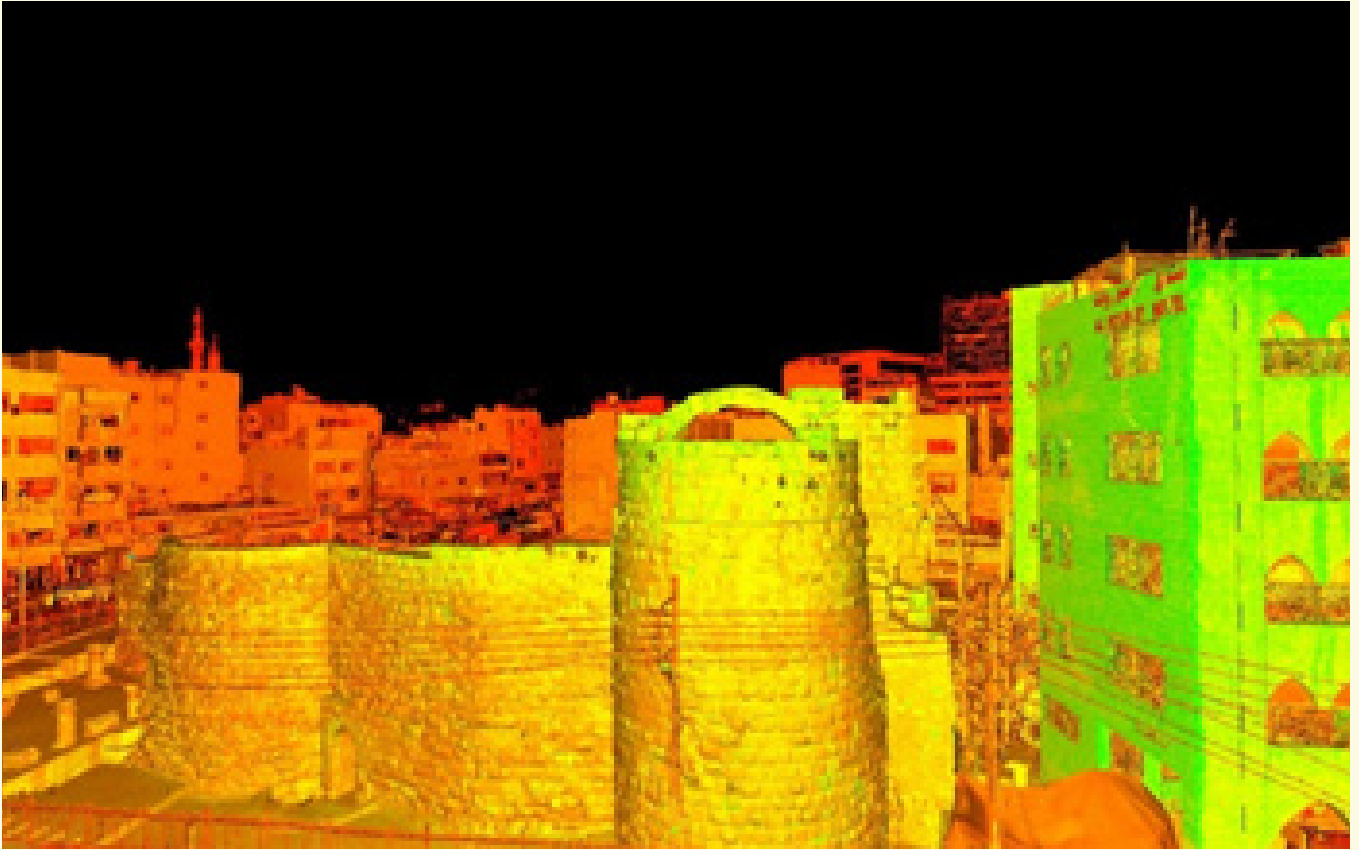
### Initial Data Processing Results:

From the previous accomplished 3D Laser scanning and advanced documentation conducted in cooperation with the Department of Antiquities (DOA). The collected data were processed by the responsible project team members and several sections and illustrations were developed for the conservation efforts and for the site management plan. More details of conservation interventions and deterioration features are added to the illustrations. The illustrations will be used for interpretation and presentation purposes.

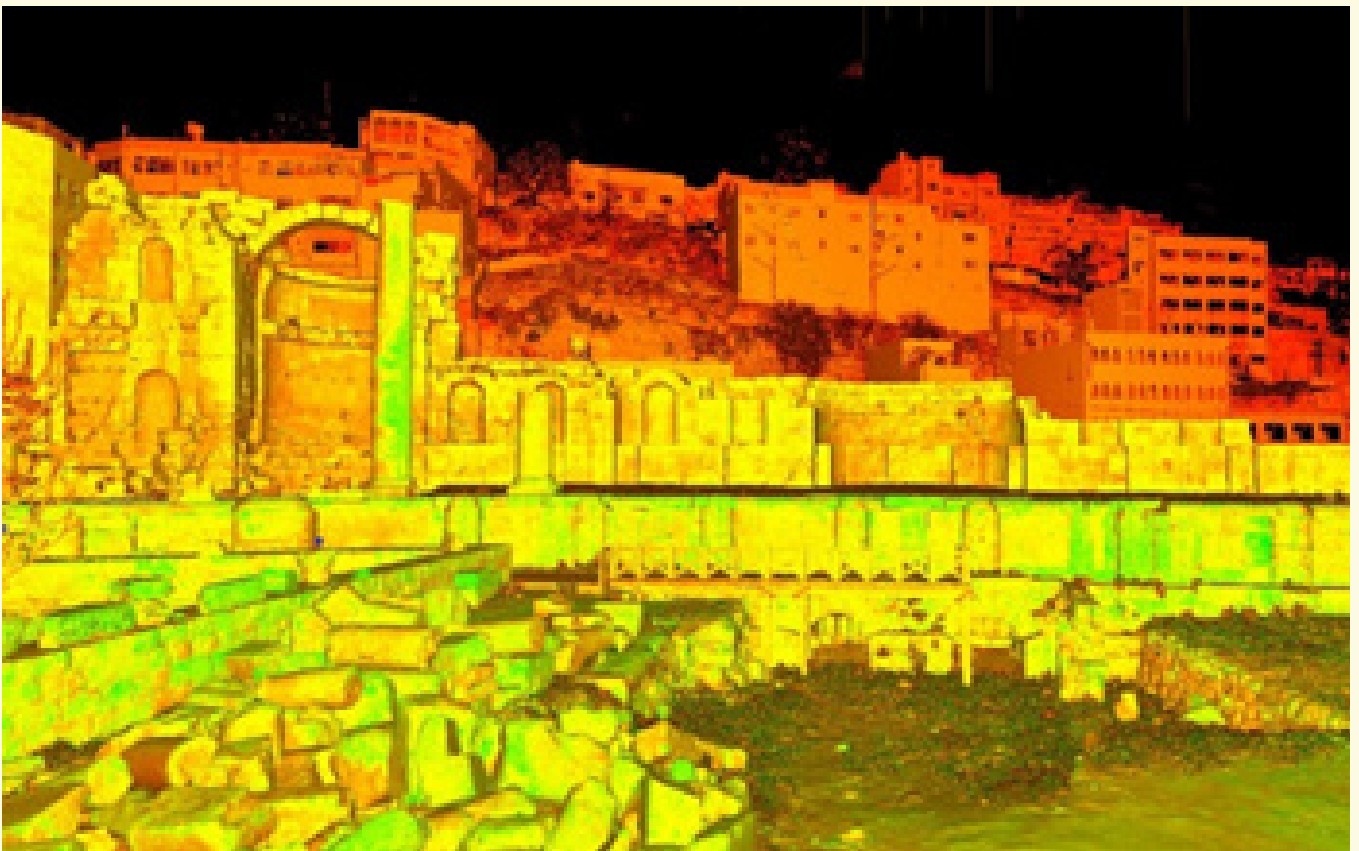


*Figs. 64: A view of a point cloud image for the main façade from the 3D scanning of the Nymphaeum*



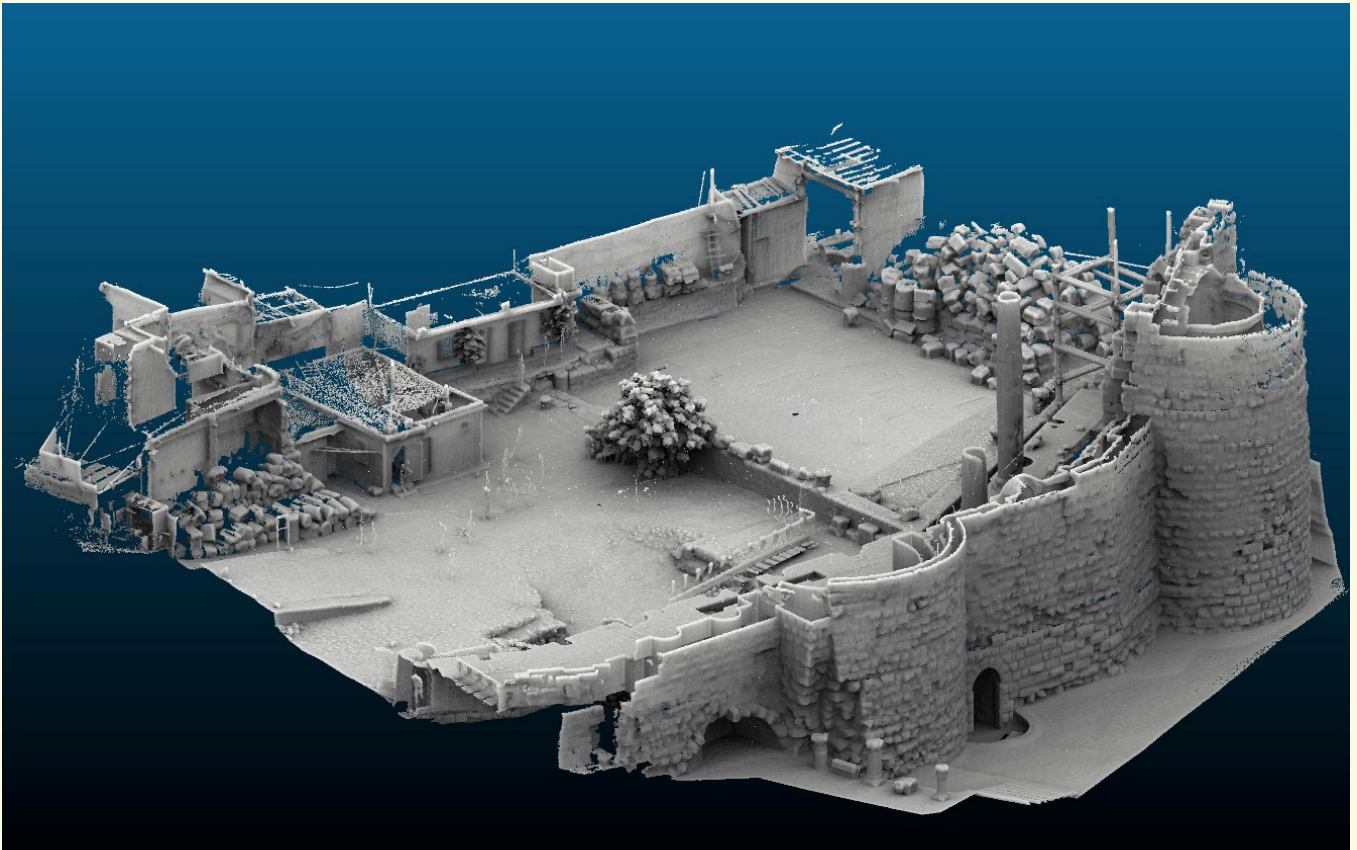


*Figs. 65: A view of a point cloud image for the rear façade from the 3D scanning of the Nymphaeum*



*Figs. 66: A view of a point cloud image for the main façade from the 3D scanning of the Nymphaeum*





*Figs. 67: A 3D model point cloud for the Nymphaeum*

#### **Advanced Data Analysis and Final Results:**

New plans and sections were developed in partnership with La Sapienza University of Rome. The documentation work was carried out by an international team made of Jordan and Italian researchers. The relevance of this experience, quite apart from the application of the 3D capturing technologies, must be found in two different but complementary aspects:

- the cooperative work flow between the team in Jordan (responsible for most of the capturing campaign) and the Italian team that mainly worked on the modeling phase (2D, 3D).
- the innovative use of the point cloud as base for orthophotos aiming at pushing the resolution of these images to the limit of the cloud itself. In this framework “giga orthophotos” were produced and widely used especially for the 2D models construction.

The activities carried out within the above-mentioned joint research project have been following this work flow:

- Collection and analysis of the dataset provided by the Jordan team.
- Cleaning, refinement, orientation and registration of the 3D point clouds.
- Production of referenced images from the general point cloud (geometric 2D models).
- Production of line drawings describing the detailed condition of the site and the monument.
- Construction of a hi-res polygonal 3D model by interpolation of the 3D point clouds.
- Texturization of the hi-poly 3D model.
- Production of a hi-res fly-through animation.





Fig. 68: 2D Geometric Model, RGB texturized Giga photo of the General Plan View, scale 1:50





Fig. 69: 2D Architectural Model, Plan View, upper level, line drawing scale 1:50



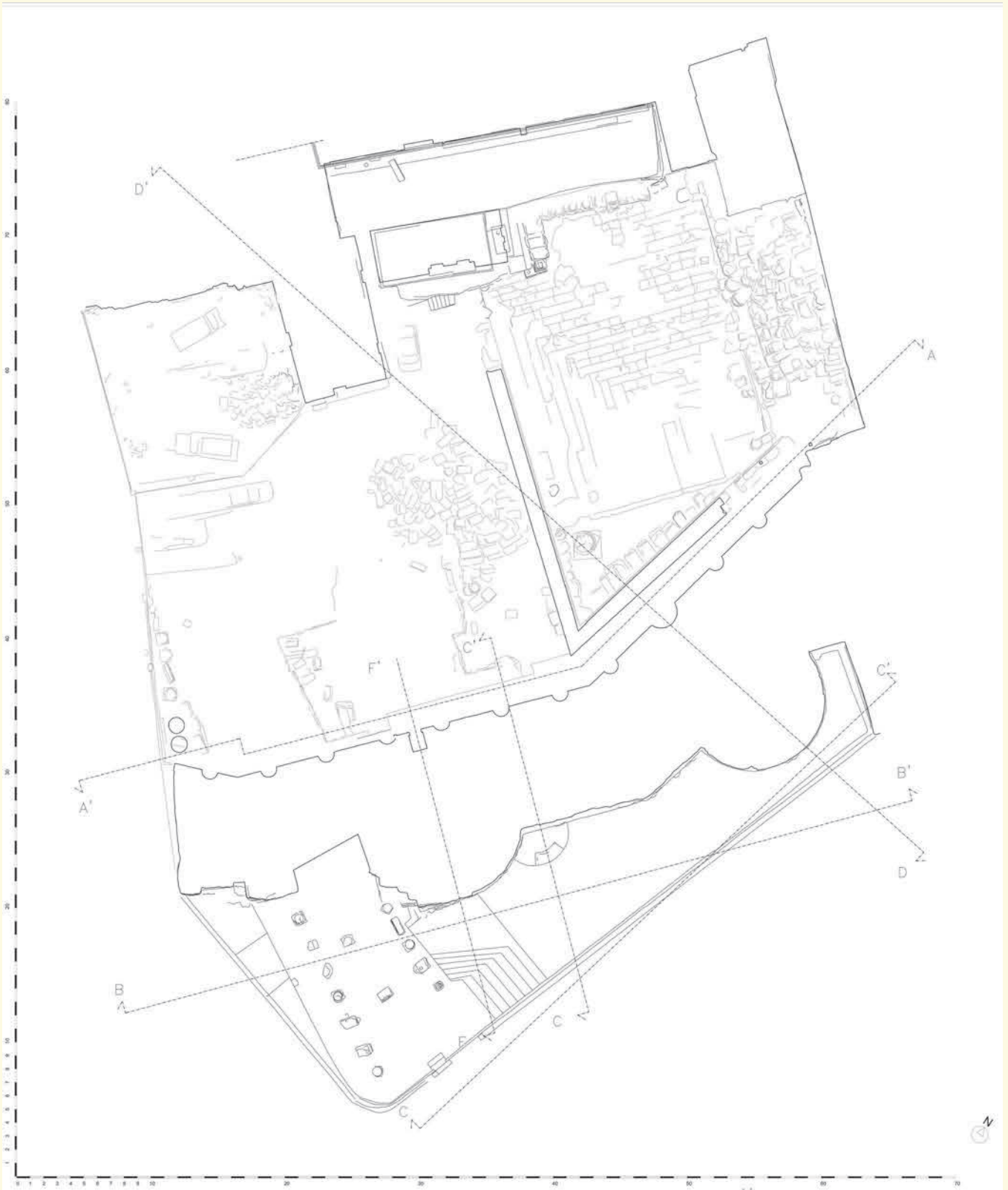


Fig. 70: 2D Architectural Model, Plan View, middle level, line drawing scale 1:50



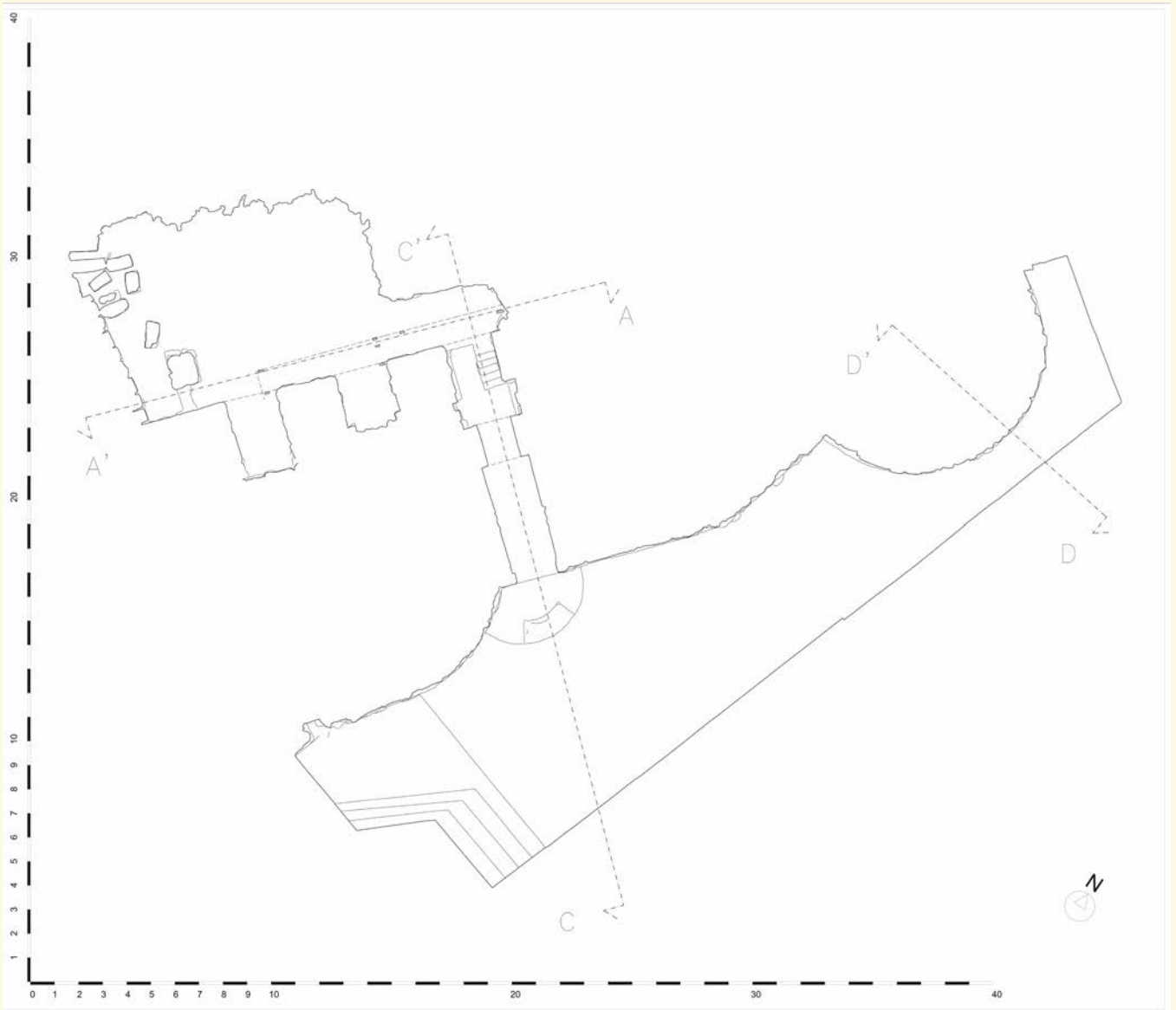
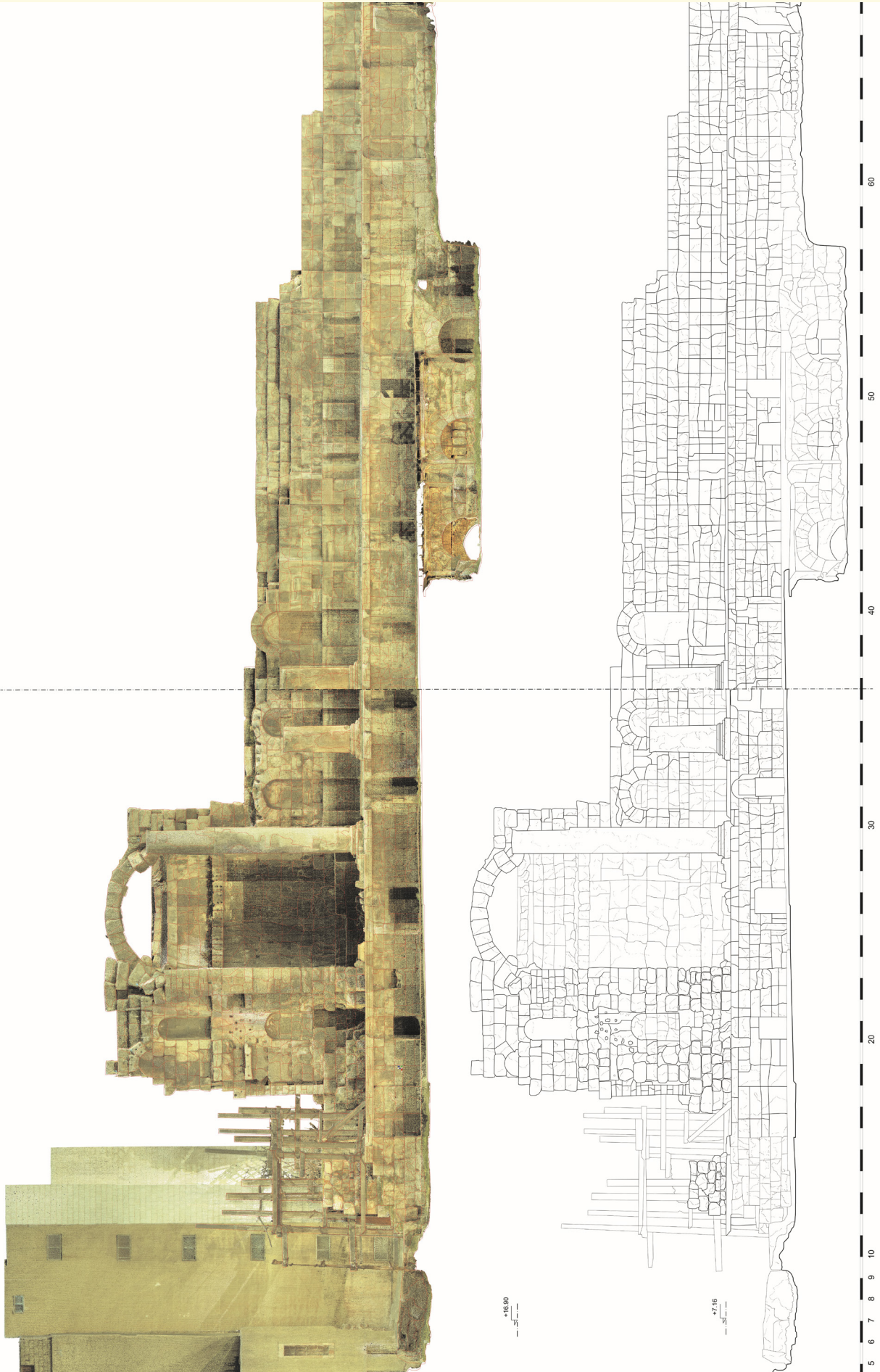


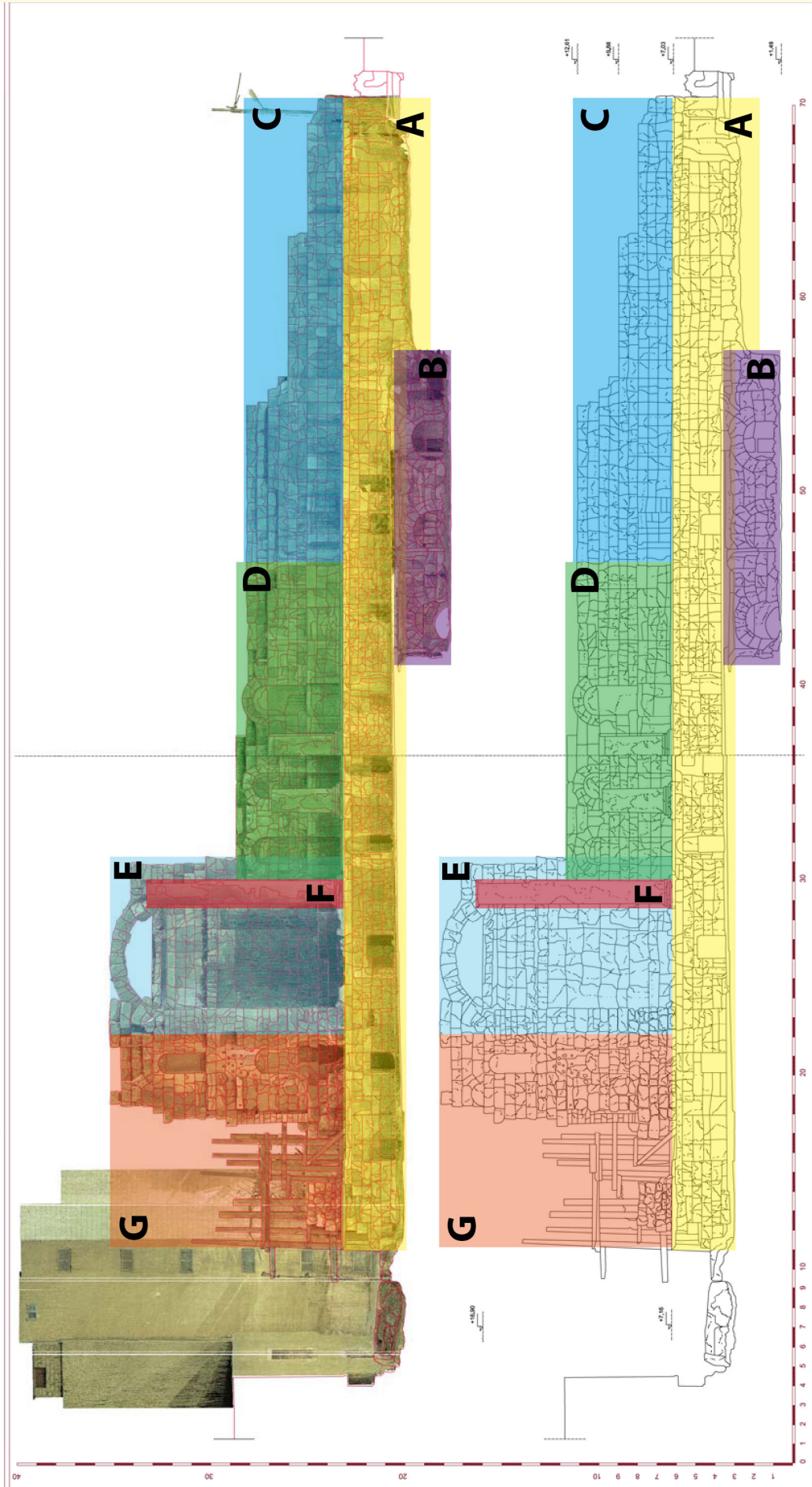
Fig. 70: 2D Architectural Model, Plan View, middle level, line drawing scale 1:50





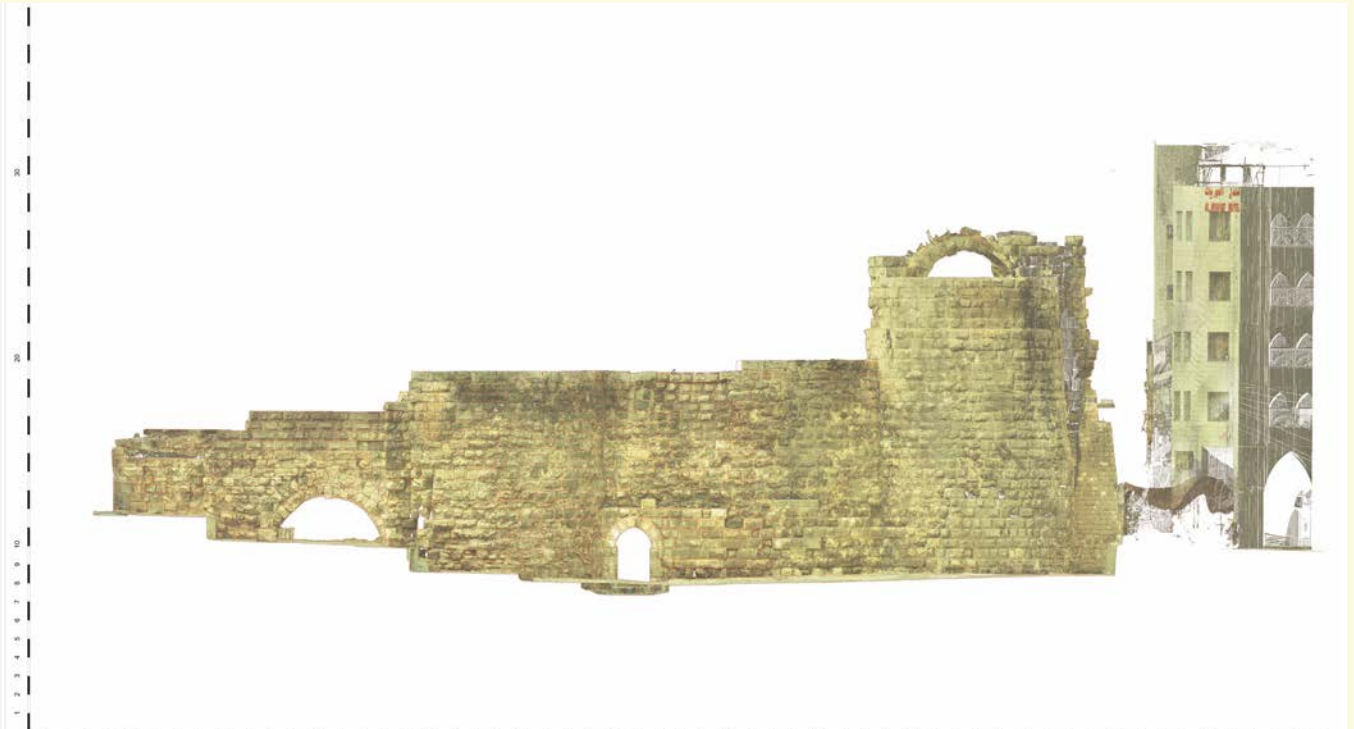
*Figs. 72-73: 2D Geometric Model, Elevation AA', internal main façade, RGB texturized Giga photo with overlay of the line drawing scale 1:50; 2D Architectural Model, Elevation, internal main façade, line drawing scale 1:50*



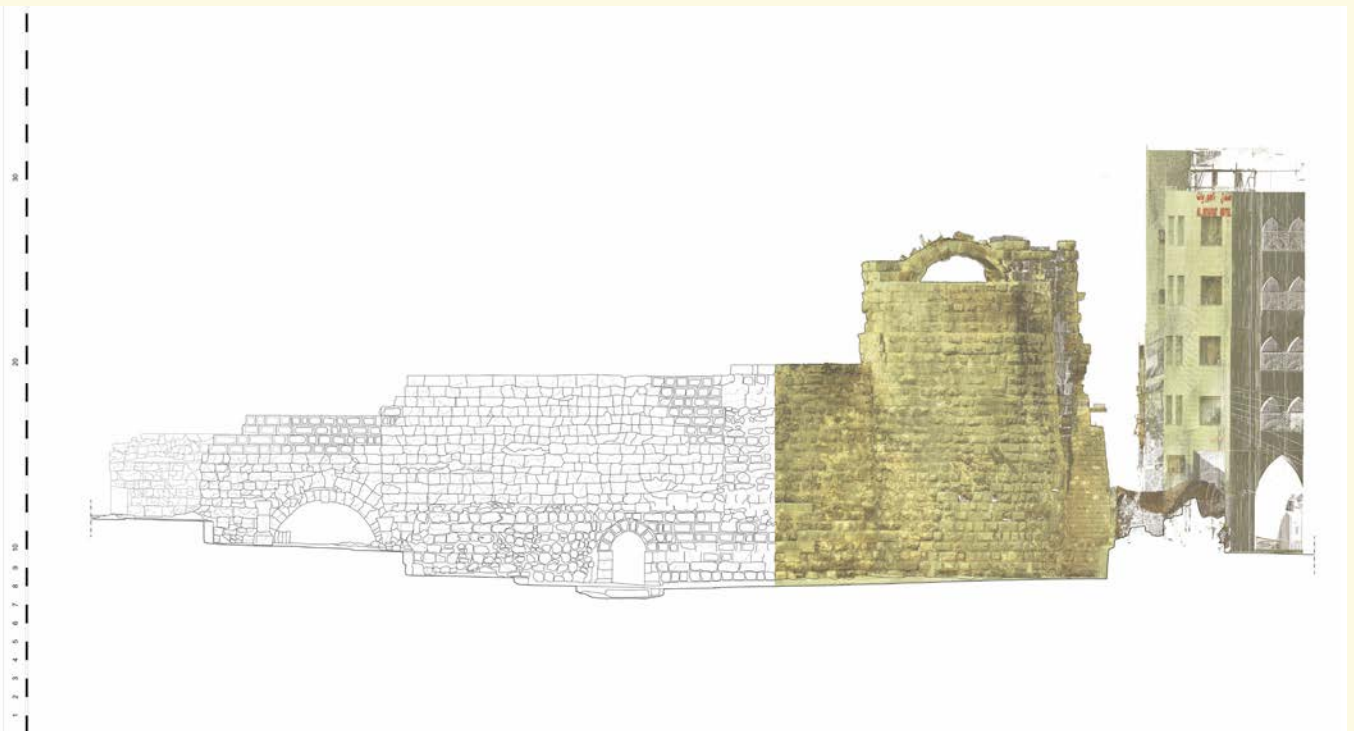


Figs. 74-75: Conservation intervention classification areas using the 2D Geometric Model, Elevation



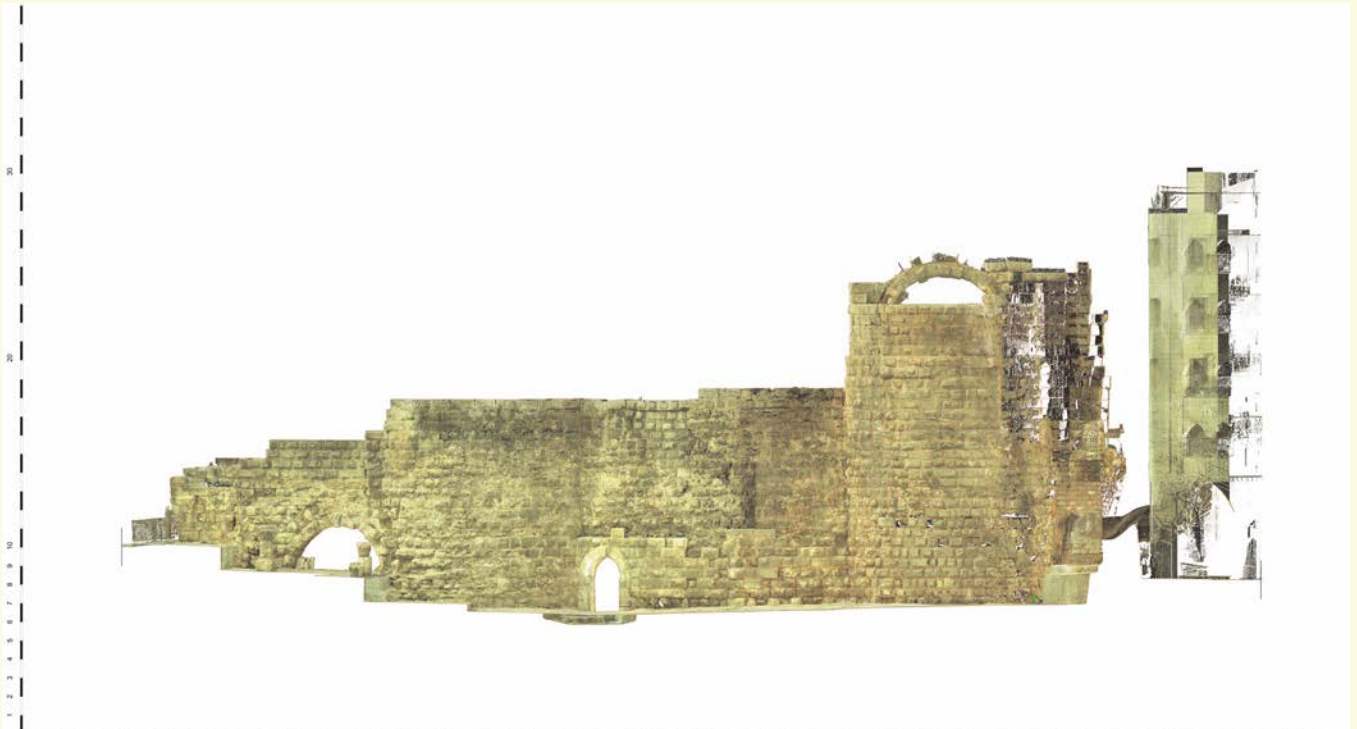


*Fig. 76: 2D Geometric Model, Elevation BB', external main façade - left portion, RGB texturized Giga photo with overlay of the line drawing scale 1:50. Due to the deformation caused by the inclined position of the right portion of the façade, the redrawing limited in this table only to the left part. The Giga photo on the right is thus added only to provide a complete reference and NOT for measuring purposes.*

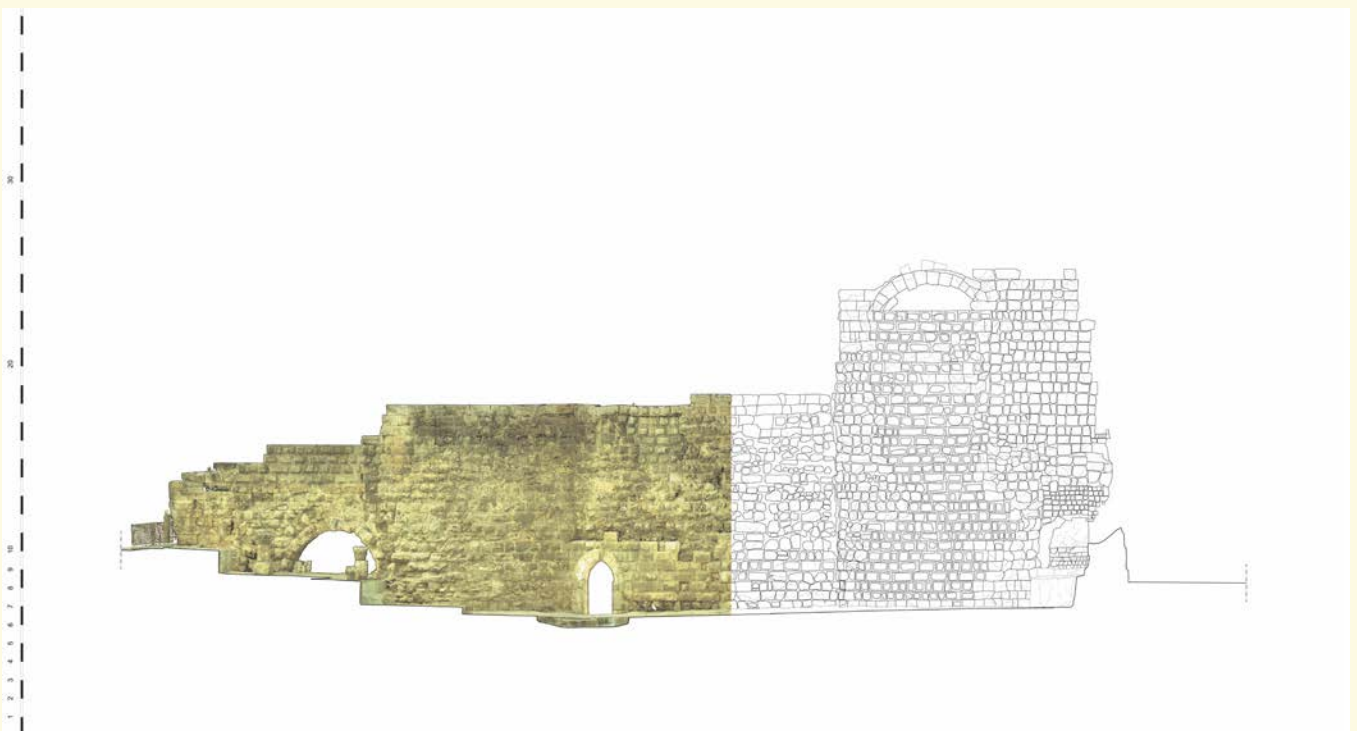


*Fig. 77: 2D Architectural Model, Elevation BB', external main façade - left portion, line drawing scale 1:50. Due to the deformation caused by the inclined position of the right portion of the façade, the redrawing limited in this table only to the left part. The Giga photo on the right is thus added only to provide a complete reference and NOT for measuring purposes.*





*Fig. 78: 2D Geometric Model, Elevation CC', external main façade - right portion, RGB texturized Giga photo with overlay of the line drawing scale 1:50. Due to the deformation caused by the inclined position of the left portion of the façade, the redrawing limited in this table only to the right part. The Giga photo on the left is thus added only to provide a complete reference and NOT for measuring purposes.*



*Fig. 79: 2D Architectural Model, Elevation, external main façade - right portion, line drawing scale 1:50. Due to the deformation caused by the inclined position of the left portion of the façade, the redrawing limited in this table only to the right part. The Giga photo on the left is thus added only to provide a complete reference and NOT for measuring purposes.*



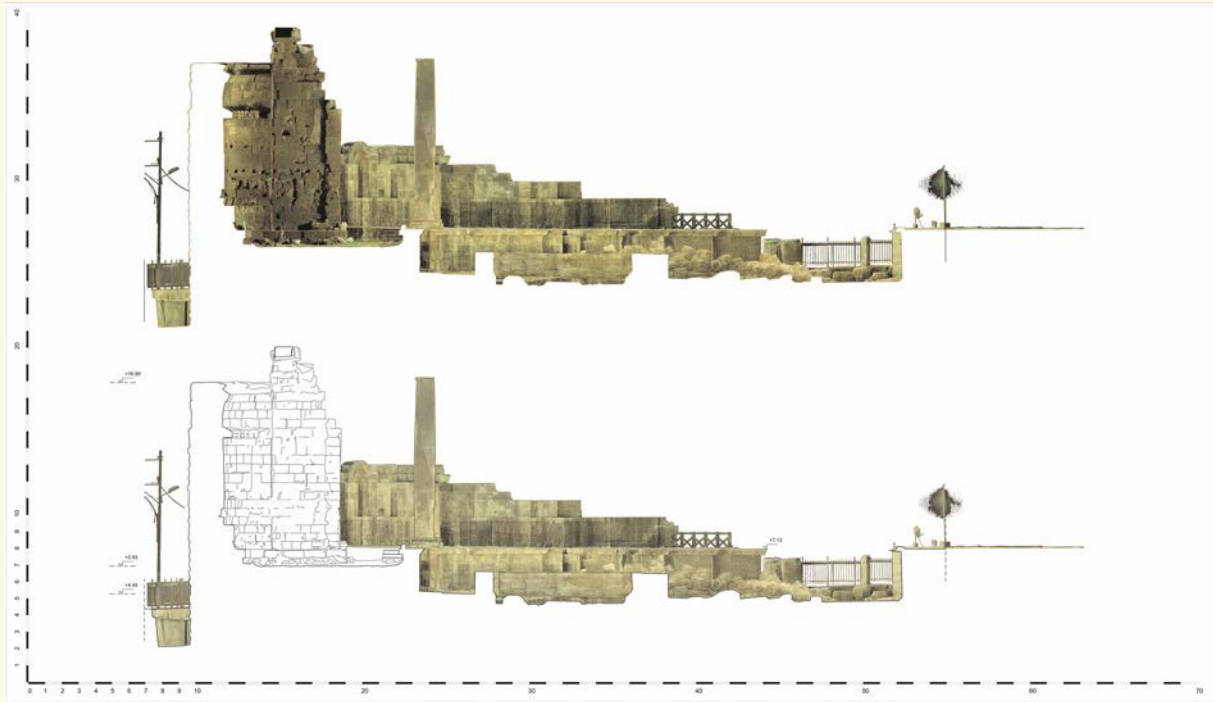


Fig. 80: 2D Geometric Model, Transversal Section DD' on higher tower, RGB texturized Giga photo with overlay of the line drawing scale 1:50. 2D Architectural Model, line drawing scale 1:50. Due to the deformation caused by the inclined position of the background structures, the redrawing limited in this table only to the appropriately oriented parts. The Giga photo on the right is thus added only to provide a complete reference and NOT for measuring purposes.

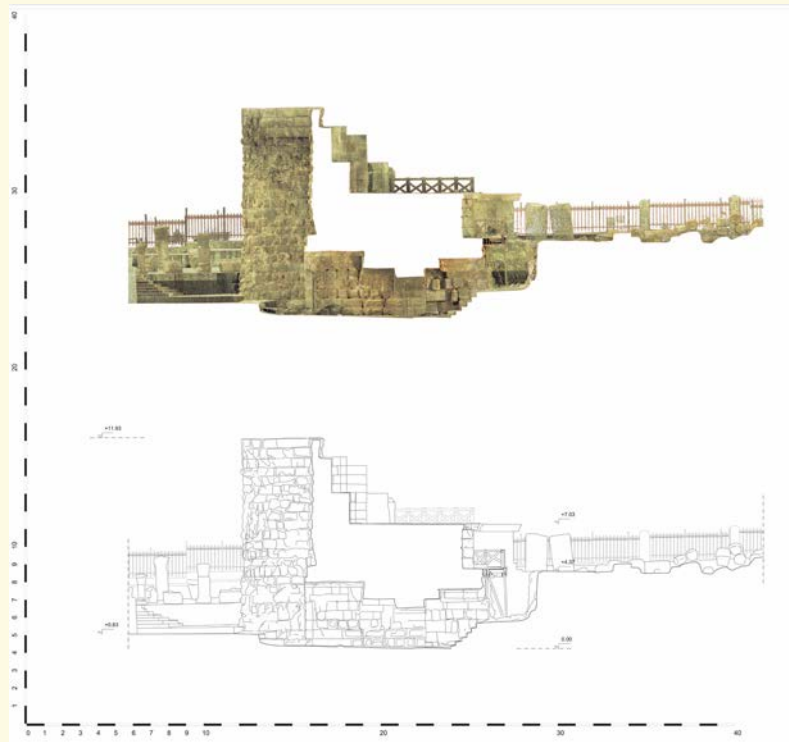


Fig. 81: 2D Geometric Model, Transversal Section EE' on the wall between the towers, RGB texturized Giga photo with overlay of the line drawing scale 1:50. 2D Architectural Model, line drawing scale 1:50.



**C2.1. Conduct advanced documentation for the monument and the whole surrounding plazas and area using 3D Laser Scanner for the monument after the finalizations of all preservation and rehabilitation works.**

The project conducted a 3D photogrammetry documentation for the site after the end of the intervention of the project and the results were used to produce different panels and drawings for the Nymphaeum.

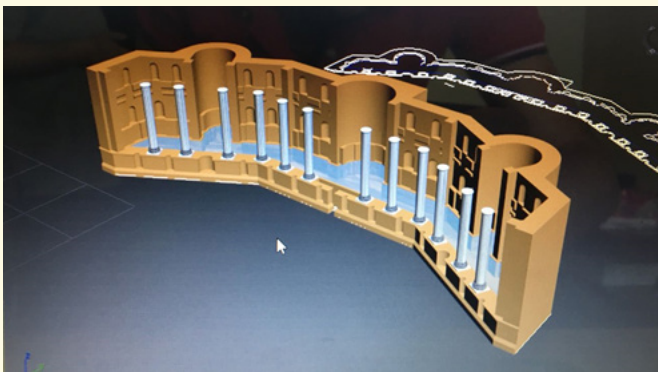


Fig. 82: As a result of the photogrammetry 3D documentation

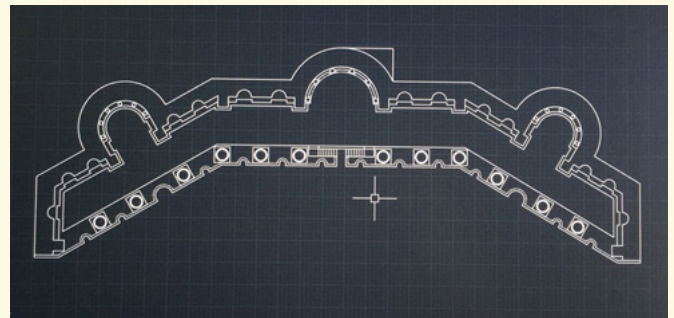


Fig. 83: Producing a plan of the Nymphaeum based on its original structure

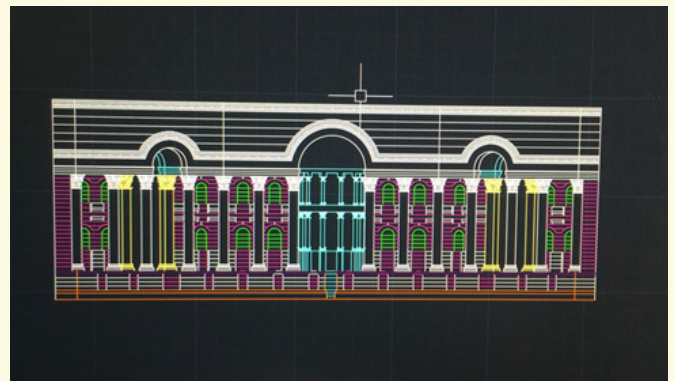


Fig. 84: Producing a detailed elevation of the Nymphaeum based on its original structure

**C2.2. Data Processing to produce illustrations and detailed drawings for the "The Nymphaeum Archaeological Park" (3D Models, plans, sections, elevations, etc.)**

Based on the previous documentation of the Nymphaeum and using old footage and drawings by scholars from the 1900s, project team members were able to reproduce an accurate site map that is used now for the interpretation panels and promotional material as follows (fig. 85):

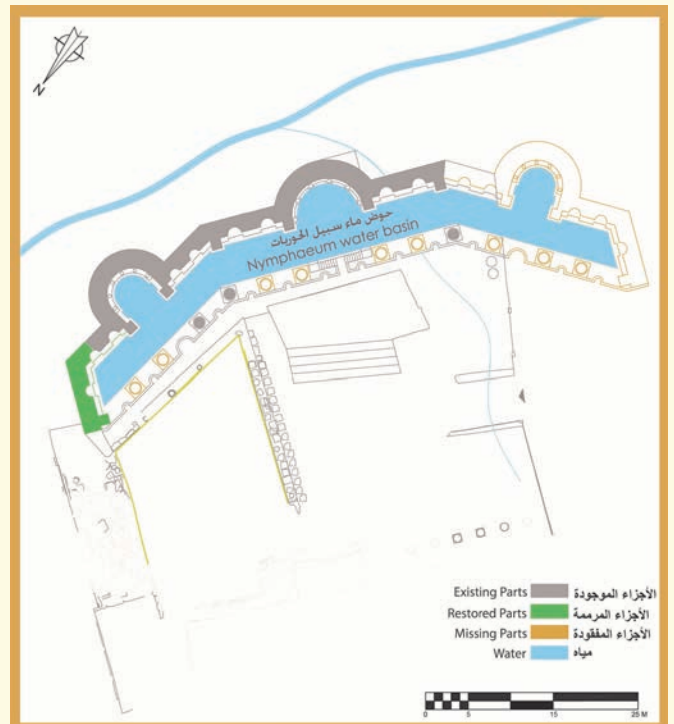


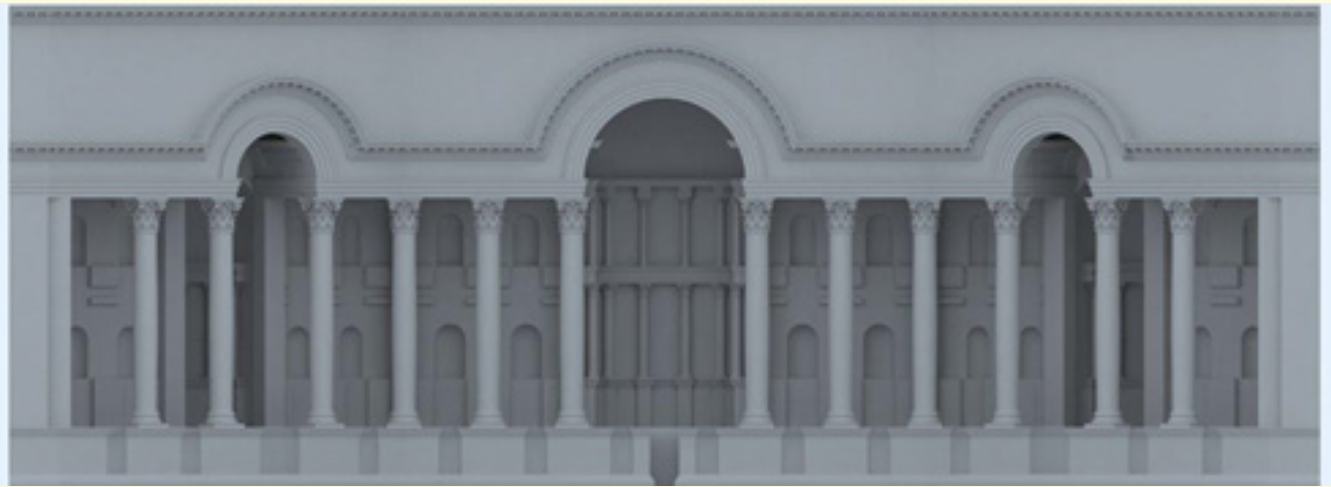
Fig. 85: Producing a plan of the Nymphaeum based on its current situation and after constructing the buttress



### C.2.3. Virtual 3D model construction to provide a professional interpretation for the site.

Dr. Mohammad El-Khalili, Director of Restoration and Conservation, and Nizar Al Adarbeh, Site Management and Tourism Development Expert, worked with Adel Mtawi, an architect student from the University of Petra under the Tarmeem Center to develop a 3D suggested

model for the Nymphaeum. In order to regenerate a better model showing a suggested 3D reconstruction for the monument, the team used all the previous project produced drawings and illustrations in addition to previous proposed models of the Nymphaeum. The 3D model was 3D-printed and installed in one of the interpretation panels at the site (figs. 86-91).



*Fig. 86: The 3D rendered model for the Nymphaeum showing the main façade*

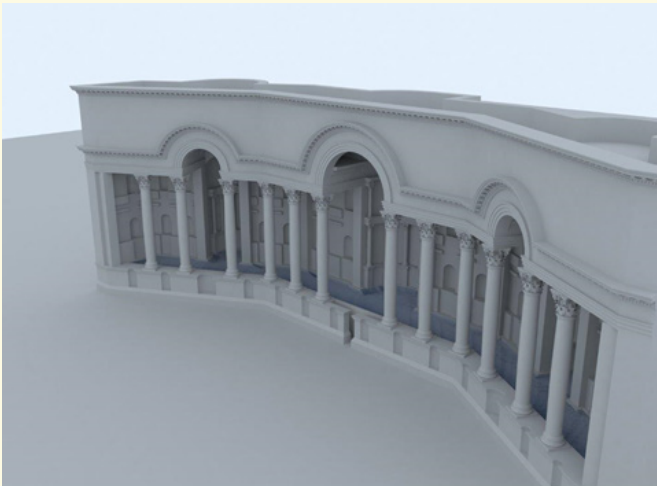


*Fig. 87: The 3D rendered model for the Nymphaeum showing the eastern side of the monument with the interior details*

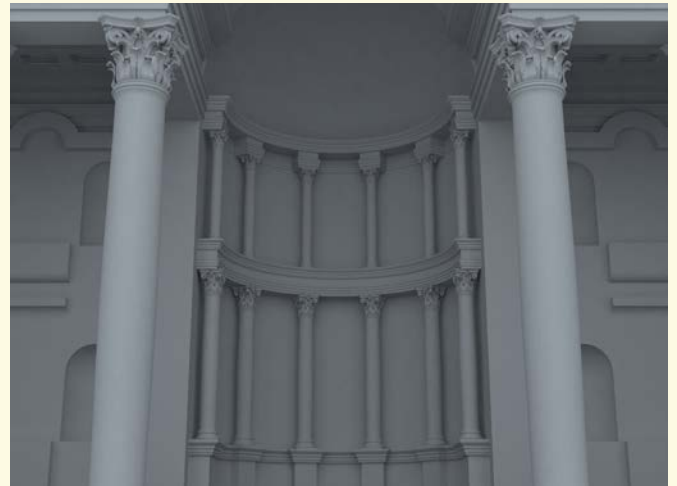


*Fig. 88: The 3D rendered model for the Nymphaeum looking towards the western part*





*Fig. 89: The 3D rendered model for the Nymphaeum showing a top view overlooking the basin filled with water*



*Fig. 90: The 3D rendered model for the Nymphaeum showing the main central apse*



*Fig. 91: The 3D rendered model for the Nymphaeum showing the interior of the area of the constructed buttress in the eastern part of the monument*



# COMPONENT III: CAPACITY BUILDING AND RAISING AWARENESS

The project team members after the preparation of the training material worked on a hands-on field training program for target groups from university students of different majors including: Conservation, Cultural Resources Management, Chemistry, Biology, Tourism Management, Architecture, and Urban Planning. The students engaged during the lifetime of the project were mainly from the following universities:

- University of Jordan (UJ)
- Hashemite University (HU)
- Petra University (UoP)
- Jordan University of Science and Technology (JUST)
- German Jordanian University (GJU)



Fig. 92: A view of project team members during a working day at the Nymphaeum site



### **C3.1. Conduct applied training programs targeting young graduate students with the majors of conservation and cultural resources management and employees of the Department of Antiquities of Jordan.**

The project offered field visits for around 200 university students and around 40 hands-on field training opportunities for target groups from the Department of Antiquities and university students of different majors including: Conservation, Cultural Resources Management, Chemistry, Biology, Tourism Management, Architecture, and Urban Planning. Target groups were mainly engaged in the following activities under the project:

#### **Site Visits:**

Several field visits organized to more than 200 students from different universities based on arrangements with university professors in order to match the curricula with practical exercises in the field. The site visits were focused on presenting

the deterioration features and factors, site conservation interventions, different techniques used for preservation, consolidation, cleaning, and reconstruction (figs. 93-95). Also presented to the students was the concept of site planning, management, and tourism development. In addition to joint visits with the DOA senior team members were conducted (fig. 94).



*Fig. 93: During a field visit at the Nymphaeum for a group of students from the University of Jordan during March 2018*



*Fig. 94: During a joint field visit at the Nymphaeum with the senior team of DOA including the General Director Dr. Monther Jamhawi during March 2018*





*Fig. 95: During a field visit for the Hashemite University at the Nymphaeum site*

### **Scientific Workshops:**

The project organized a scientific workshop at the Hamdi Mango Center for Scientific Research (HMCSR) at the University of Jordan on 12 January 2017 for more than 50 university students on different work components of the project. The program included introduction about the project, conservation and restoration of the Nymphaeum, advanced documentation, chemical conservation, and site management and tourism development (figs. 96-97).

On 31 March 2018 the project organized a scientific workshop focused on presenting to the students the concept and philosophy behind the Nymphaeum project including full description and discussion on the project components as well as details on the opportunity for students to take part in the project through hands-on training in the field



*Fig. 96: Workshop participants at Hamdi Mango Center*



*Fig. 97: Participants received certificates after the attendance of a full day scientific workshop on the Nymphaeum Project at Hamdi Mango Center during March 2018*



### Scientific Research:

The project discussed with several university professors the opportunity of using the Nymphaeum as a case study through encouraging students to conduct their thesis and graduation projects on subjects relevant to the project components while

the project offered facilitation and material needed for the research. This practice enhanced the capacity building results of the project and ensured more sustainable results of the project with hands-on applications.



Fig. 98: During a student project presentation from the Petra University on urban planning and rehabilitation considering the Nymphaeum site as a public space

### Hands-on Training:

Around 40 university students from undergraduate and graduate levels took part in different conservation and restoration intervention phases of the project. Mainly the students worked on performing documentation, cleaning process, consolidation, replacement and reconstruction. This opportunity enhanced the applied skills of students and exposed them to very technical field work techniques. The project used the trained teams as conservation and documentation technicians and around 10 members were selected to continue working at the site for longer periods (figs. 99-103).

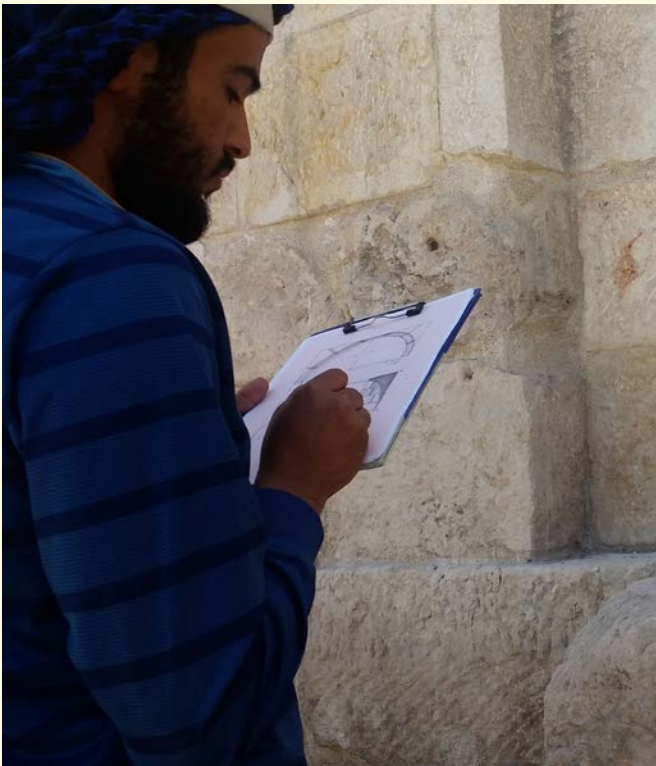


Fig. 99: One of the team members working on consolidation at a subterranean vault at the site





*Fig. 100: One of the graduate students numbering stone parts at the site*



*Fig. 101: One of the students making detailed drawings of different parts of the Nymphaeum structural elements and ornamental features*



*Fig. 102: One of the students performing final stages of detailed photos for the Nymphaeum after the conclusion of the conservation and restoration interventions*





*Fig. 103: Students working on façade cleaning*

### **C3.2. Enhance public awareness of the importance of the Nymphaeum as part of the main cultural treasures of Amman downtown.**

The project published many posts on its Facebook page ([www.facebook.com/AmmanNymphaeumProject](http://www.facebook.com/AmmanNymphaeumProject)) to highlight the importance of the project and the significance of

the Nymphaeum as a major attraction in Amman. The site was highlighted and received massive visibility across all social media and at all local media outlets during different stages of project implementation. In addition to the public workshop the project organized lectures at the universities.



*Fig. 104: During a lecture on the Nymphaeum Project for the students at the Hashemite University*



# COMPONENT IV: SITE MANAGEMENT & ARCHAEOLOGICAL PARK ESTABLISHMENT

The project team members worked on several issues related to enhancing the management of the site through formulating a site management plan, enhancing the circulation and conducting different interventions to make the site ready as an archaeological park:

- Safeguarding the environment
- Landscaping
- Lighting the site
- Aerial Photography
- Re-fencing the site



*Fig. 105: A view of the wooden bridge after being repaired and extended*



#### **C4.1. Safeguarding the environment of the Nymphaeum by enhancing and beautifying the surrounding environment through cooperation with the Greater Amman Municipality.**

The project team worked on the analyses of the site management needs and worked on different corrective actions directly focused on the following:

##### **Safeguarding the environment:**

Today the major achievements of the conservation results are very clear at the site and now any visitor who knows the monument can express the huge difference, not only because of the successful conservation and restoration accomplished but also the full valorization of the space and reorganization

of stone parts and the removal of the odd and intrusive structures and any visual pollution inside the site (fig. 106). This intervention also increased the available space to be used for cultural activities.

The project started the dismantling of the old temporary structures installed by DOA as a storage and a workspace during the old restoration project at the site (figs. 107-110). The barracks were considered a very dis-figurative element and a visual pollution. This was an important step and key to proper management of the site and towards its transformation into an archaeological park.



*Fig. 106: The barracks before they were removed.*

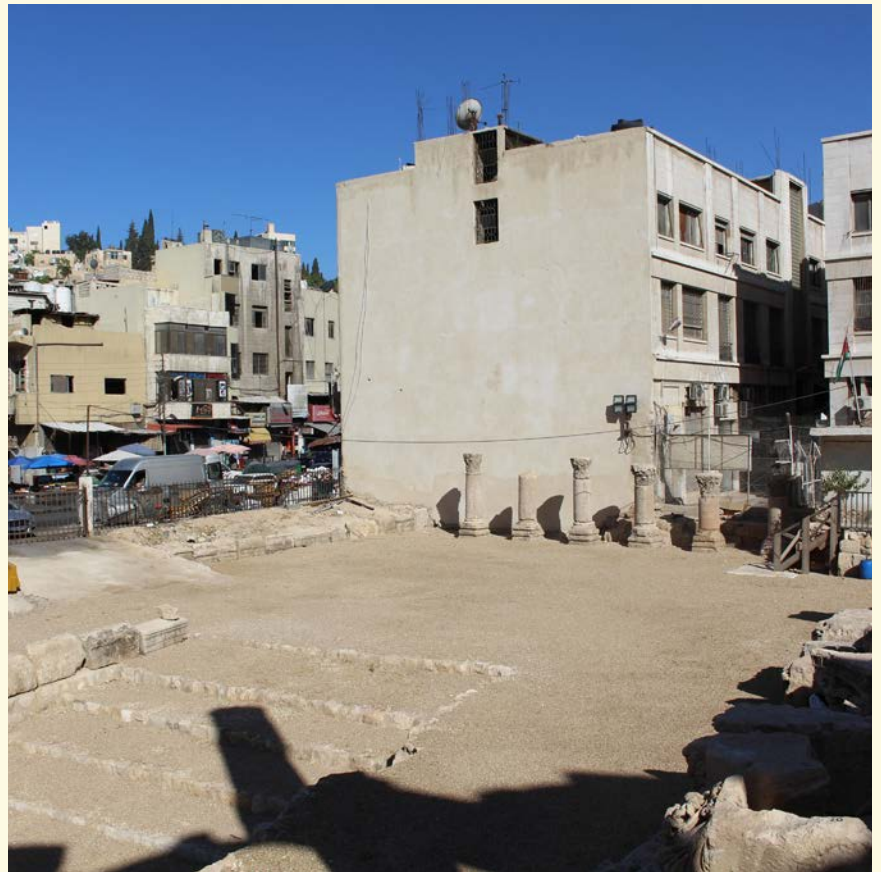


*Fig. 107: The area after the removal of the barracks.*





*Fig. 108: The DOA temporary rooms and the fig tree before removal*



*Figs. 109 & 110: Site after covering side building façade, removal of temporary rooms and the fig tree and after covering the ground with gravel*



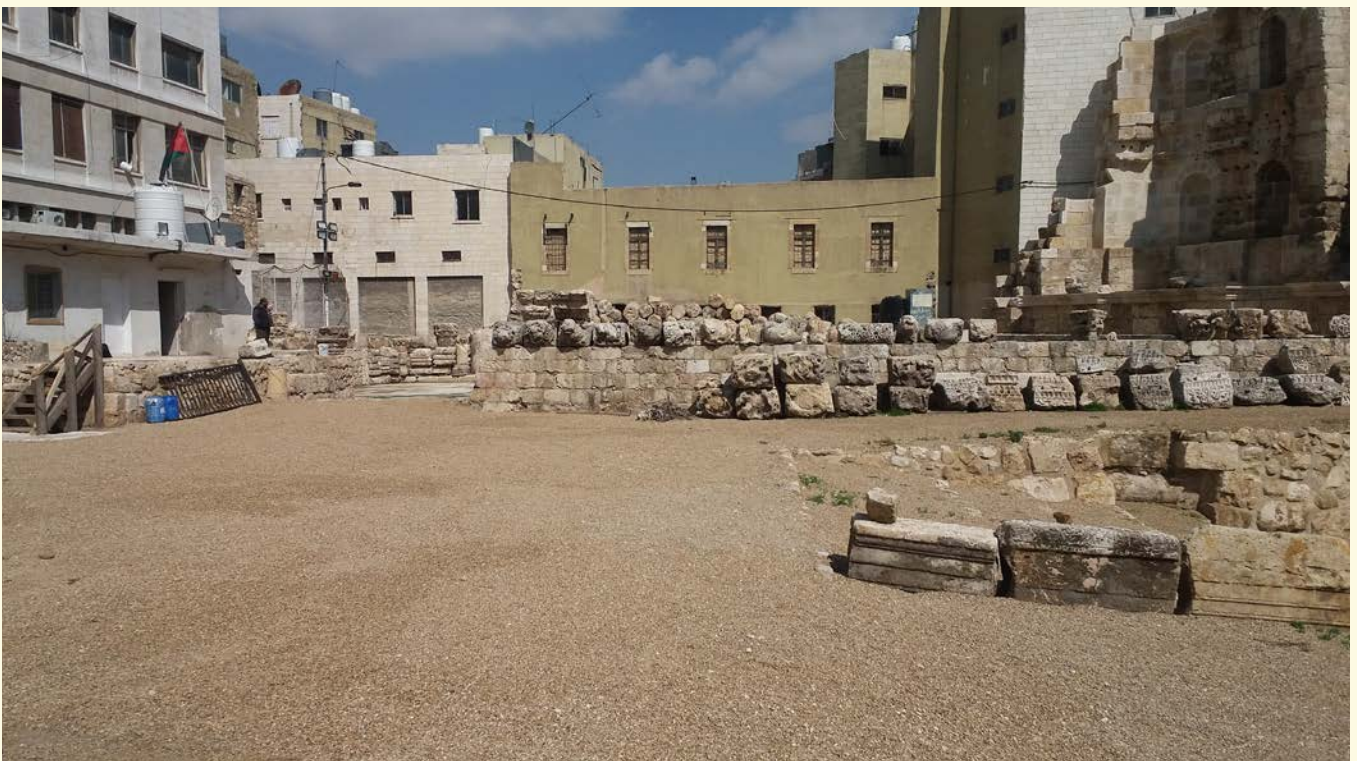
## Landscaping:

The project conducted a whole clean up for the front area from debris and then installed some terraces and compatible landscaping which proved to be effective during winter in the last quarter of 2016. During the first quarter of 2018, the project team continued the work on different areas of the site with additional landscaping interventions. The

last stage of leveling and landscaping was covering the site open areas and part of the basin of the Nymphaeum with gravel to provide a unified look and make it easier for circulation as well as to limit the possibility of vegetation growth (figs.111&112).



*Fig. 111: Site during leveling and before ground was covered with gravel*



*Fig. 112: Site after leveling and after ground was covered with gravel*





*Fig. 113: Basin before starting the project interventions*



*Fig. 114: Basin after end of project restoration and conservation and the basin covered with gravel*





*Figs. 115-116: Basin before starting the project interventions (left) and after (right) end of project with all restoration and conservation interventions and the basin covered with gravel*

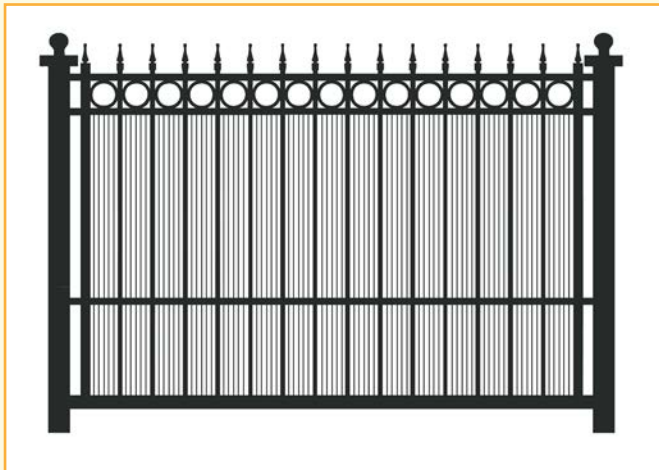


### Lighting up the site:

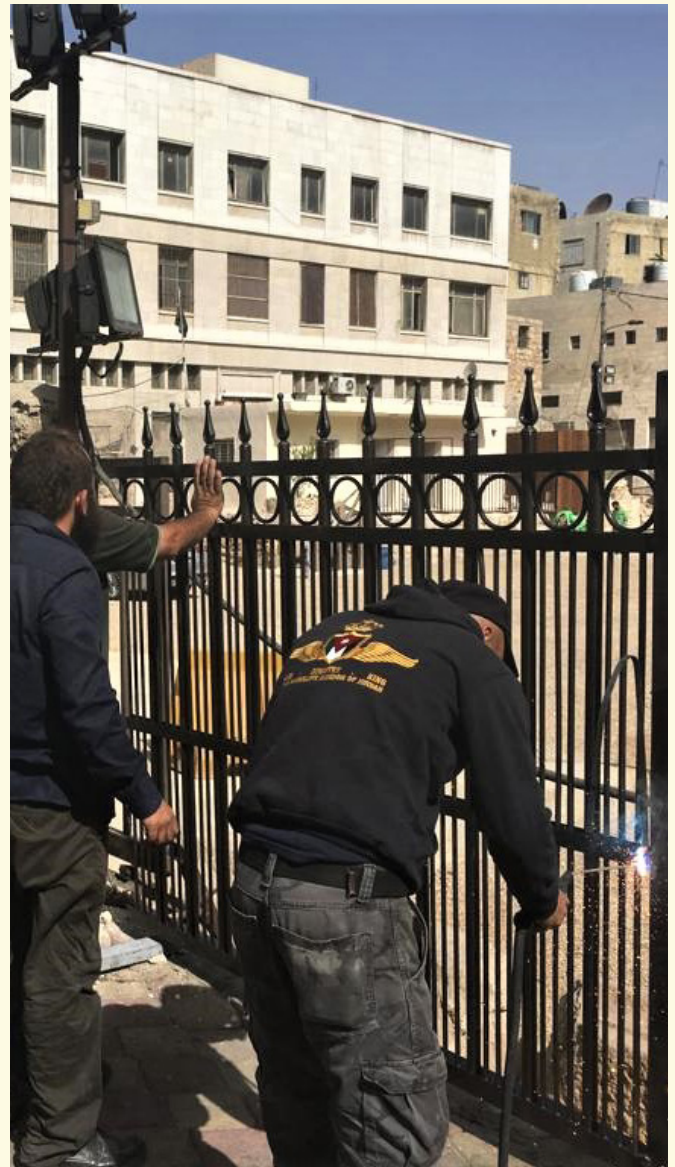
The project cooperated with GAM to install a new lighting using LED system for lighting the site at night which enhanced the presentation of the site and became a great attraction to downtown Amman (fig. 119). This was a planned action and a prerequisite to enable the project to activate the utilization of the site for night activities.

### Re-fencing the site:

In cooperation with GAM and DOA the project designed a new fencing system for the site and GAM produced and installed the new fencing which enhanced its protection (figs. 117-119).



*Fig. 117: Nymphaeum new fence design by Nizar Al Adarbeh.*



*Fig. 118: GAM workers installing the new fence around the Nymphaeum site.*



*Fig. 119: The Nymphaeum with lights at night and with the new fence after installation.*



## Aerial Photography

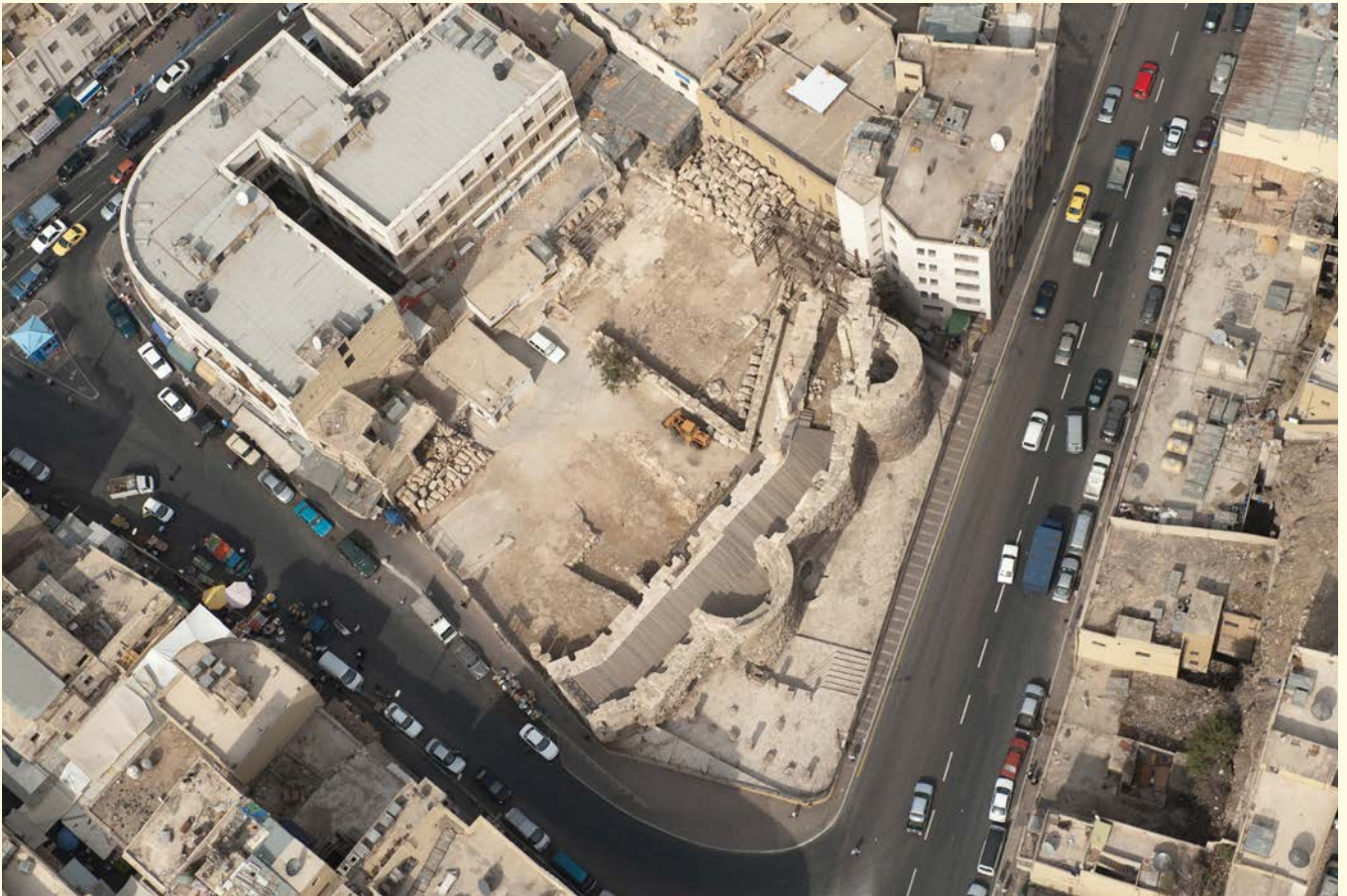
In order to trace back the different stages of the site intervention and the Nymphaeum Project achievements, the project contacted Aerial Archive for Archaeology in the Middle East (APAAME) and retrieved a very good collection of aerial photos for the Nymphaeum. These photos are very useful for understanding the different stages of site development (figs. 120-127). Project Team

coordinated with APAAME to conduct new aerial photography in their mission to Jordan during October 2018. APAAME is a long-term research project founded by David Kennedy and based at the University of Sheffield (1978-1990) and then the University of Western Australia (1990-2015) ([www.apaame.org](http://www.apaame.org)).

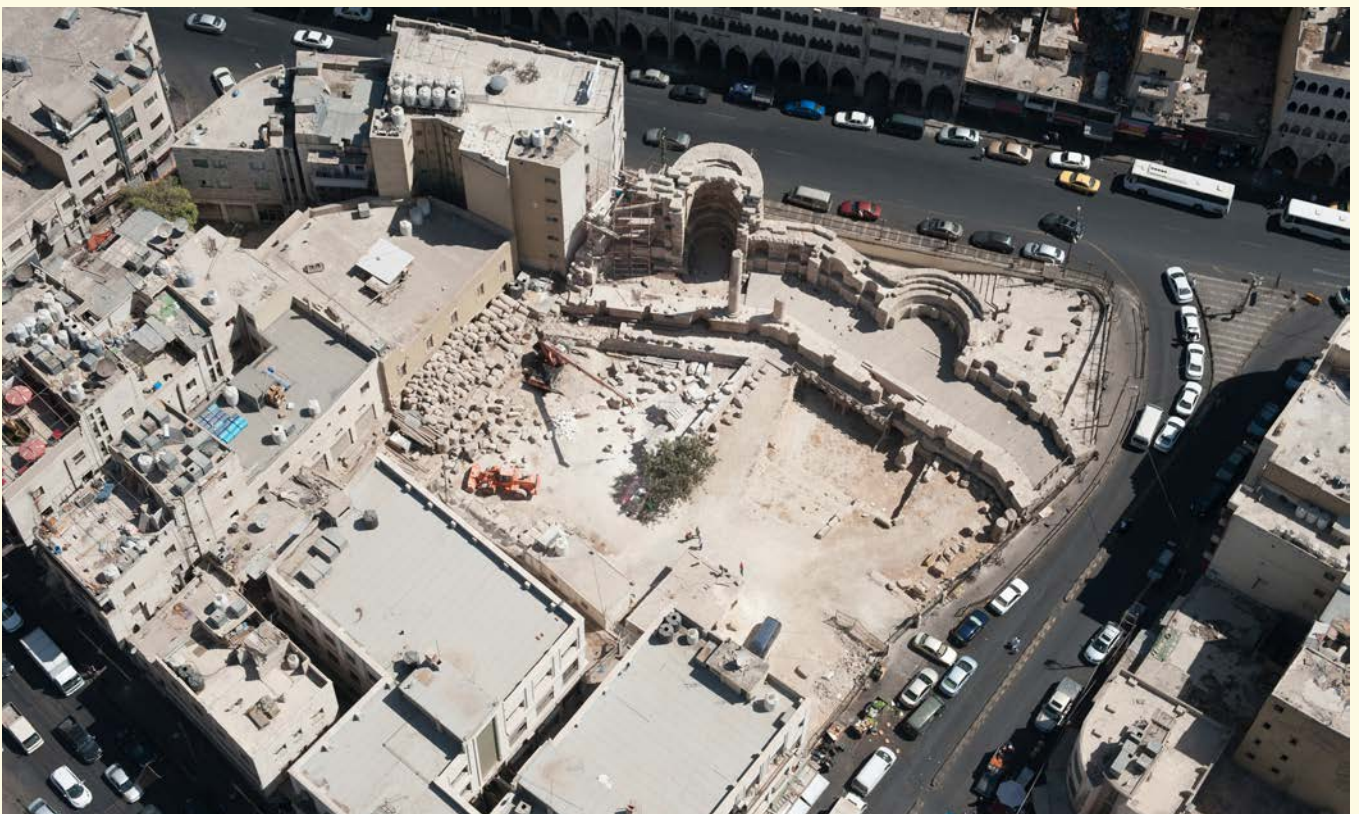


*Figs 120: Aerial Photography of the Nymphaeum (©APAAME\_19980521\_DLK-0016)*





*Fig. 121: Aerial Photography of the Nymphaeum (©APAAME\_20091019\_DLK-0305)*



*Fig. 122: Aerial Photography of the Nymphaeum (©APAAME\_20170927\_MND-0682)*





*Fig. 123: Aerial Photography of the Nymphaeum (©APAAME\_20170927\_DLK-0595)*



*Fig. 124: Aerial Photography of the Nymphaeum (©APAAME\_20181022\_RHB-0661)*





*Fig. 125: Aerial Photography of the Nymphaeum (©APAAME\_20181022\_MND-0857)*



*Fig. 126: Aerial Photography of the Nymphaeum (©APAAME\_20181022\_MND-0849)*





## **C4.2. Establish an “Archaeological Park” model based on the standards of the UNESCO and World Heritage Convention. (In cooperation with the Department of Antiquities).**

### **Site circulation:**

The development of site plans and illustrations enhanced the modeling of the management for the site through identifying the needed further changes inside the site in terms of solving some major problems related to the old buildings constructed by DOA for the purposes of excavation and conservation as well as working on the study of needed landscaping interventions. The following main interventions were conducted, including removing the temporary rooms from the site, mitigation measures and preventive conservation, circulation of and safety of visitors, and the cultural forum area establishment (fig. 128). Furthermore, in cooperation with the DOA, the project included in the site management plan monitoring and future maintenance of the site as an Archaeological Park (fig. 129).

### **Wooden Installations**

Other important intervention at the site is the fixing and replacement of the wooden bridge, platforms, and stairs. This intervention involved replacing damaged wooden beams and fixing the whole platform area on top of the basin to ensure safety, in addition to installing a platform and wooden stairs (figs. 130-132).

*Fig. 127: Aerial Photography of the Nymphaeum and the Amman Citadel (©APAAME\_20181022\_MND-0858)*





Fig. 128: Nymphaeum Site Plan with visitor circulation

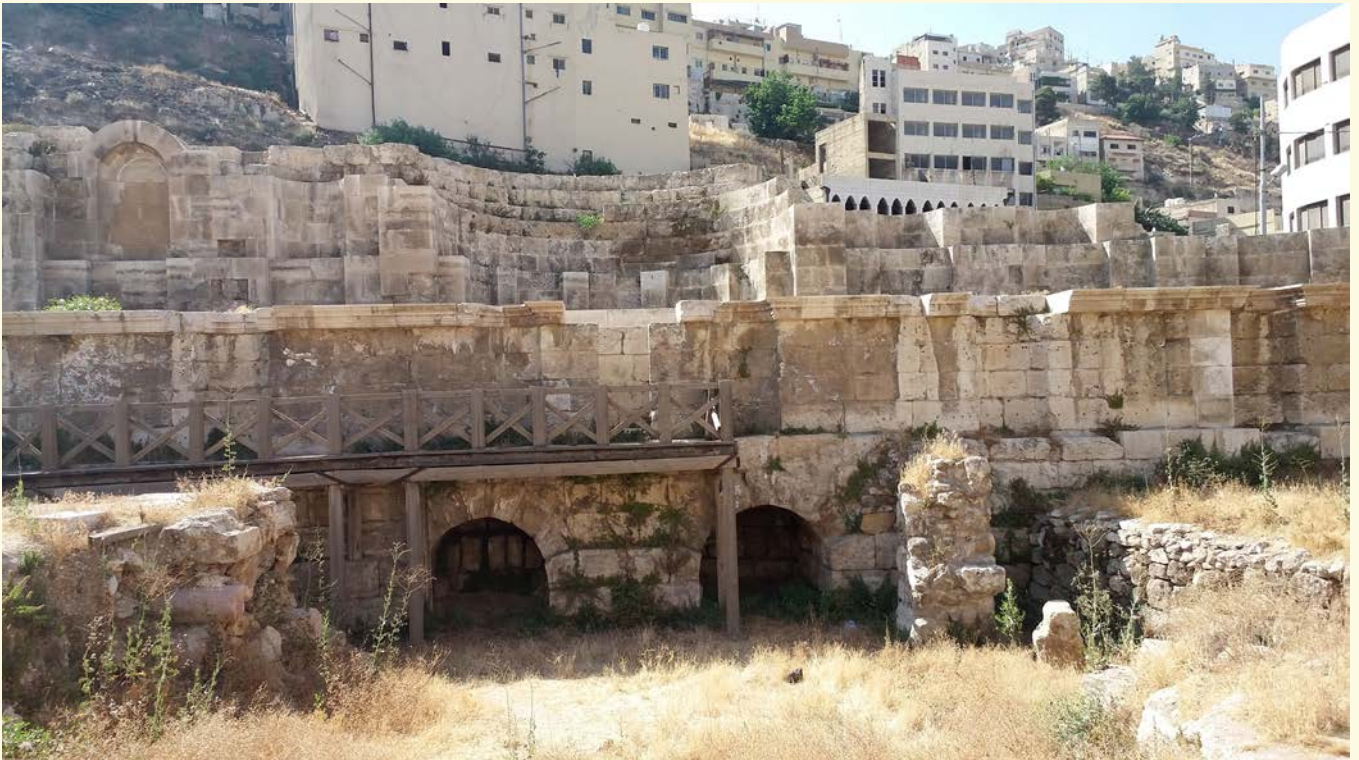


Fig. 129: Discussing with DOA the key challenges at the site and future monitoring and maintenance needs



Fig. 130: The project team during the discussion of the bridge extension.





*Fig. 131: Front façade with the bridge before starting the project*



*Fig. 132: Front façade with the new bridge extension at the end of the project with all restoration and conservation works concluded and the site ground covered with gravel*



# COMPONENT V: TOURISM DEVELOPMENT

Utilize the site for cultural and tourism related events especially at night. The project planned to enhance the concept of regeneration of urban heritage in cultural activities through encouraging the utilization of the site for activities. The following are key areas that will enhance this concept:

- Branding and promotion
- Communication Material
- Directional Signs
- Site Interpretation

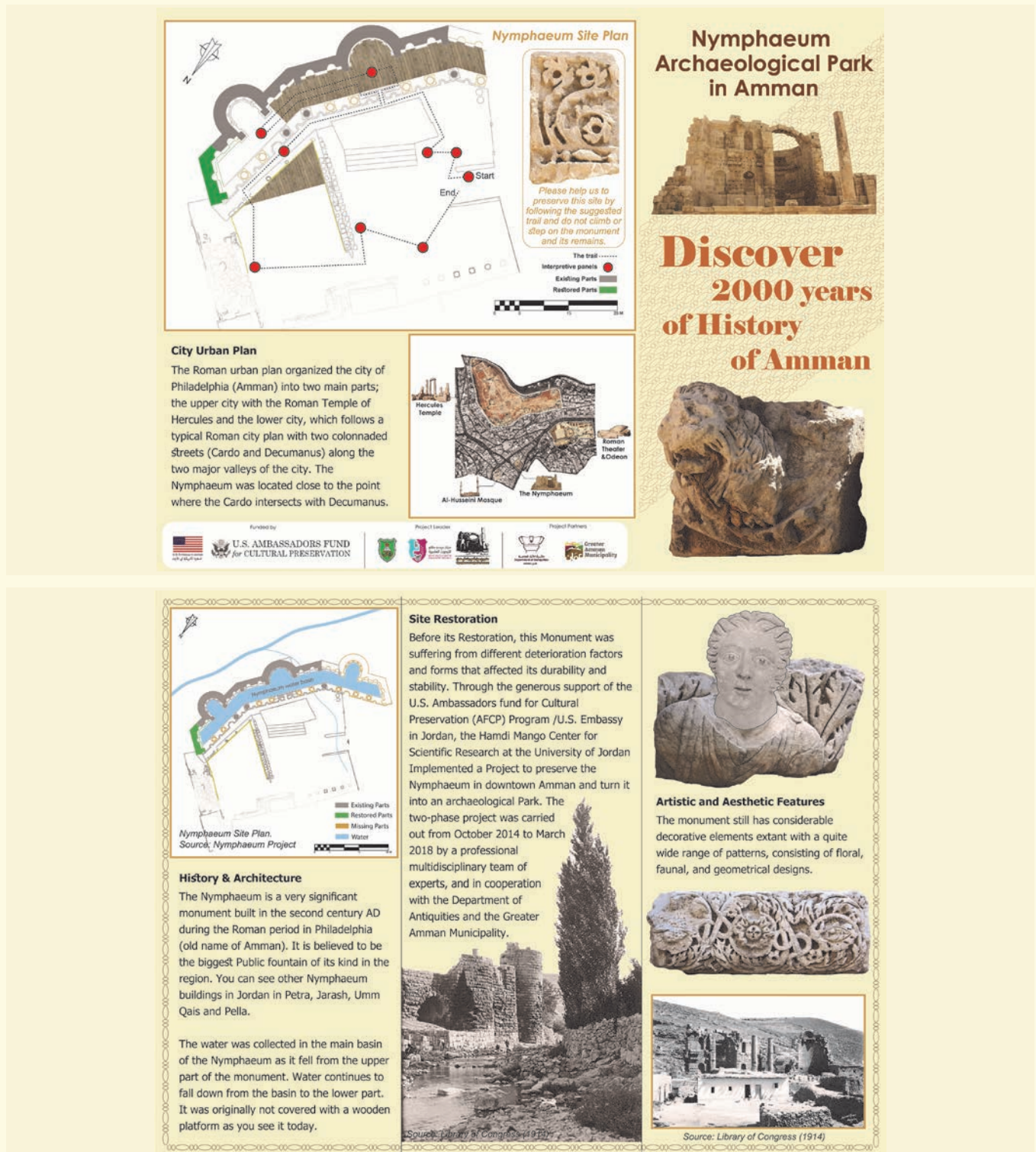


*Fig. 133: A tour guide with a tourist group visiting the site*



**C5.1 Provide the related tourism entities with the important information, figures, drawings to use them in the touristic brochures, maps, websites, etc. (in cooperation with the Ministry of Tourism and Antiquities (MoTA), the Jordan Tourism Board (JTB), GAM).**

The project provided the entities with the text and figures from the project explaining different stages of project implementation and final results, in addition to sharing the designed bi-lingual brochure, newsletters and signage (figs. 134 & 135).



Figs. 134 and 135 Nymphaeum English Brochure - Front and Back. Design by Nizar Al Adarbeh



## C5.2 Improvement of signage for tourists to find the Nymphaeum.

Linking the site with the different attractions in the downtown area including the original historical linkages of the monument with the Roman Theater and the Citadel, which will be part of the tourist itinerary. More cooperation for tourism promotion and marketing was conducted with the Jordan Tourism Board, The Ministry of Tourism and Antiquities, and the Greater Municipality of Amman. The GAM installed several signs leading to and

marking the site. Several videos and posts can be tracked online and on social media for many visitors and tourists who visited the Nymphaeum. This mean higher visibility and more content about the Nymphaeum. This is expected to boost massively after the site launch. Another major achievement is the inclusion of the Nymphaeum as a major bus stop for the JETT's Open Touristic Bus.



Fig. 136: The image shows the important location of the monument to connect it with the neighboring touristic attractions.

## C5.3 Produce new site panels with information and illustrations to present the “Nymphaeum Archaeological Park” to the visitors.

The project team led by the site management and tourism development expert, Nizar Al Adarbeh, worked on designing the project's bilingual signage which reflects all the important aspects of the site in nine signs. The signs highlighted information about the Nymphaeum Project, site challenges,

history and architecture, Nymphaeum hydrology, reinforcement, building material and marble, site reuse, the Umayyad reservoir, the columns, artistic and aesthetic features, 3D model for the Nymphaeum monument, and Roman city urban plan (figs. 137-146). The signs were produced in cooperation with Tarmeem Center for the Preservation and Conservation of Cultural and Natural Heritage (TC).



## Nymphaeum Archaeological Park in Amman منتزه سبيل الحوريات الأثري في عمان

### Nymphaeum Project

Through the generous support of the U.S. Ambassadors Fund for Cultural Preservation (AFCP) Program/U.S. Embassy in Jordan, the Hamdi Mango Center for Scientific Research at the University of Jordan implemented a project to preserve the Nymphaeum in downtown Amman and turn it into an archaeological park. The two-phase project was carried out from October 2014 to March 2018 by a professional multidisciplinary team of experts, and in cooperation with the Department of Antiquities and the Greater Amman Municipality.

### مشروع ترميم سبيل الحوريات

بدعم من صندوق السفارة للحفاظ على التراث في السفارة الأمريكية في الأردن قام مركز حمدي منكو للبحوث العلمية في الجامعة الأردنية بتنفيذ مشروع للحفاظ على موقع سبيل الحوريات في وسط العاصمة عمان وتحويله إلى منتزه أثري. وتم تنفيذ المشروع على مرحلتين خلال الفترة من تشرين الأول 2014 - آذار 2018 من خلال فريق عمل من المتخصصين والخبراء وبالتعاون مع دائرة الآثار الأردنية وأمانة عمان الكبرى.

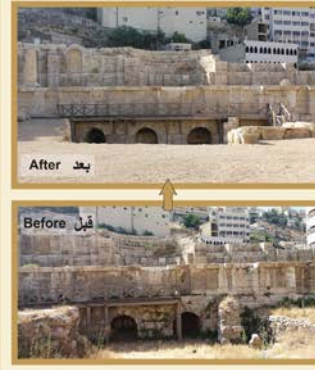
### Site Challenges

Before its restoration, this monument was suffering from different deterioration factors and forms that affected its durability and stability. The air pollution deposits and salts covered the monument surface with a black crust. The monument was considered a visual pollution in the downtown area. Thus the structure needed an urgent intervention to restore and conserve it and to regenerate its role within the area.

### تحديات الموقع

قبل ترميم هذا المعلم الأثري كان هذا المعلم يعاني من مختلف عوامل وأشكال التلف والتي بدورها أثرت على متانته وثباته. حيث أدى تراكم رواسب من ملوثات الهواء من عوادم السيارات وغيرها وتشكل الأملاح على سطح حجارة المبنى الأثري إلى تكون طبقة سوداء تغطي المبنى. وبالتالي كان يعتبر هذا المعلم مثالاً واضحاً لتلوث البصري في منطقة وسط عمان. ولذلك كان لابد من التدخل العاجل للحفاظ عليه وترميمه وتأهيله وإعادة إحياء دوره في المنطقة.

**افتتاح الموقع**  
افتتح الموقع لأول مرة للزوار في تشرين الأول عام 2018 تحت مسمى "منتزه سبيل الحوريات الأثري"، والذي يستضيف عدداً من الأنشطة الثقافية ويترحب بزيواره للاستمتاع بهذا المعلم الرائع والتعرف على تاريخه العريق وعمارته المتميزة.



### Site Launch

The site was opened for the first time to visitors during October 2018 as the "Nymphaeum Archaeological Park" to host cultural activities and welcome its guests to this magnificent monument where they can learn about its majestic history and architecture.

Please help us to preserve this site by following the suggested trail and do not climb or step on the monument and its remains.



Funded by | **U.S. AMBASSADORS FUND for CULTURAL PRESERVATION**



Project Leader | **فهد المشروع**



Project Partners | **شركة المشروع**

ساعدونا للحفاظ على هذا الموقع من خلال الإنزمام بالمعمار المقترح وعدم التسلق أو القفز فوق أجزاء وحجارة المبنى الأثري.

Fig. 137: (Sign #1) A brief about the Nymphaeum Project, site challenges, and the site launch

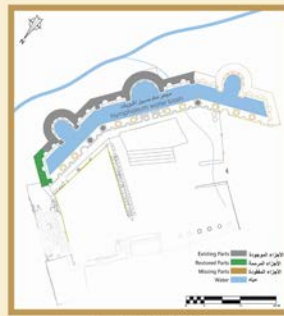
### History & Architecture

You are standing in front of a very significant monument built in the second century AD during the Roman period in Philadelphia (ancient name of Amman). The Roman Nymphaeum is believed to be the biggest public fountain of its kind in the region and it was one of the main monumental buildings in the ancient city of Philadelphia. You can see other Nymphaeum buildings in Jordan in Petra, Jarash, Umm Qais and Pella.

The significance of the monument was very clear to the many travelers and scholars who visited and described its large size, architectural and ornamental features, for example, Burkhardt, Butler, Seetzen, and others (figs. 2-4).

You are standing now at the original water stream that meets with the main stream of old Amman after going through a barrel vault from the foundation of the Nymphaeum (fig. 1).

### منتزه سبيل الحوريات الأثري في عمان Nymphaeum Archaeological Park in Amman



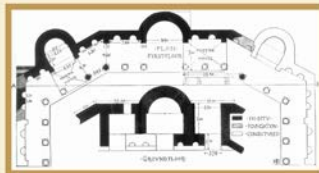
الشكل (1): مخطط سبيل الحوريات  
Figure (1): Nymphaeum Site Plan

### تاريخ الموقع وفن العمارة

أنت تقف أمام أحد أهم المعالم في الفترة الرومانية في فيلادلفيا (الاسم القديم لمدينة عمان) في القرن الثاني الميلادي. يُعتقد أن سبيل الحوريات في عمان هو أكبر مبنى عام لنافورة ماء في المنطقة. وتوجد أمثلة أخرى لمباني سبيل الحوريات في الأردن في البترا وجرش وأم قيس وطبقة فحل.

ونظراً لأهمية هذا المعلم فقد زاره العديد من الرحالة والباحثين الذين قاموا بوصفه وتوثيقه من الناحية المعمارية والزخرفية، ومن هؤلاء بيركهارت وبترل وستينزن وآخرون (الأشكال 2-4).

أنت تقف الآن عند مجرى المياه الأصلي والذي يلتقي بمجرى المياه الرئيسي للمدينة بعد تدفقه من خلال القبو الذي يخترق أسفل مبنى السبيل (الشكل 1).



الشكل (4): مخطط سبيل الحوريات، الصمندر، بترل (1907)  
Figure (4): Nymphaeum Plan by Butler (1907)



الشكل (3): واجهة سبيل الحوريات، الصمندر، بترل (1907)  
Figure (3): Nymphaeum elevation by Butler (1907)



الشكل (2): صورة قديمة لسبيل الحوريات، بترل، فوردر (1907)  
Figure (2): An old photo of the Nymphaeum, Butler (1907)



Funded by | **U.S. AMBASSADORS FUND for CULTURAL PRESERVATION**



Project Leader | **فهد المشروع**



Project Partners | **شركة المشروع**

Fig. 138: (Sign #2) History and Architecture



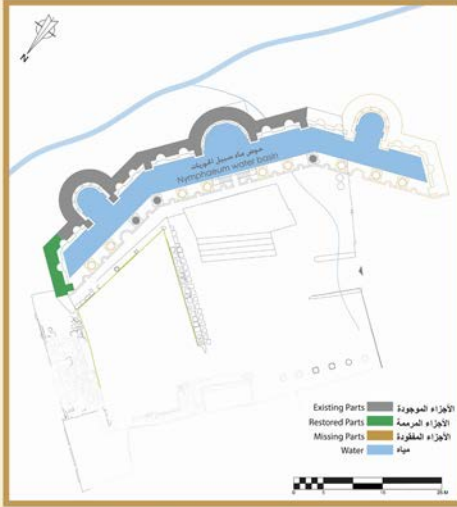
## متنزه سبيل الحوريات الأثري في عمان Nymphaeum Archaeological Park in Amman

### Nymphaeum Hydrology

You are now standing on the original basin of the Nymphaeum where the water was collected as it fell from the upper part of the monument (fig. 4). Water continues to fall down from the basin to the lower part. It was originally not covered with a wooden platform as you see it today.

### النظام المائي لسبيل الحوريات

أنت تقف الآن على حوض المياه الأصلي لسبيل الحوريات (الشكل 4)، حيث كانت المياه تتجمع في الحوض بعد سقوطها على شكل شلالات من الجزء العلوي للمبنى ثم تتدفق إلى الجزء السفلي. بالأصل لم يكن هذا الحوض مغطى بالألواح الخشبية كما نراه اليوم.



الشكل (4): مخطط لسبيل الحوريات. Source: Nymphaeum Project



الشكل (2): تصميم ثلاثي الأبعاد لسبيل الحوريات. Source: Nymphaeum Project (2018)



الشكل (3): تصميم ثلاثي الأبعاد لسبيل الحوريات. Source: Butler (1907)



الشكل (1): صورة لسبيل الحوريات وسبيل عمان. Source: Library of Congress (1914)



Fig. 139: (Sign #3) Nymphaeum Hydrology

## متنزه سبيل الحوريات الأثري في عمان Nymphaeum Archaeological Park in Amman

### Reinforcement

Before restoration, the Nymphaeum was suffering from a high risk of structural instability due to earthquakes and floods. The apse to your right and the eastern side of the monument in front of you suffered from great stresses of inclination, torsion and collapse (figs. 3-4). This side was left for a long time with large and minor cracks and therefore to save the structure it was necessary to construct a buttress based on the original design of the Nymphaeum in order to mitigate the risk of further collapse. This buttress was erected using original stone ashlars from the site and new stones as needed along with interventions and consolidations for cracks (figs. 1-2).

### تدعيم المبنى

جاءت أعمال الترميم لمبنى سبيل الحوريات للحفاظ عليه واستدامته، لما يشكله هذا المعلم من أهمية تاريخية مرتبطة بالذاكرة الشعبية لسكان مدينة عمان قديماً وحديثاً. فقد تعرض المبنى لعدة هزات أرضية وفيضانات أدت إلى تصدع وانتهيار أجزاء كبيرة منه، كما هو الحال في الحنية التي على يمينك والجزء الشرقي من المبنى أمامك (الاشكال 3 و4) فكان من الضروري إنشاء دعامة لضمان ثبات هذا الجزء والتخفيف من خطر انهيار المبنى استناداً إلى المخطط الأصلي للمبنى وباستخدام حجارة البناء الأصلية وحجارة جديدة حسب الحاجة. إضافة إلى معالجة التشققات والتصدعات (الاشكال 1 و2).



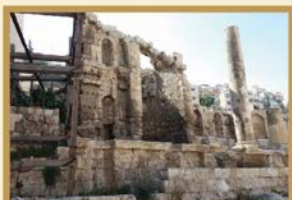
الشكل (1): سبيل الحوريات بعد انتهاء أعمال الترميم (أيار 2018). Source: Nymphaeum Project (March 2018)



الشكل (3): المصنر: مكتبة الكونغرس الأمريكي 1914. Source: Library of Congress (1914)



الشكل (2): سبيل الحوريات أثناء أعمال الترميم (أغسطس 2015). Source: Nymphaeum Project (August 2015)



الشكل (4): سبيل الحوريات قبل بدء أعمال الترميم (يونيو 2015). Source: Nymphaeum Project (June 2015)



Fig. 140: (Sign #4) Reinforcement



## متنزه سبيل الحوريات الأثري في عمان Nymphaeum Archaeological Park in Amman

### Building Material and Marble

The whole structure was built with largely limestone blocks. From the outer side rustic blocks were used and in the main façade square blocks were placed in alternate courses of headers and stretchers.

The interior walls of the Nymphaeum and lower parts of the three large apses and the small niches are fitted with round and square holes sunk in the stones which indicate that the interior was dressed with marble (fig. 1-3). You can see at the lower part of the niche in front of you small fragments of the original marble still in its original place (fig. 4).

It is believed that marble statues were placed in the niches of the monument (fig. 1).



شكل (1): نموذج ترحيبي افتراضي لجزء من الواجهة مكمومة بالأحجار الرخامية  
Figure (1): A suggested 3D view of the marble cladding on the facade

### مواد البناء والرخام

بني سبيل الحوريات من الحجر الجيري، حيث استخدم الحجر النافر "حجر طبزة" في بناء الجدار الخارجي للمبنى، واتباع أسلوب التشريك في الواجهة الأمامية.

كانت الجدران الداخلية للمبنى والحنيت الكبيرة والصغيرة مغطاه بطبقة من الرخام، واستدل على ذلك من خلال وجود فتحات مستديرة ومربعة في حجارة المبنى الداخلية (الأشكال 1-3). يمكنك أن ترى في الجزء السفلي من الحنية أمامك أجزاء صغيرة من الرخام لاتزال في مكانها الأصلي (الشكل 4).

ويعتقد أن التماثيل الرخامية كانت توضع في الحنيت في الواجهة الأمامية للمبنى (الشكل 1).



شكل (4): بقايا من العطاء الرخامي الذي كان يكس الحنية  
Figure (4): Marble fragments covering the niche



شكل (3): الثقوب التي كانت تستخدم لتثبيت الألواح الرخامية على الواجهة  
Figure (3): Holes used to fix the marble panels on the facade



شكل (2): بقايا الإسمن الرخامي والحاسي  
Figure (2): Remains of the marble and copper anchor



Funded by | ممول من  
U.S. AMBASSADORS FUND  
for CULTURAL PRESERVATION



قائد المشروع | Project Leader  
مجلس عمان للتراث  
عمان  
Amman Municipality



شركاء المشروع | Project Partners  
بلدية عمان  
Greater Amman Municipality

Fig. 141: (Sign #5) Building Material and Marble

## متنزه سبيل الحوريات الأثري في عمان Nymphaeum Archaeological Park in Amman

### خزان المياه الأموي

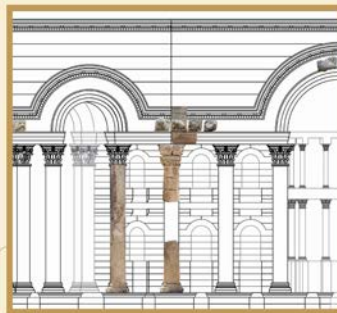
خلال الفترة الأموية (661-750 ميلادي) استخدمت حجارة من مبنى سبيل الحوريات لبناء خزان مياه فوق الساحة المرصوفة أمام المبنى حيث تقف أنت الآن (الشكل 3).

### Umayyad reservoir

During the Umayyad period (661-750 AD) some parts of the Nymphaeum were reused for a reservoir constructed on top of the paved Roman plaza in front of the Nymphaeum where you are standing now (fig. 3).



شكل (3): رسم ترحيبي لخزان الأموي  
Figure (3): Illustration showing the Umayyad reservoir



شكل (2): رسم ترحيبي لأعمدة مبنى سبيل الحوريات  
Figure (2): Drawing showing the columns of the Nymphaeum

### الأعمدة

إلى يسارك يمكنك مشاهدة عدد كبير من أجزاء أعمدة سبيل الحوريات وربما لمبانٍ أخرى أيضاً (شكل 2).

### The Columns

To your left at the site you can see a huge pile of column drums and other features belonging to the site and maybe other buildings (fig. 2).

### إعادة استخدام الموقع

أعيد استخدام هذا المعلم حتى التاريخ الحديث لمدينة عمان فقد استخدمت بعض حجراته في بناء المنازل والمباني خاصة بعد قدوم المهاجرين الجدد من الشركس والشيشان وبعض القبائل العربية خلال القرن التاسع عشر (الشكل 1).

### Site Reuse

The reuse of the monument continued even in the recent history of Amman as some remains were used to build houses and other structures especially after the arrival of the new immigrants to the region, including Circassians and Chechens groups and some Arabian tribes during the 19th century (fig. 1).



شكل (1): المصدر: مكتبة الكونغرس الأمريكي 1914  
Figure (1): Source: Library of Congress (1914)



Funded by | ممول من  
U.S. AMBASSADORS FUND  
for CULTURAL PRESERVATION



قائد المشروع | Project Leader  
مجلس عمان للتراث  
عمان  
Amman Municipality



شركاء المشروع | Project Partners  
بلدية عمان  
Greater Amman Municipality

Fig. 142: (Sign #6) Site Reuse, Umayyad reservoir, and the columns



## متنزه سبيل الحوريات الأثري في عمان Nymphaeum Archaeological Park in Amman

### Artistic and Aesthetic Features

The monument still has considerable decorative elements extant with a quite wide range of patterns, consisting of floral, faunal, and geometrical designs. More are details in high relief of land and sea animals placed inside floral decorative motifs (figs. 1, 2, & 4) and available remains of capitals, architraves, and friezes (fig. 3). You can imagine how the Nymphaeum was elaborated and aesthetically modeled to be a place of rest and glory at the heart of the city during the Roman Period (2nd - 4th century AD).



الشكل (1): تخطيط عالٍ لشكل إنسان من موقع سبيل الحوريات (الفرس موجود في متحف جبل اللطمة).

Figure 1): Reconstruction of high relief of a human figure from the Nymphaeum (head fragment is displayed at the Jordan Archaeological Museum/Amman Citadel)

### العناصر الفنية والجمالية

لا يزال مبنى سبيل الحوريات غنياً بالعناصر الزخرفية المتمثلة بمجموعة واسعة من المنحوتات بتصاميم نباتية وحيوانية وهندسية ومنحوتات بارزة بأشكال حيوانات برية وبحرية وتمائيل أدامية تحيطها زخارف نباتية (الأشكال 1, 2, 4) إضافة إلى ما تبقى من التيجان والأقاريز والجسور المزخرفة (الشكل 3). يمكنك أن تتصور فخامة وجمالية سبيل الحوريات، ليكون مكاناً مثالياً للراحة والاستجمام وممارسة النشاطات المختلفة في قلب المدينة خلال الفترة الرومانية (القرن الثاني - القرن الرابع الميلادي).



الشكل (4): تحت بروز الأسد من موقع سبيل الحوريات.  
Figure 4): High relief of a lion from the Nymphaeum.



الشكل (3): أمثلة لبعض الأجزاء الزخرفية من موقع سبيل الحوريات.  
Figure 3): Some examples of relief decorations from the Nymphaeum.



الشكل (2): تحت بروز ثور من موقع سبيل الحوريات.  
Figure 2): High relief of a lioness from the Nymphaeum.

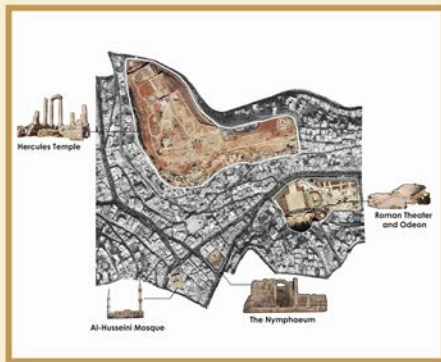
Funded by | ممول من  
U.S. AMBASSADORS FUND  
for CULTURAL PRESERVATION

Project Leader | قائد المشروع  
مركز البحوث والتراث  
العلمية في عمان  
Jordan Archaeological Museum

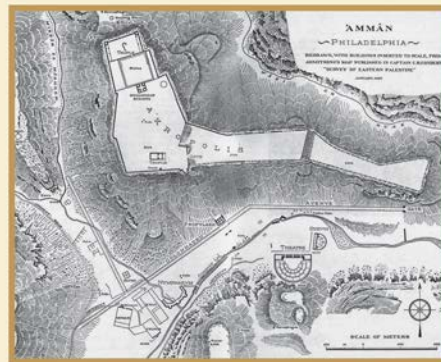
Project Partners | شركاء المشروع  
Greater Amman Municipality  
بلدية عمان الكبرى  
Municipality of Amman

Fig. 143: (Sign #7) Artistic and Aesthetic Features

## متنزه سبيل الحوريات الأثري في عمان Nymphaeum Archaeological Park in Amman



الشكل (2): صورة لوسط عمان توضح المعالم الرئيسية (جوجل 2018)  
Figure 2): Satellite image of Amman showing main monuments (Google Earth 2018)



الشكل (1): مخطط لمدينة فيلادلفيا (عمان) يوضح معالم المدينة وتقسيمها (بوتر 1907)  
Figure 1): City plan of Philadelphia (Amman) with the main monuments (Butler 1907)

### City Urban plan

The Roman urban plan organized the city of Philadelphia (Amman) into two main parts: the upper city with the Roman Temple of Hercules and the lower city, which follows a typical Roman city plan with two colonnaded streets (Cardo and Decumanus) along the two major valleys of the city. The Nymphaeum was located close to the point where the Cardo intersects with the Decumanus (figs. 1-2).

### التخطيط الحضري للمدينة

إن التخطيط الحضري لمدينة فيلادلفيا (عمان) في الفترة الرومانية قسم المدينة إلى قسمين رئيسيين، المدينة العلوية والتي تضم معبد هرقل والمدينة السفلية والتي تتبع مخطط المدينة الرومانية التقليدي وتضم شارعين للأعمدة (شارع "كاردو" الذي يتجه من الشمال إلى الجنوب وشارع "ديكومانوس" من الشرق إلى الغرب) على طول الوديان الرئيسية للمدينة. ويقع سبيل الحوريات بالقرب من نقطة تقاطع الشارعين (الأشكال 1-2).

Funded by | ممول من  
U.S. AMBASSADORS FUND  
for CULTURAL PRESERVATION

Project Leader | قائد المشروع  
مركز البحوث والتراث  
العلمية في عمان  
Jordan Archaeological Museum

Project Partners | شركاء المشروع  
Greater Amman Municipality  
بلدية عمان الكبرى  
Municipality of Amman

Fig. 144: (Sign #9) City Urban plan





Fig. 145: (Sign #8) 3D Model for the Nymphaeum Monument

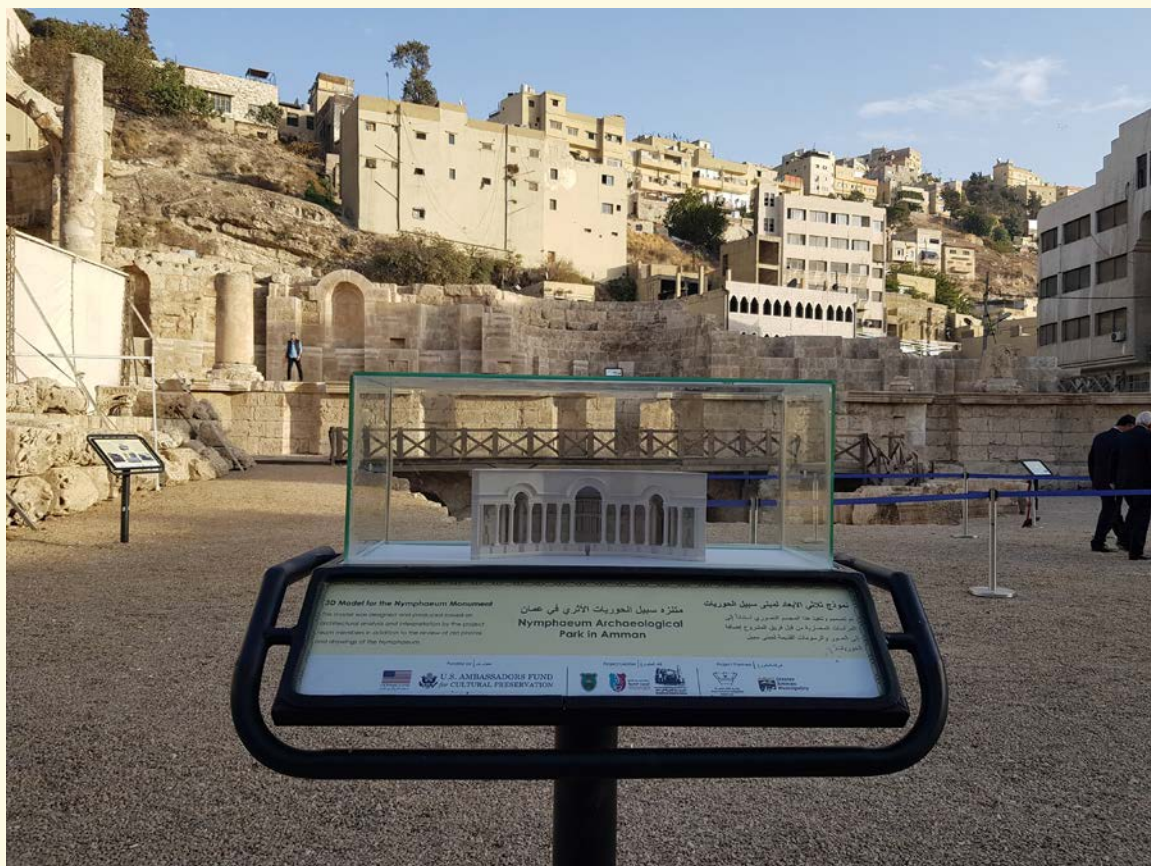


Fig. 146: (Sign #8) As placed at the site



# COMPONENT VI: DISSEMINATION AND VISIBILITY



*Fig. 147: During a project launching event at the Nymphaeum site*



The project conducted several dissemination and visibility actions as follows:

### C6.1 Project Visibility:

- A detailed Communication Plan was developed at the project start to ensure proper visibility and communicating project activities.
- The project work was highlighted during two major kickoff events for the two phases of the project during the project implementation.
- Several site visits and cultural events were conducted to enhance the visibility of the site.
- At the end of the project implementation the team members decided to use an open source for the project website hosted at Word Press servers to ensure long term embedding of all project outcomes and material (<http://ammannymphaeum.wordpress.com>). The website contains a presentation of the project and its components, partnerships, proceedings and publications, news and articles, and useful links. The project created a very dynamic and vibrant project website that is compatible with mobiles based on WordPress responsive theme design to enable more flexibility and user-friendly content management system.
- Using social media ([www.facebook.com/AmmanNymphaeumProject](http://www.facebook.com/AmmanNymphaeumProject)). The project developed a very active Facebook page with daily posts and many followers. The project shared hundreds of photos for actions in the field and for major achievements and best practices for students' engagement in the project.
- Project visibility was further enhanced through the interpretation signs installed at the site (refer to *Component V: Tourism Development*.)
- Several published news articles about the Nymphaeum during the project implementation period. In addition to the very good TV

coverage of the project through live interviews and reportage (can be accessed on the project website).

- Final site launch was marked for October 2018.

### C6.2 Dissemination Activities:

- Produced regular newsletter in print and as electronic versions highlighting project progress and results disseminated to all stakeholders. The newsletters gave a very bright message on the project activities, project objectives and progress as well as highlighting the US Ambassadors Fund to the project. The newsletters were also sent through electronic version and available for download at the project website.

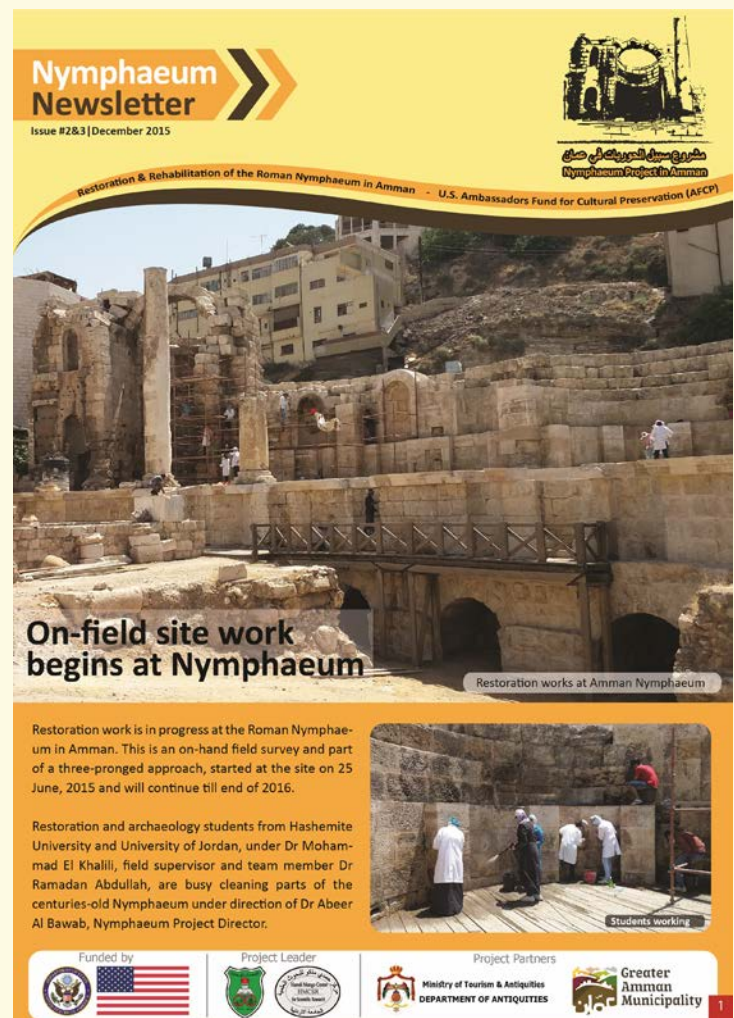


Fig. 148: A sample of the project newsletter



The project was presented by the project team members at different symposia, workshops, and conferences.

- MONUBASIN Symposium: Prof. Abeer AlBawab represented the project at the International Symposium on the Conservation of Monuments in the Mediterranean Basin (MONUBASIN) with its topic "Natural and Anthropogenic Hazards and Sustainable Preservation". This conference provided a forum for scientists, technicians and experts, in the area of conservation and restoration of monuments, to present their work and exchange ideas and experiences. (<http://conference2017.monubasin.com/>).
- ASOR 2017: Dr. Mohammed El-Khalili and Nizar Al Adarbeh represented the project with two papers in the session of Cultural Heritage Management: Methods, Practices, and Case Studies at the Annual Meeting of the American Schools of Oriental Research (ASOR) 2017 held in Boston, United States 15-18 November ([www.asor.org](http://www.asor.org)). The ASOR Annual Meeting attracts over 1,000 scholars and enthusiasts of archaeology, linguistics, geography, epigraphy, anthropology, and other fields related to the study of the ancient Near East and major sessions are dedicated annually to highlight archaeological research and conservation efforts in Jordan.
- ICOMOS 2017: Dr. Mohammed El-Khalili and Nizar Al Adarbeh represented the project also at the ICOMOS General Assembly and Scientific Symposium 2017 held during 11-15 December in New Delhi, India. It was an excellent chance for the project to disseminate project results in a global scientific venue (<http://icomosga2017.org>).
- ICHAJ: Project team members took part in the ICHAJ 13 Conference (The International

Conference on the History and Archaeology of Jordan) during (22-26 May 2016) ([www.ichaj.org](http://www.ichaj.org)) during the first phase of the project. The project team presented the final project results in ICHAJ14 under the Section: III – Sub-section Conservation and Site Management. The conference was convened in Florence, Italy in January 2019, with the participation of more than 400 international scholars and researchers. ICHAJ is the most important international event on the history and archaeology of Jordan and has been organized every three years since 1980.

- The project was featured with an article in the *Archaeology in Jordan (AIJ)* 2018. A new, biannual open access (OA) newsletter published online by ACOR ([www.acorjordan.org](http://www.acorjordan.org)) aimed at raising scholarly awareness of archaeological and cultural resource management projects being carried out in Jordan and to make this information accessible to a wider audience.
- The Roman Nymphaeum in Amman - Restoration and Rehabilitation 2014–2018: This publication covers all the aspects of the project and its results at the end of the project period. It is an important reference to scholars and students for best practice in cultural heritage regeneration.





*Fig. 149: Anastylosis of a column at the site to present how the capital capped the top of the drums.*



# COMPONENT VII: PROJECT MANAGEMENT



*Fig. 150: Project key team members at the site. By Ibrahim Al Barghothi  
From the right: Dr. Mohammad El Khalili, Prof. Abeer Al Bawab, Nizar Al Adarbeh*



## Component VII: Project Management

Dr. Abeer Al Bawab, the Director of the Project with the project key team members, handled the task of the project management in terms of financial and technical work needed.

The project team members maintained long-term cooperation with the project partners, the Department of Antiquities and the Greater Amman Municipality. In addition to ensure the full engagement of the project team members and to monitor the project progress and performance on regular basis, there were meetings at the Hamdi Mango Center for Scientific Research (HMCSR) at the University of Jordan and on-site meetings focusing on hands-on discussion and in

depth review of the project work and its needed interventions. Nizar Al Adarbeh, Site Management and Tourism Development Expert worked on the regular documentation of the project interventions and was assigned to prepare all needed project technical reporting to the AFCP Office at the US Embassy in Amman.

Dr. Mohammed El Khalili, Director of Restoration and Conservation, was mainly leading the field interventions and managing all team members. The success of the project and the accomplishment of its objectives were clear results of the team members work and their dedication during the lifetime of the project.



*Fig.151: Project team discussing work progress in the field.*

*From the right: Dr. Ramadan Abdullah, Dr. Mohammad El Khalili, Dr. Abeer Al Bawab, Nizar Al Adarbeh*



## BIBLIOGRAPHY

- Al Adarbeh, N.; El Khalili, M. Al Bawab, A. *The Roman Nymphaeum. The Archaeology in Jordan Newsletter (AIJ) 2018. Biannual open access (OA) newsletter published online by ACOR (www.acorjordan.org) ISBN: 978-0-578-41390-7*
- Al Bawab, A.; Al Adarbeh, N.; El Khalili, M.; Bozeyya, A. *Restoration and Rehabilitation of the Roman Nymphaeum in Amman: "Nymphaeum Archaeological Park". 2018, Preceding of the International Symposium on the Conservation of Monuments in the Mediterranean Basin (MONUBASIN 10) Symposium, Chapter 34 pp. 321-330.*
- El-Khalili, M.; Al Adarbeh, N.; Al Bawab, A. 2017. *Annual Meeting of the American Schools of Oriental Research (ASOR 2017) Boston, United States 15-18 November*
- Al Adarbeh, N.; El-Khalili, M.; Al Bawab, A. 2017, *Annual Meeting of the American Schools of Oriental Research (ASOR 2017) Boston, United States 15-18 November*
- El-Khalili, M.; Al Adarbeh, N.; Al Bawab, A. *Community and Stakeholders Engagement in Revival of Urban Heritage: Restoration and Rehabilitation Project of the Roman Nymphaeum in Amman. (General Assembly and Scientific Symposium 2017 (19th ICOMOS 2017) New Delhi, India 11-15 December*
- El Khalili, M. ; Jamhawi, M.; Al Adarbeh, N.; Al Bawab, A. 2019. *The International Conference on the History and Archaeology of Jordan (ICHAJ 14), Florence, Italy, January 2019.*
- El-Khalili, Mohammad. 2016. *Damage Assessment of the Roman Nymphaeum in Amman, Jordan: An Analytical and Diagnostic Study. International Journal of Conservation Science. Volume 7, Issue 2, April-June 2016: 477-492*
- El-Khalili, Mohammad; Al Adarbeh, Nizar; Al Shawabkeh, Yahya; Mayyas, Abdulraouf. 2013. *Roman Nymphaeum in Amman: Documentation and Architectural Study. Disegnare Idee Immagini / Drawing ideas images 47, Universita di Roma "La Sapienza". Published December 2013 (ISBN 978-88-492-2797-0.*
- Al Bawab A., Al-Hunaiti A., Abu-Zurayk R., Abu Mallouh S., Bozeyya A., Hussein T., *Contamination of Plants, Soil, and Building Stones at a Roman Heritage Archaeological Site in an Urban Area, Feb. 2019, Journal of Fresenius Environmental Bulletin, in press.*



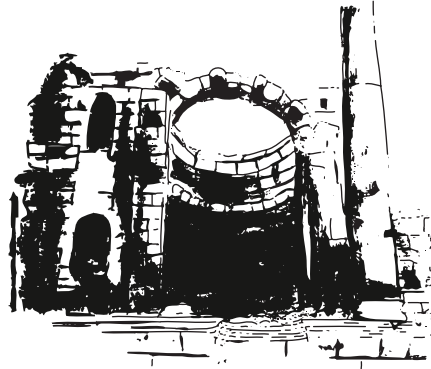


Figure 152: The Nymphaeum and downtown of Amman. Source: Library of Congress (1914)









**مشروع سبيل الحوريات في عمان**  
**Nymphaeum Project in Amman**  
**2014-2018**

