Adopting the HBIM system as a basis for preserving the architectural heritage in the city of Aleppo (AL-Matbakh al-Ajami building as a case study)

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Abstract

This study examines the role of Historic Building Information Modelling (HBIM) in preserving the architectural heritage of the Old City of Aleppo, focusing on a case study of the Al-Matbakh al-Ajami building. The study aims to provide an integrated framework for using HBIM for documenting and managing historical buildings. This is done through multiple stages and working according to the levels of detail by developing the 3D model from LOD200 to LOD500, which contributes to improving restoration and maintenance processes.

Keywords: Building Information Modeling (BIM); Architectural cultural heritage; Documentation; Heritage Building Information Modeling (HBIM); Level of Details (LOD); The old city of Aleppo; Al-Matbakh al-'Ajami'

1. Introduction

The interest in protecting urban heritage in global forums after the adoption of the Convention on the Protection of the World Cultural Heritage in Venice in 1964 contributed to the continuous development of the foundations of urban development and the sustainability of cultural heritage in accordance with international methodologies, which established many guidelines for managing urban heritage in countries in accordance with Maintenance, protection, rehabilitation and revival, in harmony with the surrounding historic urban environment.

This article relied on Aleppo, Aleppo is Syria's largest city. The ancient city of Aleppo was inscribed on the World Heritage List of UNESCO in 1986. The ancient city of Aleppo suffered severe damage and destruction between July 2012 and December 2016 during the Syrian crisis. As a result, in 2013 it was inscribed on the List of World Heritage in Danger as an "endangered site". [1] December 2016 witnessed the end of fighting in the city. Aleppo then became partially able to receive people coming from outside it. This allowed UNESCO to send an assessment mission in January 2017. [2]

Then the organizations continued to work on various projects to restore and rehabilitate historical buildings, the traditional methods failed to deal with those requirements result in myriad issues, so there is an urgent need for new methods. [3], The developed countries use BIM to solve those issues reaping the benefits of implementing BIM to achieve the project participants' requirements and the clients' satisfaction. [4], Due to the significant influence of BIM on the architecture, engineering, and construction (AEC) industry, it has resulted in considerable enhancements in project delivery performance and efficiency. [5] [6] [4]

The global adoption of Building Information Modeling (BIM) is accelerating, emerging as an effective method to enhance efficiency within the Architecture, Engineering, and Construction (AEC) sector, addressing its critical challenges. [7]

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BIM models are created for new build projects using construction drawings and are updated as the project progresses Heritage or Historic BIM (HBIM) is an evolution of BIM, first suggested by [8], regarding assets of historical significance herein referred to as Cultural Heritage (CH) [9] This model effectively supports the restoration process, operation, and maintenance phase (O&M) Operation & Management. Assessing the true condition of heritage assets through digital documentation provides valuable insights for stakeholders, facilitating informed decision-making throughout the project's lifecycle [10]. Various contextual factors are impacting the implementation of BIM and its associated levels of detail (LOD). Accordingly, a case study was chosen in the old city of Aleppo, which is Al-Matbakh al-ʿAjami building, which is considered one of the most important historical monuments in this city, as a model for preserving cultural heritage using HBIM.

2. Literature Review

Documentation of heritage buildings is one of the most important procedures that ensure their preservation, protection, and sustainability. To preserve a building, one must know its data, history, and all other information about it. Thus, the preservation process is based on a comprehensive study and understanding of the building's conditions, which results in determining a plan and method for dealing with it without harming its value. The process of documenting urban heritage is one of the important initial steps in the system of preserving and sustaining this heritage if it is subjected to damage, collapse, or extinction. The damage to the Old City of Aleppo was documented based on a comparison of satellite images taken at different times, in addition to the associated 3D documents, given the difficult security situation in Aleppo and the difficulty of accessing the city at that time. [2] The structure of the urban fabric was also analyzed historically in the *Suwayqa Ali* neighborhood, which was severely affected by the armed conflict in Aleppo between 2012 and 2016, in three time periods (1932, 2001, 2019), and historical information was reviewed and analyzed, including functional changes and architectural characteristics of 38 buildings. Building and assess the total damage to this area. The analysis work was based on historical references, available previous studies, and the database of the Syrian Heritage Archive Project at the Museum of Islamic Art in Berlin, in addition to field survey work. [11]

Heritage Building Information Modelling (HBIM) is a novel prototype library of parametric objects based on historic architectural data and a system of cross-platform programs for mapping parametric objects onto point cloud and image survey data. [12] In Murphy et al.'s (2013) study, emphasis was placed on the use of historical building information modelling (HBIM) to document European classical architecture using laser scanning and photo techniques. The study provided advanced tools for creating accurate models and developing a library of classical architectural elements. [12] However, the study was limited to European classical architecture and did not address Islamic or Oriental architecture, nor did it address the challenges of applying HBIM in post-conflict or disaster areas.

HBIM models can be linked to geodatabases to facilitate architectural heritage management. An open source platform has been created to exchange data and link geographic information to HBIM models [13]. However, the study did not adequately address the challenges of applying these technologies in developing countries or how they can be used in post-crisis reconstruction operations.

Guidelines and procedures for applying HBIM to architectural heritage in Ireland were developed, establishing uniform standards for documenting heritage using HBIM and ensuring the quality of models and data. [14] But the study focused on the Irish context without taking into account cultural and technical differences in other regions and did not address the challenges of implementing HBIM in severely damaged buildings.

A comprehensive review of HBIM applications in the field of cultural heritage is presented, analyzing current trends in the use of HBIM for cultural heritage and discussing future challenges and opportunities. [9] However, the study did not provide practical solutions to the challenges mentioned and did not focus sufficiently on applications of HBIM in the context of post-conflict reconstruction.

Level of Development or Details (LOD) The use of BIM requires the identification of the LOD for the information in the model at various stages of the facility's life cycle. [15] LODs range from LOD 100 to LOD 500, with LOD 100 being less developed and LOD 500 being more developed. The Level of Development (LOD) framework enables project participants to grasp the evolution of a model element from an initial conceptual idea to a detailed and precise definition. The LOD associated with a specific model element communicates to other project participants the anticipated development level of the information and the degree of reliability that can be placed on it at a specific stage in the model's evolution. Identifying the Level of Development (LOD) for each model element, along with its development trajectory, helps prevent other project participants from utilizing the model element in unintended ways or assuming a level of precision that exceeds the original intent of the model element's author. [16]

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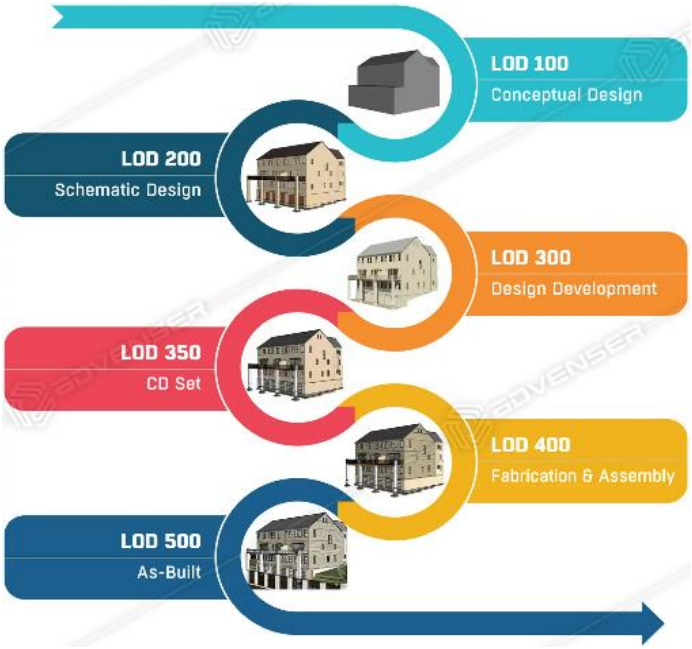

Figure 1. Levels of Development (LOD) for BIM as defined by the AIA

The LODs associated with design are not applicable to build heritage. Given the complexities associated with existing structures, a minimum LOD of 300 is deemed necessary for Heritage Building Information Modeling (HBIM) (Brumana et al., 2018). For refurbishment projects, achieving a LOD of 500 is essential, as the model must accurately reflect the "as-built" condition. [17] [18]

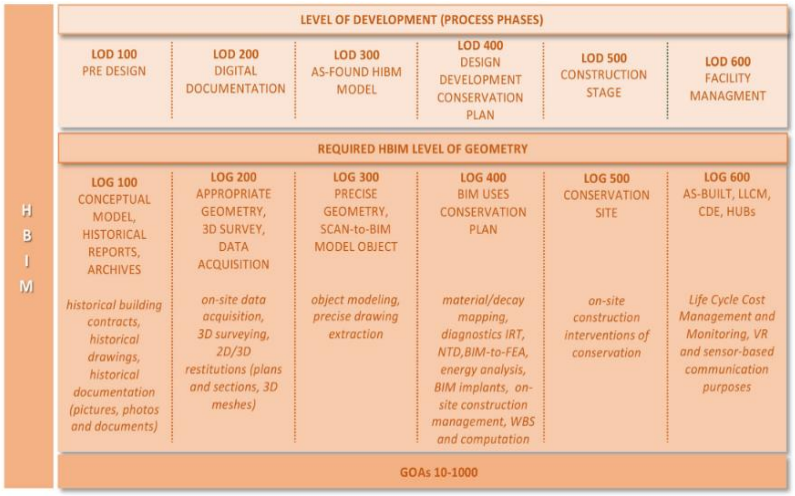

Figure 2. HBIM LOD proposal for the built heritage (Brumana, Stanga, & Banfi, 2020)

Stakeholder priorities are integrated into complementary Level of Development (LOD) guidelines for HBIM implementation, and a framework is presented for improving HBIM implementation by taking into account the needs of different stakeholders. [15] However, the study did not adequately address how to apply these guidelines in the context of severely damaged historic buildings or in post-conflict areas.

The emphasis was placed on defining specifications (GOA-LOG) for creating and reusing HBIM object libraries in a common data environment. [18] However, the study did not adequately address how to apply these specifications in the context of severely damaged historic buildings.

An overview of the current state of historical building information modelling (HBIM) is provided. [19] However, the study did not provide sufficient details on how to apply different LOD levels to architectural heritage conservation projects.

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3. Research Methodology

Thorough investigation and documentation of historic buildings lay the foundation for their conservation and effective sharing of information [20] To reach this goal, The research methodology is divided into five stages as adopted from the design science research methodology proposed by Peffers, Tuunanen, and Chatterjee [21] The first stage The "problem", or gap in knowledge, will be identified via a literature review and analysis of published HBIM case studies. Identification of this gap will assist in defining the objectives of the research. Data collection will include study of Current condition of the building, the construction documents and review of archival records. The proposed solution's development includes identifying the priorities of stakeholders involved in built heritage, particularly in relation to standard HBIM applications, and establishing intervention strategies. This analysis will inform the creation of a supplementary LOD framework tailored for HBIM. Ultimately, this supplement will be validated through a case study, showcasing its application in the development of specific building elements. An internal evaluation of the results will provide insights into areas of improvement for future research.

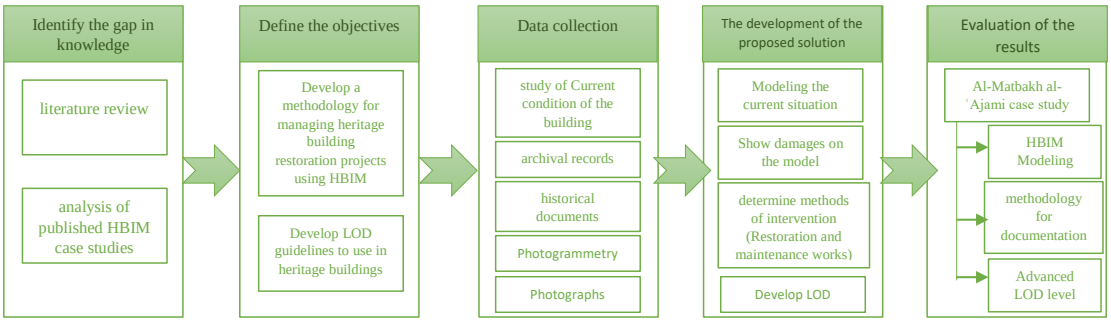

Figure 3. Research Methodology diagram

3.1. Identify the gap in knowledge (problem): Previous studies have focused on the use of HBIM in documenting European classical architecture using laser scanning and photo techniques to create accurate HBIM models and develop a library of classical architectural elements. But it was limited to European classical architecture without significantly addressing Islamic or Eastern architecture, and it did not address the challenges of applying HBIM in post-conflict or disaster areas, there is also a low level of detail achieved.

There are also many problems and errors resulting from the use of traditional methods in documenting buildings in general and historical buildings in particular, and the absence of guidelines for the reconstruction and restoration of these important buildings in the current circumstances in these regions, which led to the need to know the great importance and effective impact of adopting the building information modelling system to preserve Architectural heritage and its effective mechanisms and tools affecting the architectural form as a design, guidance, modelling and calculation tool, to mitigate human error as much as possible, and to create a model capable of cooperation between different parties.

3.2. Define the objectives: The most important objectives to be achieved are to promote a strategy that facilitates the management of heritage building restoration projects using historical building information modelling and create a building information model with an advanced level of detail.

The building information model that will be created will be used.

- To coordinate between different specialties and identify conflicts.
- To extract all the necessary drawings that the design company will be required to provide.
- Developing the LOD level of detail for these drawings based on the level of the Industry Foundation Classes (IFC), meaning that these drawings will be developed for the implementation of the building.
- Building information models must be compatible with software for detecting conflicts between different disciplines and must be available during the various stages of the project life cycle (design, implementation, operation, and maintenance), as it is possible to export and import all or part of the building model.

3.3. Data collection: This is through:

- Conducting research and studying references related to historical buildings, the historical period related to them, and their developments over time.
- Collecting and documenting historical, cultural, and architectural information related to these buildings.

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- Conduct a quick and comprehensive assessment of the condition of the buildings and identify existing problems and damages.
- Document the current condition of buildings and study the current situation using photography, photogrammetric architectural surveys, architectural drawings, and other documents

3.4. The development of the proposed solution: In this stage, the current state of the building will be modelled using historical building information modelling software, the damages will be shown on the model, and intervention methods will be determined through which historical buildings can be restored and maintained.

3.5. Evaluation of the results: By studying **Al-Matbakh al-ʿAjami** as a case study that sheds light on how to document archaeological buildings using HBIM by representing the building as an integrated database of physical and functional characteristics at an advanced LOD.

4. Case Study – Al-Matbakh al-ʿAjami – Old City of Aleppo

4.1. Al-Matbakh al-ʿAjami Location

The building is located in the old city of Aleppo, within the walls, on the street that was opened between the "Umayyad Mosque" and the "Aleppo Citadel" at the beginning of the fifties of the last century. It is surrounded by tourist cafes and the famous old inns surrounding the citadel.

Figure 4. Al-Matbakh al-ʿAjami location in the Old City of Aleppo (Syrian Heritage Archive Project by Google Earth, July 7, 2018)

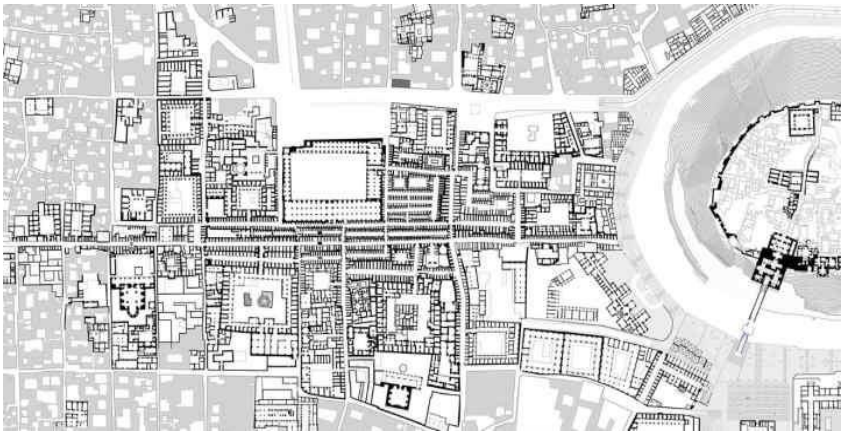

Figure 5. Al-Matbakh al-ʿAjami location in the Old City of Aleppo (Syrian Heritage Archive Project after BTU Cottbus, 2016)

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4.2. Historical description of Al-Matbakh al-ʿAjami building

It is the remains of a Zengi palace that was modified several times over time and was the residence of several prominent figures. It was built in the middle of the twelfth century AD, in the year 1150 AD, as local historical documents indicate.

It was the House of Justice during the reign of Nur al-Din Mahmoud; then it was the residence of Ahmed bin Yaqoub al-Sahib during the Mamluk era; and then it was inhabited by Khayir Bey, the last Mamluk ruler.

It was used as a workshop during a long period of the Ottoman era. The building was used as a museum of popular traditions from 1967 to 1975. In 1999, it was revived with a traditional heritage function through which it serves luxurious traditional cuisine related to the ancient traditions of the city of Aleppo. Thus, both the ground floor and the first floor were occupied with luxury restaurant furnishings, while the middle floor was limited to the purely administrative function occupied by the place's employees. In 2005, the General Directorate of Antiquities and Museums began internal restoration work aimed at turning it into a tourist investment. The building was destroyed to varying degrees due to the war, and this will be mentioned in later paragraphs.

4.3. Architectural description of Al-Matbakh al-ʿAjami plan

The building is entered from the east through a long, winding, domed vestibule. The building is a large hall oriented along a north-south axis, covering about 500 square meters, and made up of an approximately square central void, like a heavenly space, with dimensions of approximately 9.30 m and approximately 9.80 m. In the middle of it, there is a pool of water above it. A large dome (008 A). The heavenly space is surrounded by three corridors separated from it by wonderfully decorated columns dating back to the Mamluk period.

In the south, there is a huge iwan (013.C), and another in the north is a small one (005.A). In the east and west, there are two halls with domes that open into the central courtyard, and the two side halls are entered through a large door on either side of which are two small openings surmounted by smaller arches (002.A, 007.A).

From the southern iwan, one can enter two rooms, the first in the east, which is a rectangular room with supports in the form of an iwan, shallow on its three sides (014.C), and the second in the west, which is a room covered with a dome in the shape of a semicircle with a twelve-sided neck and windows. A small rectangle supported by corners with triangular spherical overhangs. This room is elongated towards the west through a hall covered by a dome with an arched arch made of carved stone (0150.C). The two rooms were completely demolished when the adjacent street was opened in the year 1950, and their features were removed with the recent restoration of the building. Figure No. 7 at both ends of the small northern iwan, there are corridors and an entry vestibule that communicate with the other courtyards in a well-known classical style. The north-eastern entrance (004.A) currently converges with the main entrance corridor, while the northwestern entrance (006.A) allows entry to a small open courtyard where there is a staircase to Surface (012.B).

In the north, there is a large hall with different architecture, oriented along an east-west axis (008.B). This hall, along with the entrance corridors, covers an area of less than 100 square meters. It consists of a central square courtyard with a side length of 5 meters and is covered by a dome with twelve sides without a neck and surmounted by an octagonal upper opening. This dome is centered on a very short elevation on triangular overhangs common in buildings of the century. The twelfth and thirteenth until the Ottoman period, but were later replaced by spherical double pendentives.

To the west, a large iwan opens with a low convex arch, and to the east is a hall entered by a pivoting door surmounted by a low arch on a wooden lintel. Researchers consider this hall to be one of the rare examples of residence halls from the Mamluk period found in Aleppo. Its well-known traditional plan is similar to that of other ancient halls. The twelve-sided dome stands, to the north of this hall there is a small hall with an area of approximately 30 square meters, and it is based around a central courtyard covered by a dome without a dome. This hall could be part of the private bathroom (010.B).

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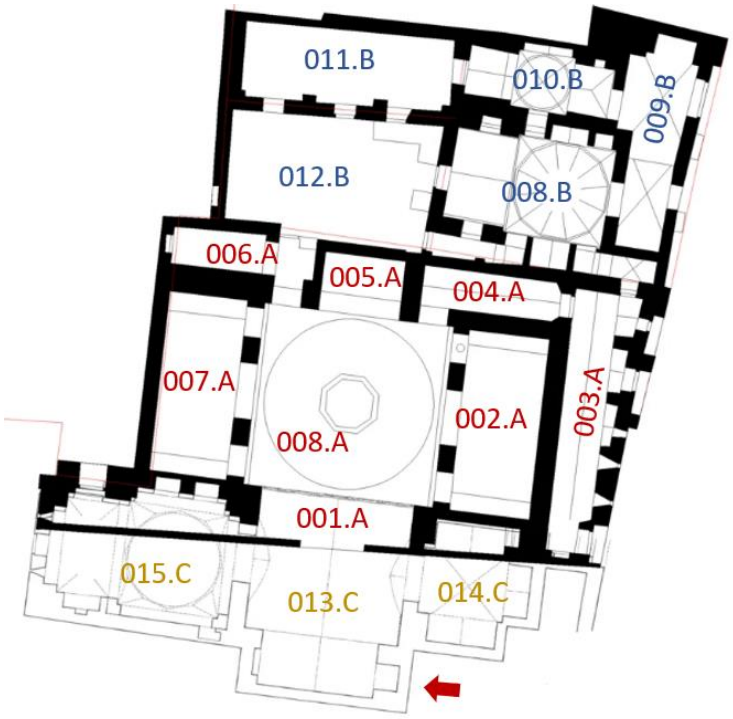

Figure 6. Al-Matbakh al-ʿAjami plan

4.4. Stages of work

4.4.1. Study the current condition of the building and assess the damage

The damage resulting from the war was determined based on the study previously conducted in 2017 by the Directorate of Antiquities and Museums in the city of Aleppo to determine the damaged elements, in addition to the German study that was conducted in 2020 as a rapid assessment of the damage within the project to document the Syrian cultural heritage, which was conducted by researchers A. Haddad, I. Ballouz, R. Alafandi, and Y. Rieffel (consultant).

Through field visits, study by the researcher in 2024, and review of the increasing damage that occurred to the building after the devastating earthquake that occurred in 2023, the following was noted:

Figure 7. Al-Matbakh al-ʿAjami before and after the armed

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Figure 8. The dome of the large hall

Figure 9. A major collapse in the dome of the large hall

Figure 10. Increased deterioration in the dome of the great hall

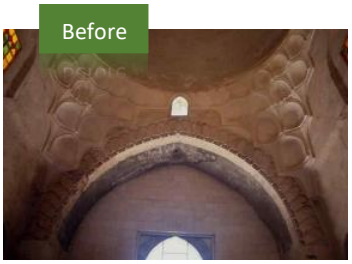

Figure11. Corner squinches

Figure 12. Collapse of the southeast corner apse

Figure 13. Collapse of the Northwest corner apse

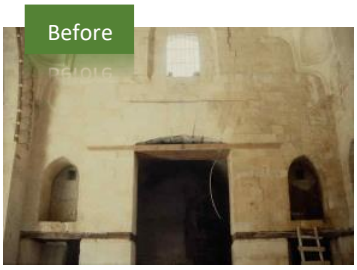

Figure14. The western wall in the main hall

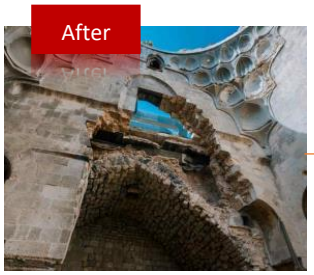

Figure 15. Partial collapse of the western wall of the large

Figure 16. Complete collapse of the western wall of the large hall

4.4.2. Determine the purpose of using HBIM.

This is to restore and rehabilitate Al-Matbakh al-ʿAjami building using the latest technologies, obtain quick and accurate outputs, and apply this methodology to subsequent similar projects.

4.4.3. Level of Details (LOD) required

It is the amount of detail, the quantity, accuracy and reliability of the information present in each element of the building that can be included in the digital model of Al-Matbakh al-ʿAjami and the extent of its development at each stage of the building's life cycle, as its development begins from level 200 until it reaches level 500. Accordingly, five main groups of elements will be distinguished, which are as follows:

- Partially hidden structural and architectural elements (walls, floors, ceilings and domes for the rest of the building) LOD200
- Structural and architectural elements in the southern facade and the main hall (wooden lintels, walls, domes, openings, doors...) LOD300
- Architectural elements in the southern facade and the main hall (windows, doors and niches) and showing the damage in the building LOD350
- Architectural elements in the southern facade and the main hall (damages - decorations) LOD400
- Architectural elements in the southern facade and the main hall (decorations) LOD500

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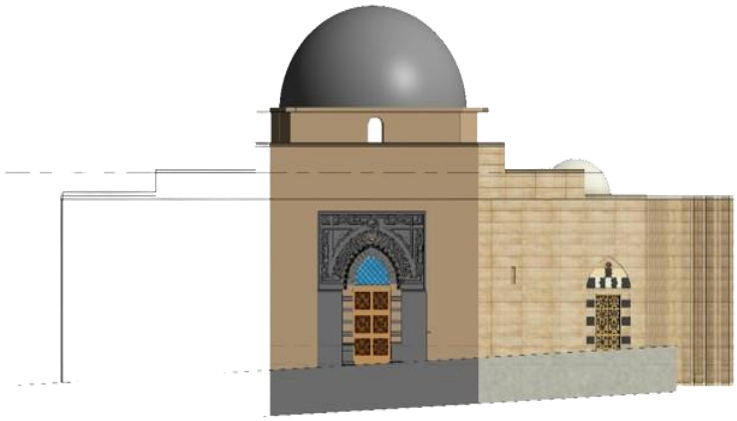


Figure 17. Work progress at different LOD levels from LOD100 up to LOD500

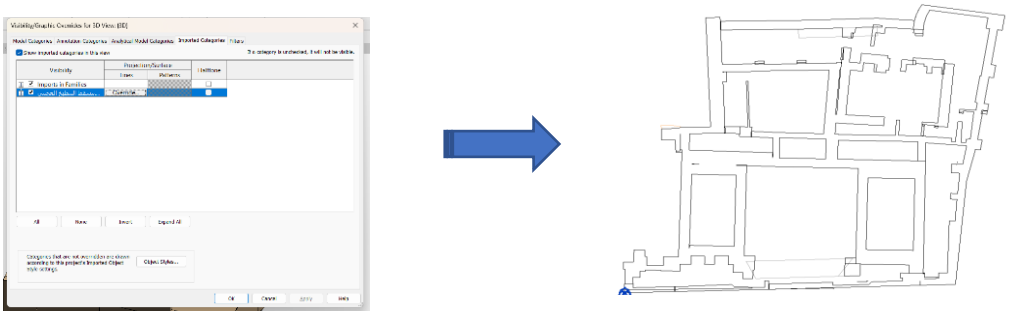
4.4.4. HBIM Modeling

Building an initial, non-detailed HBIM model using Revit software and entering preliminary information and specifications for Al-Matbakh al-ʿAjami.

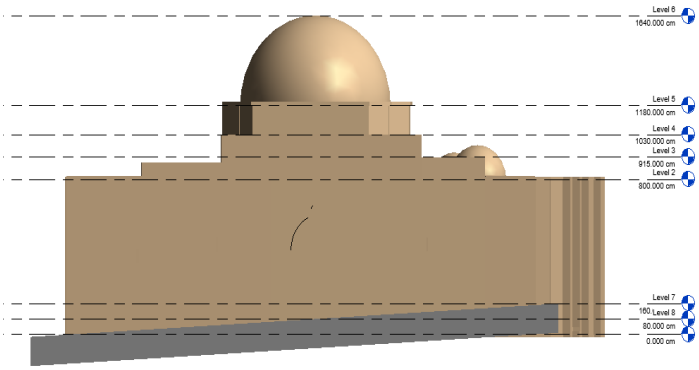
After the stage of collecting information, studying the current situation, and developing a clear vision of the building through photogrammetry and photography, the level of detail can be considered LOD100. The initial model will be built and reach the LOD200 so that the building appears in general, includes the main building elements such as walls, floors, and domes, and does not contain additional information such as details, materials, etc.

Accordingly:

- The AutoCAD file containing the Persian cuisine project was exported to Revit to begin the modeling process.



- Then determine the heights of the building as it appears on the facade.



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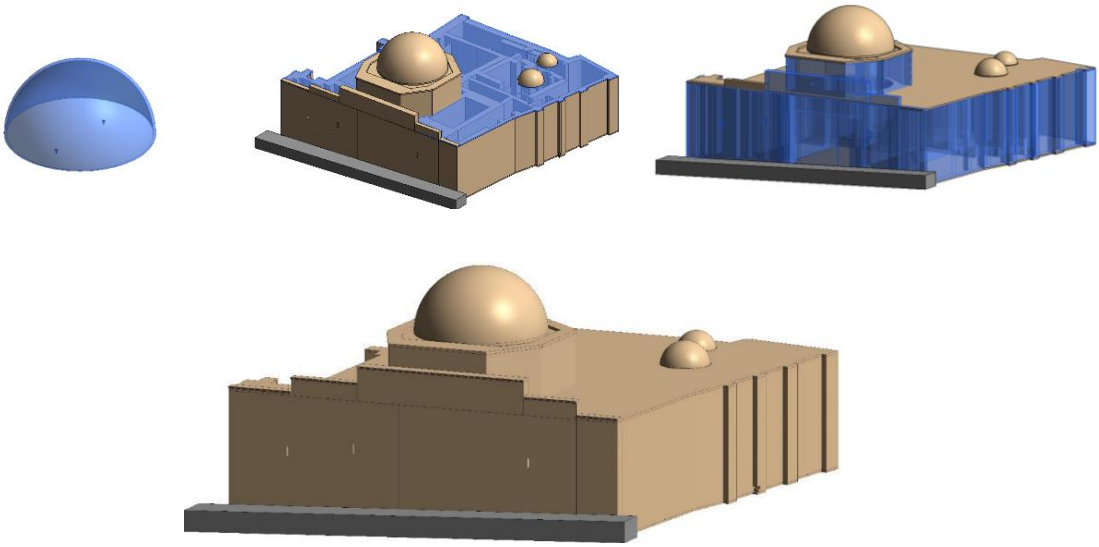
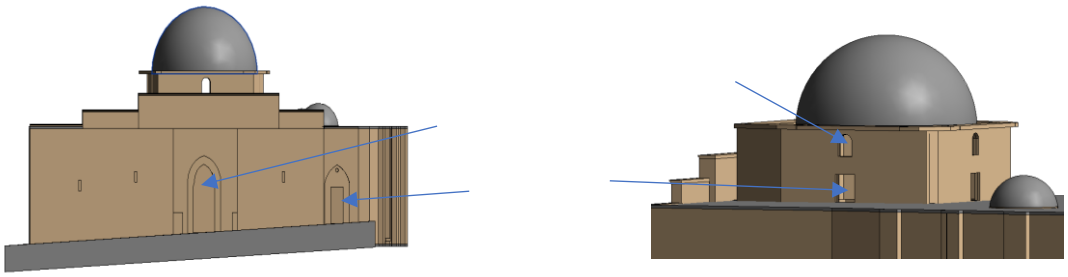
- Build various structural and architectural elements



Prototype with LOD200

Model development and access for lod300-lod350 a set of information has been added regarding the locations of window and door openings, the structural structure of the building, and the materials used in construction.

- Locations of window and door openings.



- The structural structure of the building and the materials used in construction.

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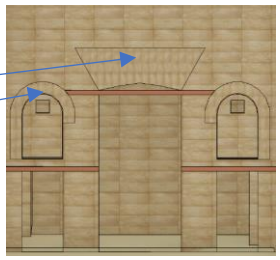
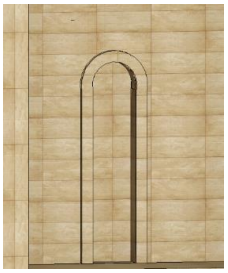
- More details were added and the LOD became 350

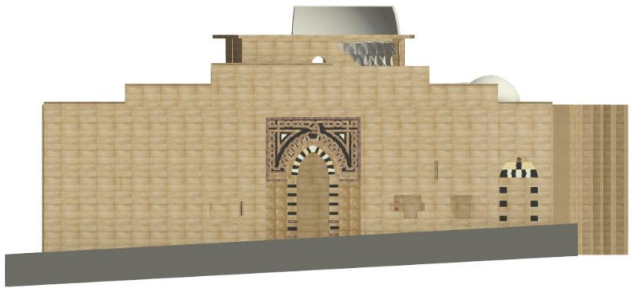
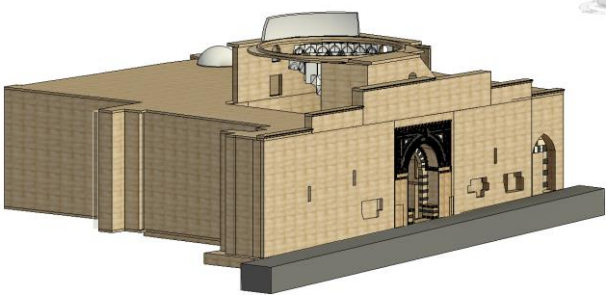
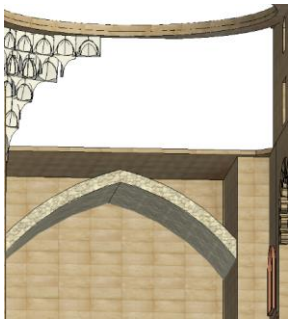
Small stone arches hold the pressure from the stones above the stone windows and doors

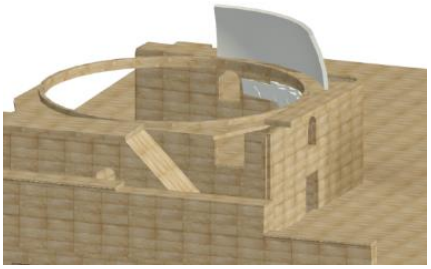



The mihrab in the inner wall of the small

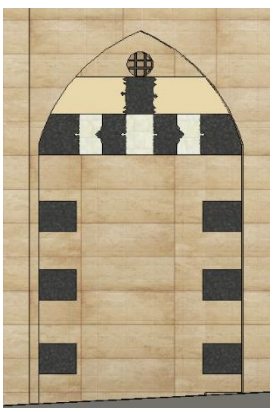
<u>Modeling the current state of the building, showing some architectural details, and clarifying the damages on the model (LOD400)</u>

- Modeling the current state of the building



- showing some architectural details
  - The ablaq stone used to decorate the main and subsidiary doors is made up of rectangular stone courses used in three colors (black, white, and yellow) and overlaid with each other with beautifully and harmoniously curved lines, giving a unique decoration.



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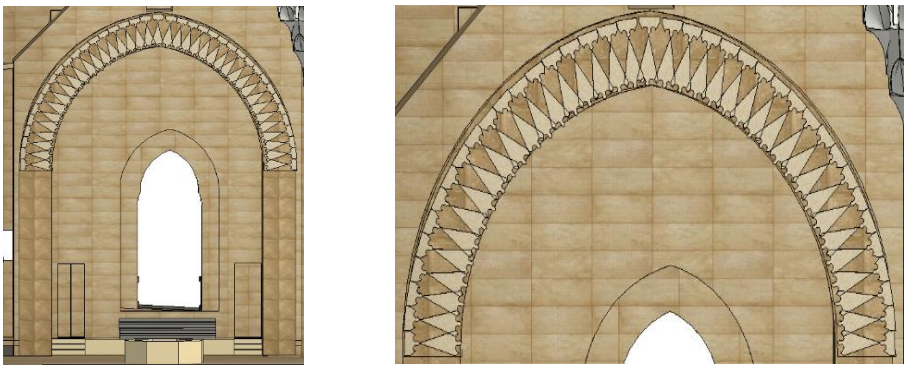
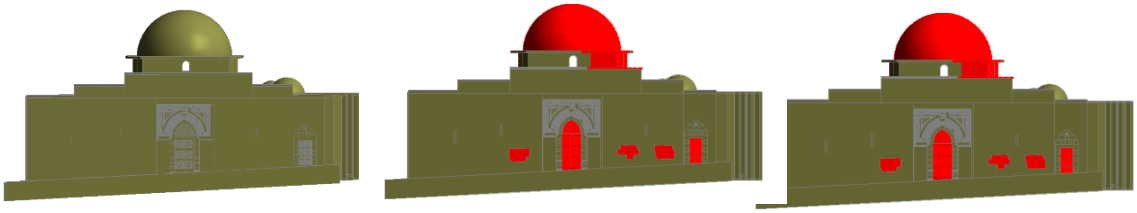
- Decorations of the large arch on the inner southern facade of the main hall

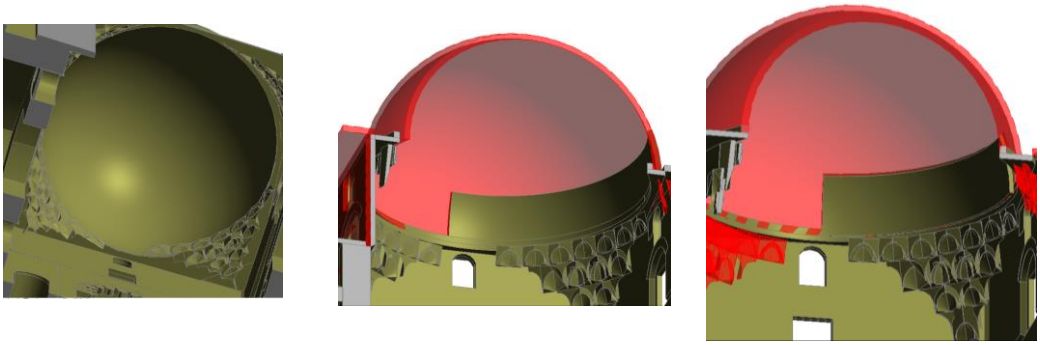


- Decorations of the northern iwan arch

- Damage assessment shown on the model

Pre-war *Post-war* *Post-earthquake*





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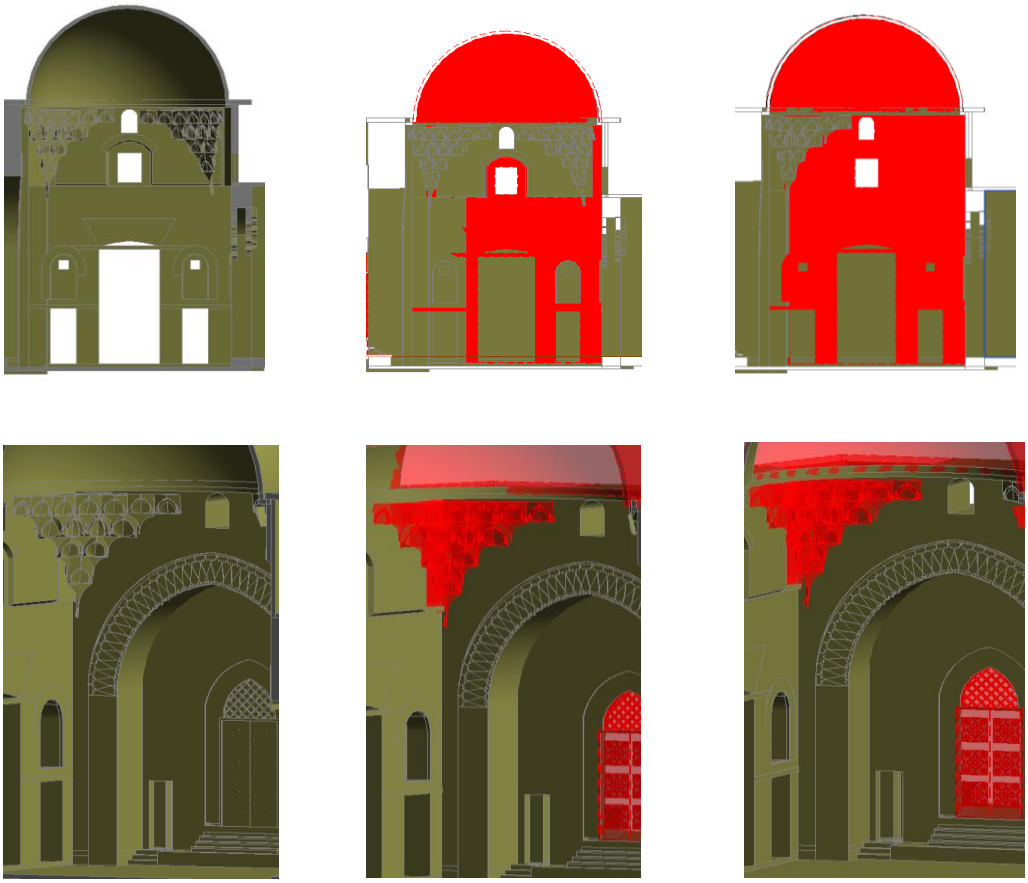

Determine methods of intervention (Restoration and maintenance works)

The methods that will be used for the restoration and rehabilitation of Al-Matbakh al-ʿAjami can be classified into:

- Architectural preservation and maintenance (Conservation): using additions and supporting materials that preserve the building's structure to ensure its continuity and lack of damage as much as possible, and its adaptation to rapid change resulting from the crises that the building went through, whether war or earthquake.
- Rehabilitation: Parts of the building will be restored, renovated, protected, maintained, and reused, and attention will be paid to its urban surroundings in terms of improving the roads leading to it and providing it with the necessary infrastructure, facilities, and services by examining the water, sewage, electricity, and telephone networks and providing and maintaining the related works.
- Restoration and Renovation, by returning the building to its original state as it was before the destruction it suffered during the war and the earthquake.
- Reuse: Adaptive Reuse by reusing and investing it and proposing new uses that suit the current development.

Developing the 3D model of the building to reach the final model after reconstruction (LOD500)

The architectural details in the Great Hall and the main southern facade will be completed in several styles: 1. Creating the family in place: These are elements that are modelled directly in the project file without using other files. They are specific to the model only and cannot be used in other projects (walls, arches, etc.). 2. Create external files: They can be modified separately and used for many different projects. Flexibly, by replacing each family with another of the same category (doors, windows, etc.), 3: Create elements using auxiliary programs: by using AutoCAD and exporting to the HBIM model to obtain real geometric shapes.

- Main door decorations:

A high level of decorative detail has been achieved through: drew each part of the door separately in different ways and later assembled these parts into the original model.

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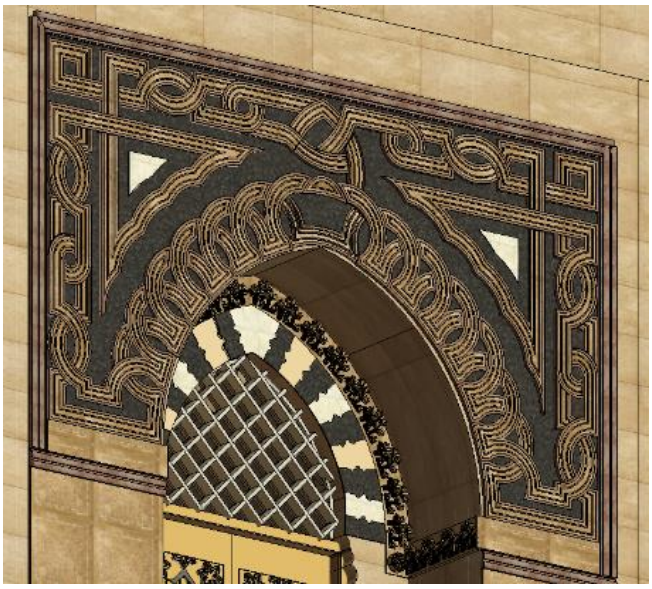
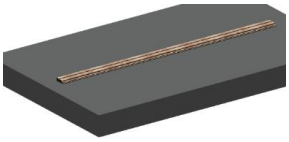
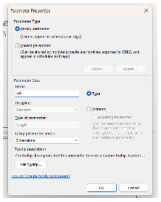
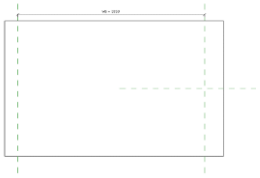


- Creating the outer frame of the door and the terraces

This is done using an external file through the (Sweep) command, creating (Reference Plane), giving it (Parameter), drawing its section, and then giving it the stone material.

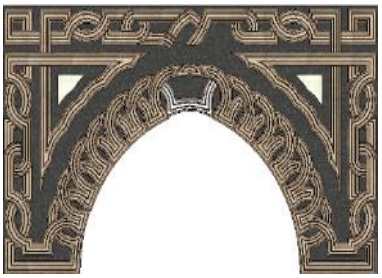


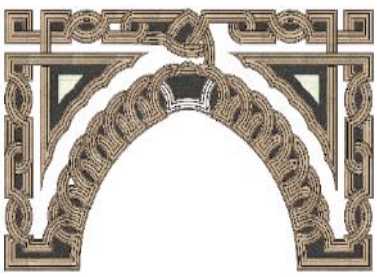


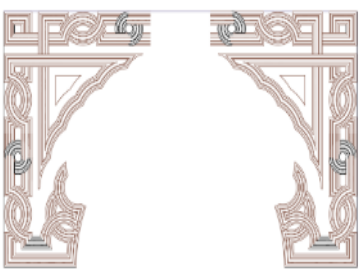


- Interlocking stone decorations

By completing part of the work in AutoCAD and then completing it in Revit in an external file, executing the Extrusion command with several dimensions and giving each part its own material.







- Floral decoration surrounding the pointed arch of the door and the decorative circular pediment.

The floral decorations were created using an external file and executing the Extrusion command in several dimensions, giving each part its own material, then transferring it to the project file and repeating the shape according to the path of the pointed arch to mimic the original shape.

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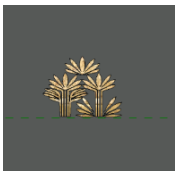
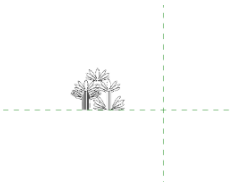
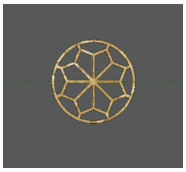
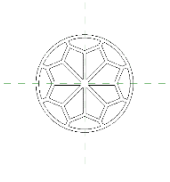
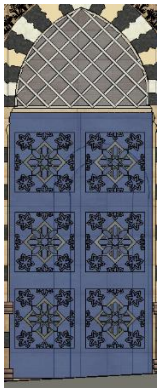
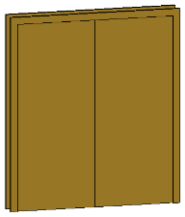
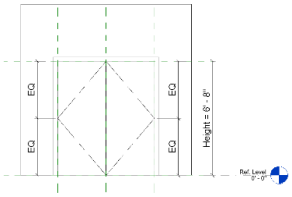
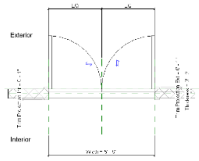





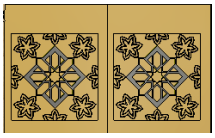
- Ornate copper door

The lower part of the door. An external file (Family) for a door was imported, modifications were added to it in terms of dimensions and material, and then exported to the original project file.
The decorations were drawn in an AutoCAD file and then exported to an external file (Family) and the Extrusion command was executed and then exported to the original project file to be added to the section.

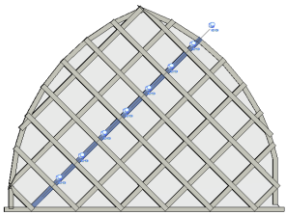
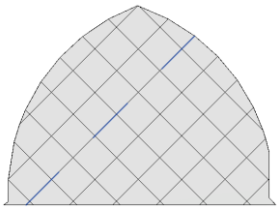




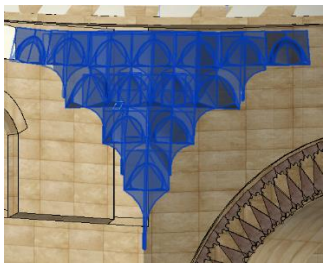


The upper part of the door was created in the original profile (Curtain Wall) and its axes were placed diagonally at both ends and aluminum construction was made.

- Corner squinches (muqarnas)

It is one of the most complex shapes and was created using several external files using the Blend command, then compiled into one file and installed on several levels according to a curved shape.



It is the result of fitting this shape with one of the following shapes

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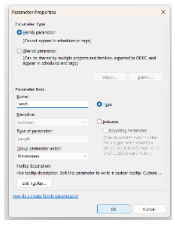
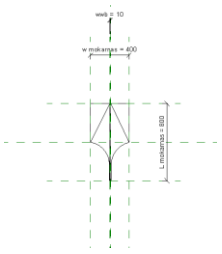
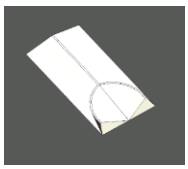
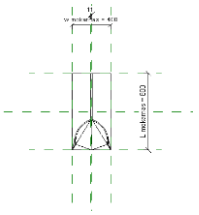
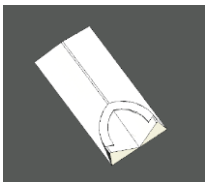
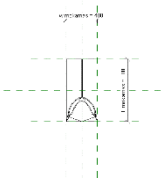
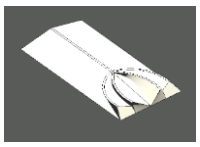
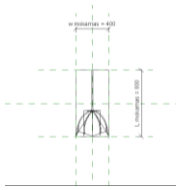






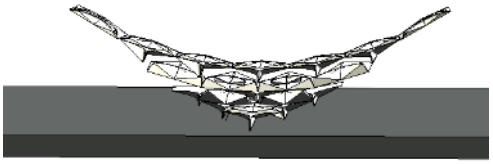
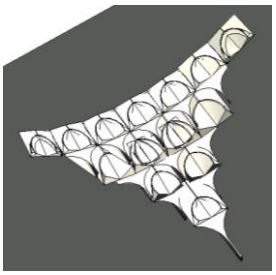
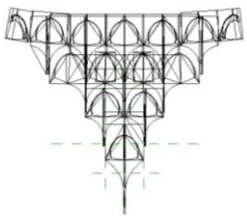
First form

The second shape

The third shape

Assembled in one file and installed on several levels according to a curved shape

Final model after rehabilitation and reconstruction:

After the development of the work during the previous stages and the multiple levels of detail (from LOD100 to LOD500), through which we returned the building to its original state as it was previously and improved its general shape without distorting it, thus the final three-dimensional model of the studied part of the Persian kitchen was reached with its details.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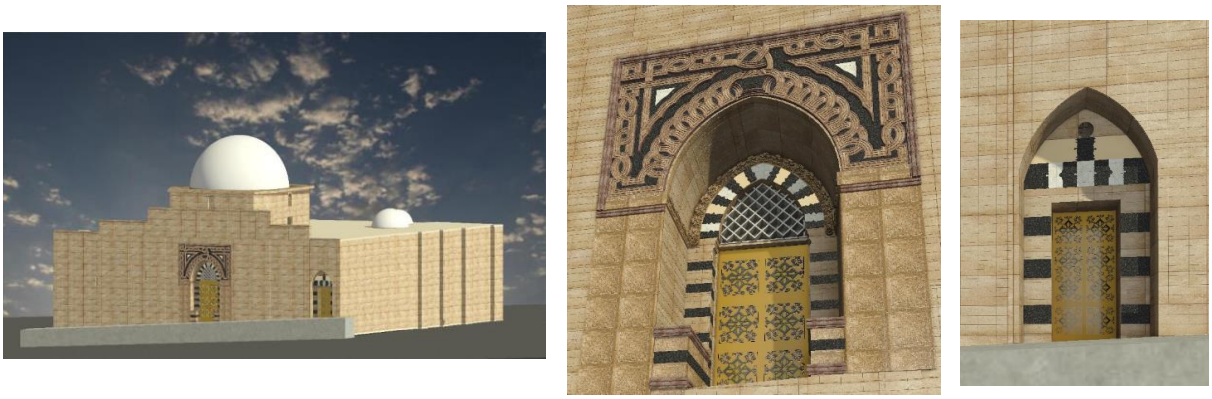
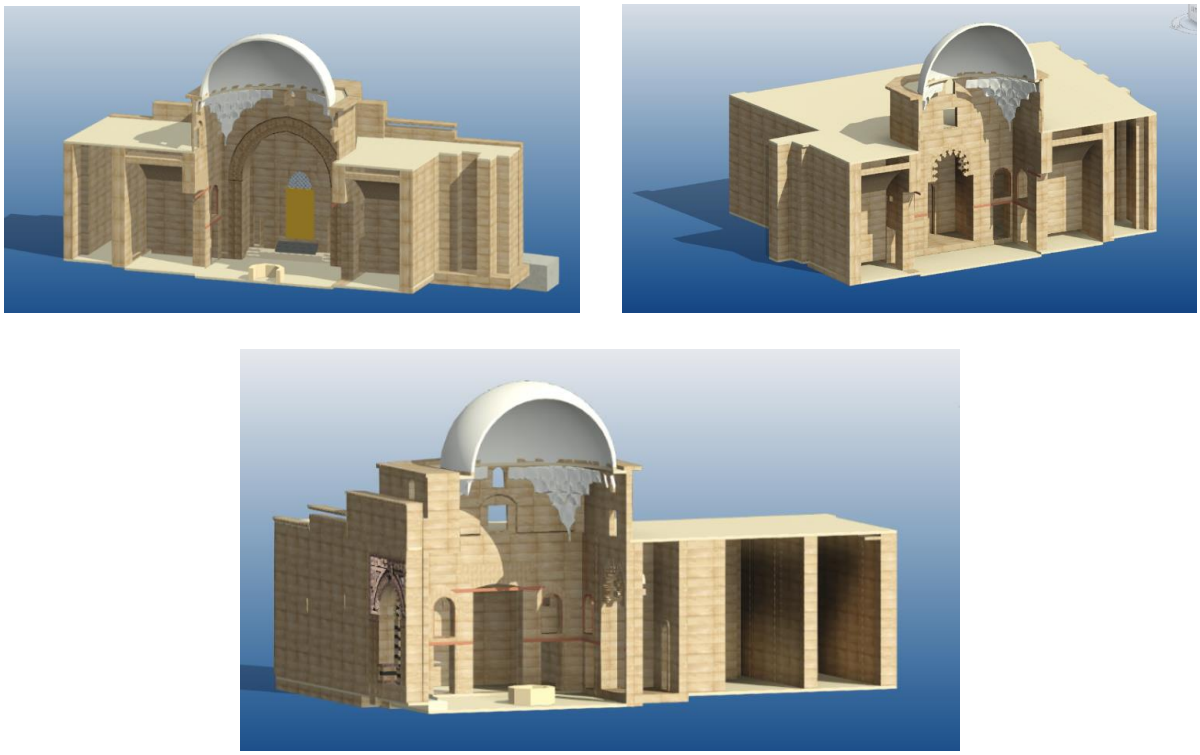


Illustrative perspective clips showing parts of Persian cuisine and details in the main large hall



Interior shots in the main large hall

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5. Conclusion

The research is distinguished by its focus on the local context of the old city of Aleppo, and this represents a valuable addition compared to previous studies that focused on other contexts. This approach, adapted to the local context, takes into account the specific cultural, technical, and economic characteristics of the city of Aleppo, ensuring the suitability and applicability of the proposed solutions in this specific context. The research also directly addresses the challenges resulting from conflicts and natural disasters. This aspect is particularly important in the context of crisis-affected areas, where heritage preservation operations face unique challenges that require practical and applicable solutions. By using digital technology, specifically Historical Building Information Modeling (HBIM), as a key tool for preserving the architectural heritage in the city of Aleppo, with a particular focus on the application of LOD levels, this approach opens new horizons for the use of digital technologies in the field of heritage preservation, contributing to the development of traditional practices and enhancing their efficiency and effectiveness. The research is also characterized by a comprehensive and integrated approach, as it addresses the various stages of the process of preserving architectural heritage using HBIM, starting from documentation and evaluation through design and restoration. This comprehensive approach ensures the integration of efforts and achieving the maximum benefit from the application of HBIM in heritage preservation projects.

6. Recommendations

1. Develop national guidelines for the application of HBIM in architectural heritage conservation projects.

    - Establishing unified standards for documenting architectural heritage using HBIM, taking into account the specificity of each region.
    - Develop procedures to ensure the quality of models and data produced through HBIM.
    - Establishing a national library of heritage architectural elements will facilitate the modeling process.

2. Develop a methodology for applying HBIM in post-conflict and post-disaster areas.

    - Develop a framework for the use of HBIM in reconstruction planning and management of heritage conservation projects in post-conflict and post-disaster areas.
    - Develop a methodology for documenting severely damaged buildings using HBIM, focusing on assessing the current condition and identifying priorities for intervention.
    - Establish a national database of HBIM models for damaged heritage buildings to facilitate restoration and rehabilitation operations.

3. Promoting sustainability and utilizing HBIM in the life cycle management of heritage buildings.

    - Use of HBIM in the life cycle management of heritage buildings, including regular maintenance and restoration.
    - Encouraging research and development in the field of HBIM applications for the preservation of architectural heritage in post-conflict and post-disaster areas.

4. Spread awareness and use of HBIM in education and training.

    - Spreading awareness of the importance of using HBIM in the field of architectural heritage preservation among those working in this field.
    - Incorporating educational materials about HBIM into architectural and engineering education programs.
    - Organizing training courses to qualify national cadres on the use of HBIM in heritage preservation projects.

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