



A Study of The Farasan Islands' "Saudi Arabia" Cultural Heritage Conservation and Their Characteristics for Touristic Rehabilitation

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HIGHLIGHTS

- Characteristics of Heritage Sites in the Farasan Islands.
- Proposals for Restoration of Heritage Buildings in the Islands.
- Environmental, Cultural, Economic and Social Characteristics.
- Rehabilitation Requirements for Placing Islands on the Touristic Map.

GRAPHICAL ABSTRACT



ARTICLE INFO

Article History:

Received: 10 September 2021.

Revised: 18 November 2021.

Accepted: 17 December 2021.

Available online: 28 December 2021.

Keywords:

Farasan Islands, touristic rehabilitation, environmental characteristics, natural characteristics, cultural heritage, intangible heritage.

ABSTRACT

The Farasan Islands, located in the Red Sea southwest of the Kingdom of Saudi Arabia, belong to the Jazan region. They consist of several islands; the most important of which are: Farasan, Saqid and Qummah. The Farasan Islands have many assets need to be properly employed to make them a touristic destination with a special and distinctive character. Therefore, it is necessary to outline a plan for the restoration and conservation of cultural heritage and to highlight the site's other data in favor of touristic employment.

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Accordingly, the study aims at: highlighting the potentials of the Farasan Islands represented in the cultural heritage (archaeological buildings), the natural and environmental characteristics of the site, the intangible heritage, the cultural and social characteristics of the local community. The study also aims at developing proposals for the rehabilitation of the archaeological buildings on the islands and studying the procedures to rehabilitate the Farasan Islands as a touristic destination.

The research findings indicate that the Islands are rich in many values, such as their historical depth and strategic location. The environmental conditions have an active role in shaping their heritage. The Islands' heritage requires quick intervention to reduce the risks and deterioration factors that negatively affect them.

Further, the research reflects that the archaeological and heritage buildings vary according to their need for restoration and conservation work between urgent cases of high risk, medium risk condition, normal cases or buildings in good condition and buildings in need of reuse after restoration.

1. Introduction

Farasan Islands are located within the Jazan region in the far south-west of Saudi Arabia (Fig. 1). The Farasan Islands have been known for early settlement since prehistoric times which continued steadily in ancient times and in the pre-Islamic period then in the Islamic and modern times until today [1].

The Farasan Islands

The Farasan islands form an archipelago (Fig. 2). They are about 42 km away from the city of Jizan. The archipelago includes more than ninety islands. The length of its shores is about 300 km [2]. Among the most famous of the Farasan Islands: a. The Grand Farasan Island which is the largest one and also one of the largest islands in the Red Sea and the most populated and the most fertile with an area of 1050 km². It is a rocky island that includes the city of Farasan, which fosters the governorate headquarters, government departments, hospital, water desalination plant, and a power station, followed by a group of villages: Sir, Al-Hussein, Al-Muharraq, Al-Messila, Al-Qissar, Abu Touq, Al-Hudurah, Al-Khosfin, Al-Maqid, Al-Mahsar, Khattab, Khawla, Qad Al-Hima. There are many archaeological sites on the island [4] b. Saqid Island which is the second largest island in terms of area and population. Its area is estimated to 203 km² of which is mostly sandy soil and has fresh water. The land of this island is flat and its beaches are coronated with palm trees. Saqid Island is separated from the Farasan Island

by a shallow waterway of about a half km long [4] c. Qummah Island which has a populated village, but the population of this island is small due to the lack of fresh water. This island has an important strategic location as it oversees the international corridor of the Red Sea and the ships crossing from the Suez Canal in the north to Bab al-Mandab in the south and back [5]. Among the Farasan Islands, which are also known, are D0mask, Zifaf, Al-Dassan, Washka, Kayrah, and Domask Islands [4], but only the Great Farasan, Al-Saqid and Qummah islands are inhabited.

2. Practical Development

2.1. Characteristics of Heritage Sites in the Farasan Islands

The Farasan Island has many natural and cultural heritage sites (Fig. 3), which give the island a special importance that makes it an attractive site for tourists and those interested in heritage from inside and outside the region. The study is devoted to a group of natural and cultural heritage sites in the Farasan Islands, represented by the following:

2.1.1. Natural Heritage Sites:

The Farasan Islands abound with many stunning natural sites. Among them are a group of coasts such as the coasts of the Qandal forest, Al Ghadeer, Al Qarn, Abra and Al-Faquah, in addition to a group of beaches overlooking the Gulf of Al-Hasis, the most important of which is Al-Hareed Beach. There are also natural reserves in Farsan and the most important of which is the Deer Reserve.

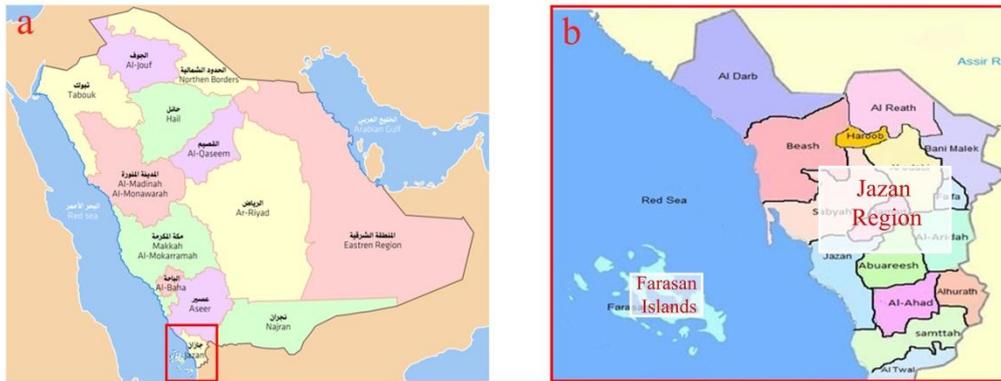


Fig. 1. (a) The Administrative Division of the Kingdom of Saudi Arabia [2], (b) A Detailed View of the Jazan Region, its Borders, and the Location of the Farasan Islands from it [3]

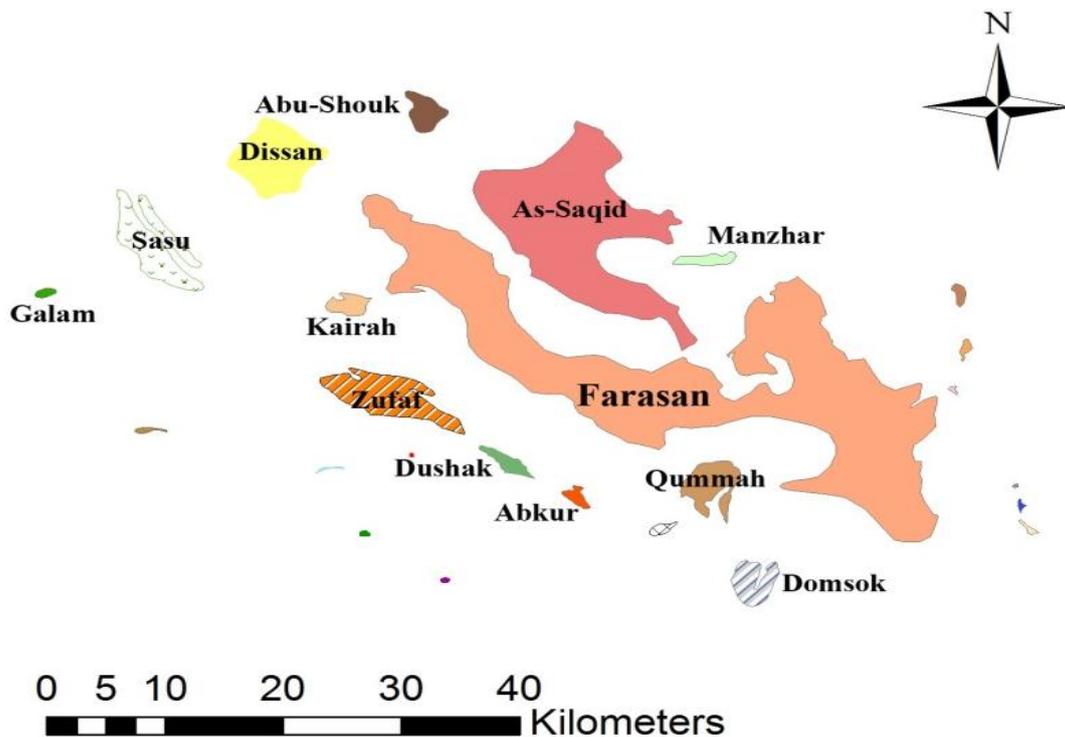


Fig. 2. Detail of the Most Important Farasan Islands (ARCGIS 9.3 and Google Earth Pro Applications)

discriminate fishing and overhunting of endangered wildlife such as Farasani deer [11], c. cultivation of non-native species such as Persops trees, which have a great effect on competing with local species and removing them from their natural habitats [10].

Likewise, large numbers of mangroves have decreased for the following reasons: a. environmental pressures and human activities taking place on the beaches such as the expansion of coastal and tourism industries in addition to the illegal cutting of trees and the intensive grazing

b. large projects and the construction of Farasan Sea Port, roads, berths and small establishments

c. cutting down trees and transporting them to other places which leads to the death of a large number of Shura trees due to cutting off sufficient supplies of water [8].

2.1.2. Cultural Heritage Sites:

The Farasan Islands possess many archaeological and historical assets. This includes many sites of Stone Age tools and some pottery fragments on their surface. As well as other sites that contain foundations for separate buildings, most of which represent housing units of different sizes in addition to the presence of many wells as a main source of water. Examples include: Al-Qurayyat, Al-Ghareen, Al-Kadami (Qissar village), Luqman Mountain, Al Muharraq Village, Matar Valley, Sir.

In addition to that, Farasan Islands encompass a number of military buildings represented by the Ottoman Citadel and the German House, along with a group of historic buildings for some wealthy people who inhabited the islands such as Al-Rifai Houses, the House and the Mosque of Al- Najdi.

The following is a review of some cultural heritage sites in the Farasan Islands "Farasan and Qumah Island", their status and the most important deterioration factors affecting them:

2.1.2.1. Archaeological Sites in the Farasan Islands:

Al-Ghareen Site: The site includes foundations for residential buildings of coral reef

[12] limestone, large quantities of pottery and ceramic fragments, a well and a cemetery (Fig. 6), All of them represent the second settlement phase of this site, which dates back to the late Islamic period [13].

The site is surrounded by an iron fence to define its urban. The site has not received any restoration work, so Al-Ghareen buildings, as an open site, are exposed to all the deterioration factors in their surrounding environment (wind, rain, human damage).

Luqman Mountain site: The site dates back to the late Islamic period and is located on a hill that shows the ruins of a tower or a defensive fortress [13] of coral reef limestone [12] (Fig. 7).

Currently, the site is ruins that are surrounded by an iron fence to define its urban and it suffers from all the factors of damage in its environment and is in need of rapid intervention with restoration works.

Al Arady Barracks: It is a group of rectangular buildings that the Ottoman soldiers used to make their camp during the Ottoman Era (Fig. 8). Next to these military barracks, the Ottomans left a paved road connected the village of Farasan to the coast of Al-Ghadeer. This road is called "Asakla" and was used as a passage for horse-drawn vehicles that transported supplies and foodstuffs for the soldiers [5].

The site contains buildings, some of which are still standing and others are ruins, and they are all liable to collapse and loss, due to the weak condition of the building materials - as it was illustrated by microscopic examination in the study of Ali and Al-Banna [12]- , Besides the biological damage resulting from plant growth within parts of the building.

The Ottoman Citadel: The citadel is located on the Farasan Island (Fig. 9a). It was built by the Ottomans (1901-1913) [5]; the highest rocky peak is about 10 m above sea level (Fig. 9b) and its total area is estimated to 170 m². Limestone is the main building material. Wood is used for roofing and as joists for entrances and doors. The building of the citadel consists of two floors (Fig. 10).



Fig. 4. (a) The Shura Trees, (b) The Qandal Trees [6], (c) The Qandal Forest in the Farasan Island [9]



Fig. 5. (a) Al Ghadeer Coast, (b) The Place where Hareed Festival is Held Every Year at Al Hassis Bay



Fig. 6. (a) Planning of the Residential Units at Al-Ghareen Site, (b) The Deterioration Phenomena of the Buildings and their Ruins,(c). The Nature of the Surface Finds



Fig. 7. General view of the ruins of Luqman Mountain Site

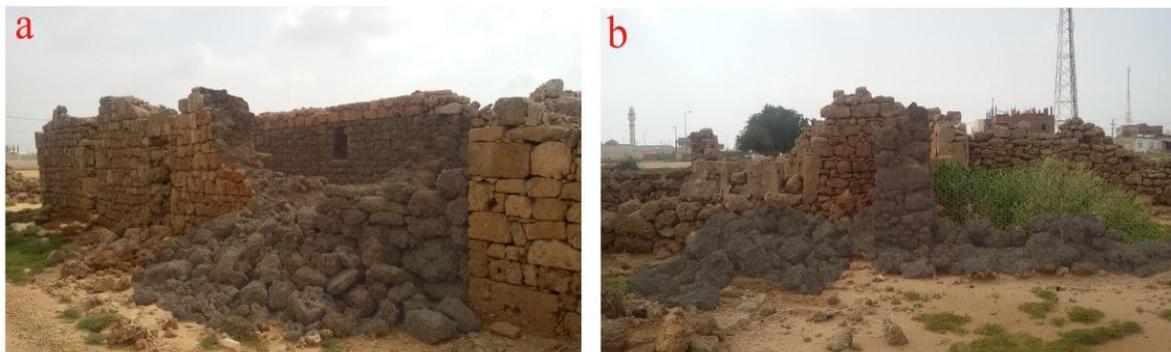


Fig. 8. (a) The Collapse of Large Parts of Al Arady Buildings, (b) The Effect of the Biological Damage

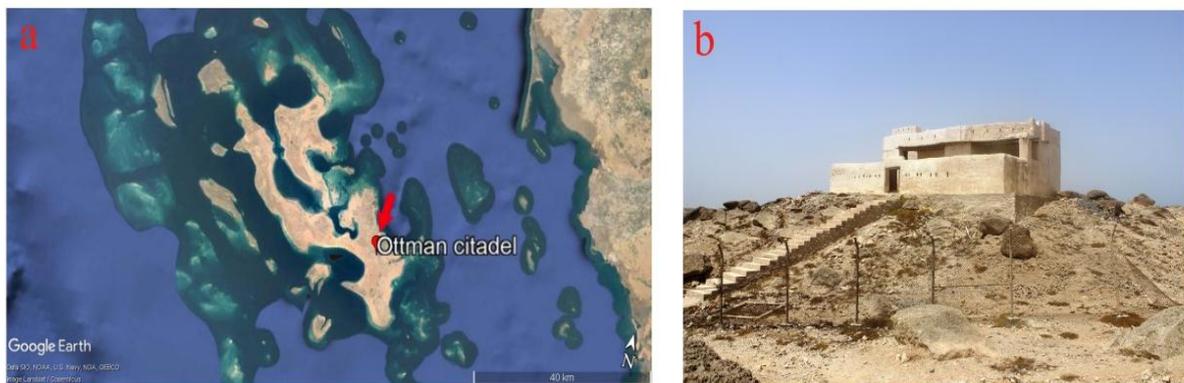


Fig. 9. (a) The Location of the Ottoman Citadel (Google Earth Application), (b) General view of the Ottoman Citadel

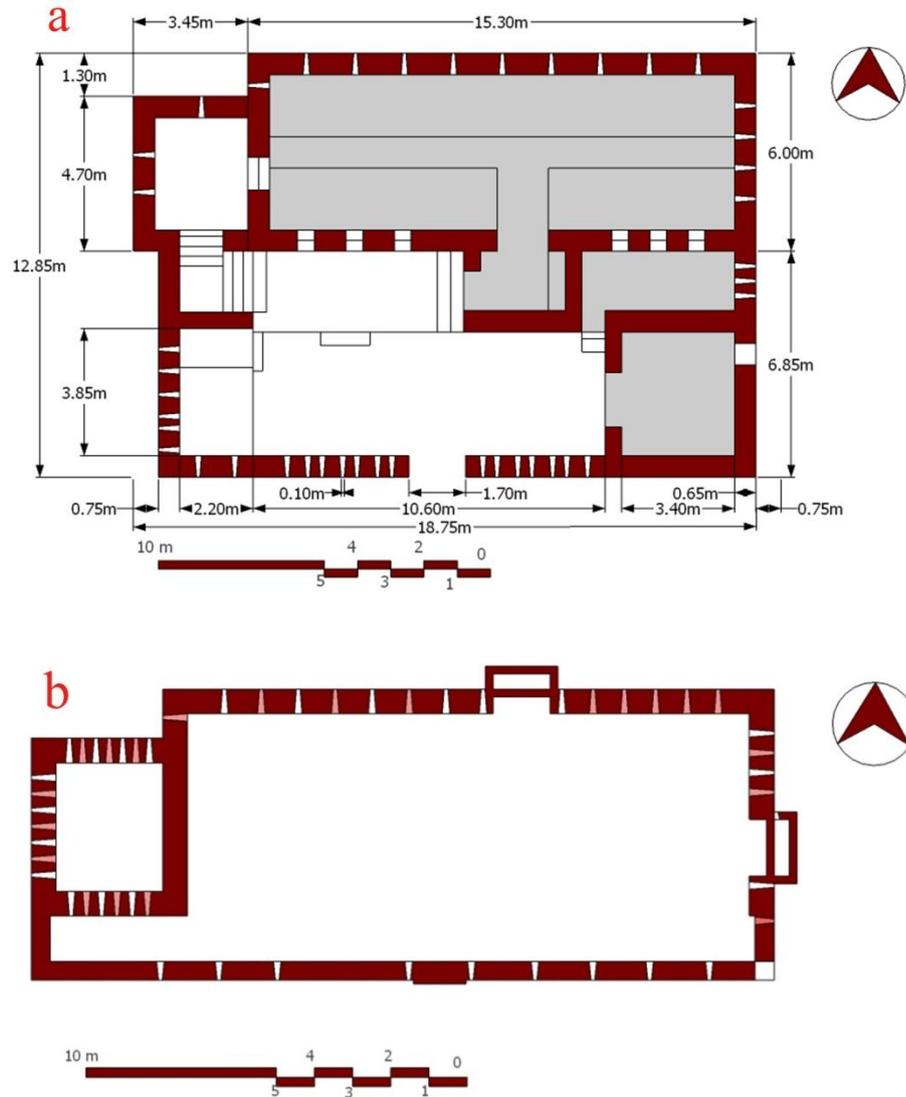


Fig. 10. Horizontal Plan of the Ottoman Citadel: (a) The Ground Floor, (b) The First Floor

The Ottoman Citadel is located in a high site far from the sea level which makes it less affected by many factors of damage that afflict the rest of the buildings in the Farasan Islands. In addition to its possession of some restoration work that makes it more resistant to the deterioration factors. However, it is noticed that there is a need for regular conservation work to fix any factors that negatively affect the building. The citadel is in

good structural and architectural state, but it suffers from some of the deterioration phenomena (Fig. 11) that necessitate carrying out regular conservation works such as: the spread of dirt on the floors and walls, the presence of many spots on the walls that result from rain falling and dust sticking in it, intentional human damage by some visitors and some aspects of biological damage represented by plant growth.

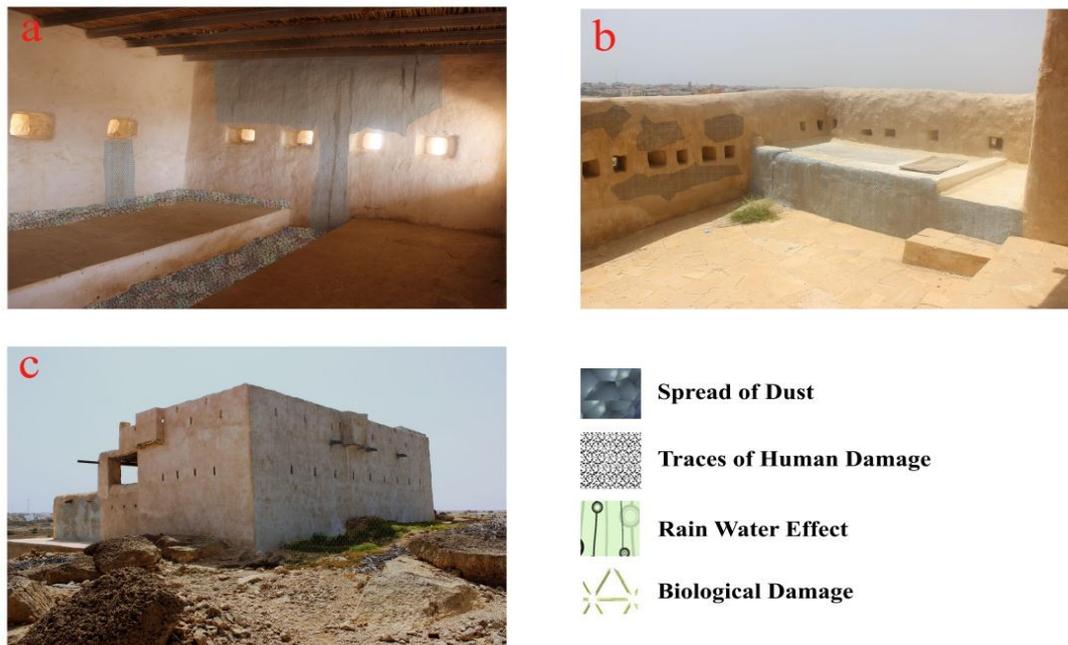


Fig. 11. (a) The Deterioration Phenomena at the Ottoman Citadel, where a. Illustrates the Spread of Dust, Dirt and Human Damage, (b) the Spread of Dust Inside the Citadel Spaces, (c) Damage of the Citadel Building from the Outside

The German House is located on the island of Qummah (Fig. 12). It was built by the Germans in 1901 during the Turkish-German alliance [14] to be a depot for coal used as fuel for ships crossing the

Red Sea between the Suez Canal and Bab al-Mandab. Limestone was used as a main building material. The building is a huge rectangular area surrounded by outer walls with four doors (Fig. 13).

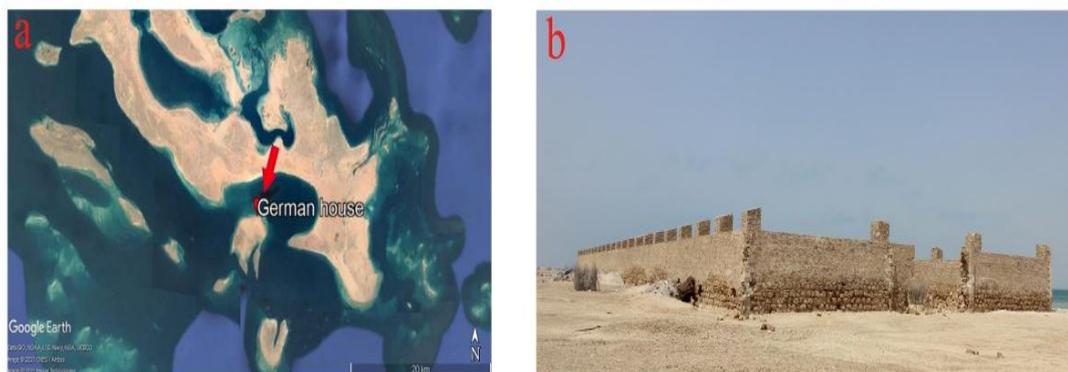


Fig. 12. (a) The Location of the German House, (b) A General View of it

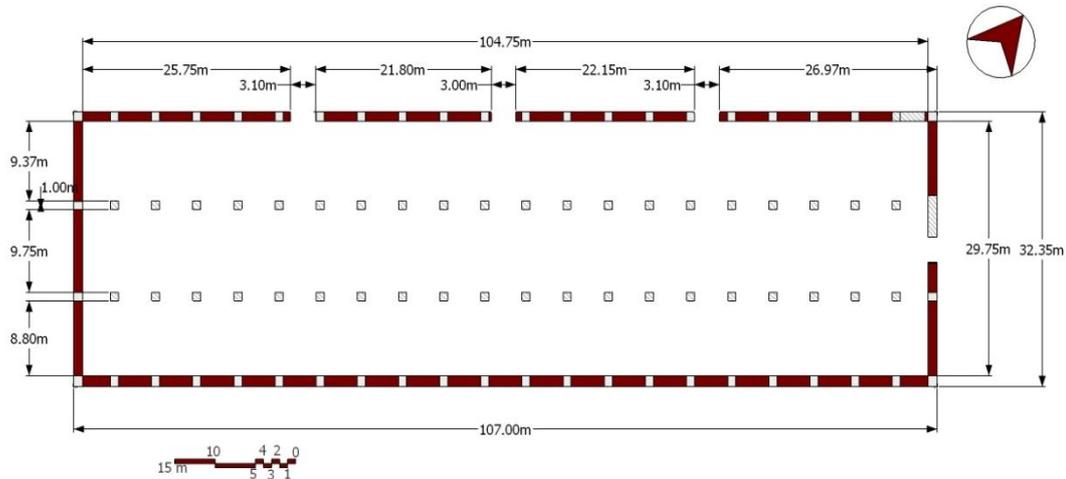


Fig. 13. Horizontal plan of the German House

The building suffers from many factors of damage stemming mainly from its proximity to the sea (5 meters), the effect of climatic conditions and the local conditions represented in the nature of the building stones themselves as they were cut from local rocks in the Farasan Islands and thus bear all their characteristics. Among the most important deterioration phenomena is the collapse of large parts of the building especially in the northwest and northeastern walls in addition to the collapse of most of the internal columns (Fig. 14) which necessitates the need to intervene to save the building.

2.1.2.2. Heritage Buildings in the Farasan Islands:

A. Religious Architecture (Najdi Mosque):

Al Najdi Mosque (Fig. 15) is located in the center of Farasan. It was built by Ibrahim Al-Najdi in 1928. The layout of the mosque (Fig. 16) is a rectangle divided into three corridors covered with twelve domes. Outside the mosque, there are several modern extensions forming a chapel for women and a bathroom.

Due to the nature of the building's usage as a mosque in which prayers are held, it is noticed that the heritage part is in a good condition and receives a great deal of periodic maintenance. Nevertheless, it needs some fine restoration work for the decorations and external facades.

B. Civil Architecture (Farasan Houses):

The house of Hussein Al-Rifai is located on the Farasan Island, established by Hussein Al-Rifai, one of the major pearl merchants, in 1922. Limestone was used as a main building material in addition to the use of some auxiliary materials in construction such as wood as joists for openings or wooden ties to support the walls.

The house's layout is rectangular in shape and extends from north to south. It is divided into two parts, one of which includes the residential block that is located on the southern side and includes the majlis, the corridor and the terrace preceded by an open courtyard. The other part is the northern courtyard that consists of a group of annexes (Fig. 17).

The house suffers from many deterioration form (Fig. 18) this includes the following: collapse of some of the upper parts of the outer wall surrounding the house, the spread of vertical cracks whose width ranges between (0.1-1.0 cm), falling of casing layers that cause erosion of the bonding mortars, biological deterioration represented by the spread of plants, intentional human damage represented in writings and engravings on stone surfaces and the presence of some restoration work carried out in a way that lacks scientific basis in this field.

The house of Abdullah Ibrahim Al-Rifai is located on the Farasan Island (Fig. 19), next to the house of Ahmed Menawar Al-Rifai. It was built by Abdullah Ibrahim Al-Rifai around the year 1922 (upon asking specialists from the region). Limestone was used as the main building material.

Although Abdullah Ibrahim Al-Rifai's House is directly adjacent to Ahmed Munawar Al-Rifai's house, which has possessed some specific restoration work, the house of Abdullah Al-Rifai lacks urgent intervention with the structural, architectural and fine restoration work to preserve it. Among the most important deterioration problems (Fig. 20) are: the collapse of large parts of the house's walls, roofs, the surrounding wall, and the stairs leading to the upper floors, the spread of vertical, horizontal and oblique cracks, which range from tiny cracks in the layers of mortar to deep cracks in the joists and walls and the collapse and loss of many wooden structural and architectural elements such as: roofs on the ground floor as a result of overloading windows and cantilevers.

Qissar Houses: The village of Al-Qissar is located on the Farasan Island. According to [15], Al-Qissar is an old deserted village, dating back to the Roman Era. The village includes about 400 houses built of local stone and palm leaves. Al-Qissar was a summer resort for its inhabitants. The houses of the village are distributed on both sides of the roads and lanes. The village includes a mosque with a simple design (Fig. 21). Al-Qissar Village has received specific restoration works for all its parts using environmental elements, which made it in a good preservation state besides its rehabilitation and re-using as a touristic attraction site under the name of Al-Qissar Heritage Village which ensures its continuous maintenance.

In general, the aforementioned archaeological or heritage sites and buildings with all their architectural and artistic features are the product of an environment of a special character - climatic, the nature of building materials, the formation and construction techniques ... etc.- and this is what gives these buildings their unique authentic features.

2.2. Proposals for Restoration and Conservation of Heritage Buildings in the Farasan Islands:

To rehabilitate heritage buildings in the Farasan Islands, it's necessary to know the nature, characteristics and status of the building materials. This can be done by conducting a set of examinations, analysis and tests. Then a rehabilitation plan that includes studying the re-use of these buildings and their optimal functions needs to be developed. After that, the necessary restoration and conservation works ought to be conducted.

2.2.1. Examinations, Analysis and Tests of Archaeological Building Materials in the Farasan Islands:

Through visual examination, it becomes clear that coral reef limestone is the main building material in addition to the use of some auxiliary building materials such as: wood as joists for openings or wooden ties to support walls. Wood is also used in some architectural elements such as windows and cantilevers.

Through a set of tests using scanning electron microscope, polarizing microscope and some methods of elemental, physical, mechanical and thermal analysis, such as X-ray diffraction analysis, X-ray fluorescence analysis, water absorption test, specific gravity test, density test, porosity test, compression test [12], Thermo Gravity Analysis and Differential Thermal Analysis [16], it turns out that the main building materials of Farasan Islands have the following properties:

Their chemical composition and optical properties are similar to the samples taken from the mother rock on the Farasan Island [16]. This means the stones used in the heritage buildings on the two islands were cut from local quarries bearing all their characteristics.

The results of XRD and XRF revealed that the samples have the same mineralogical composition but in different proportions: calcite, aragonite, albite and dolomite. Consequently, the building materials suffer from different rates of damage. The samples contain a high content of calcium carbonate which explains the light color of most of the building materials while the presence of iron

is responsible for the red color that appeared on the samples.

It turns out that the compressive strength of the studied limestone samples is very low (3.10 Mpa in Luqman Mountain's Sample), due to the presence of aragonite mineral in remarkable proportions. The low density (1.48 g/cm³ in Luqman Mountain's Sample) is due to the high porosity (29.21 % in Luqman Mountain's Sample) along with the high rate of water absorption under atmospheric pressure (17.92 % in Luqman Mountain's Sample).

The results of the thermal analysis (Thermo Gravity Analysis and Differential Thermal Analysis) of the studied samples as well as the point of deviation for them which depends on the comparison of the atomic mass of the component compounds with the atomic mass measured in the analysis which expresses the purity of the sample have shown a kind of convergence. With the exception of samples taken from the homes of Al-Qissar and the Ottoman Citadel which are distinguished by their relative purity.

As for the auxiliary building materials such as mortars, casing layers and wood, they are as follows: the used wood is one of the soft types of wood, such as; cypress, pine, cedar, and juniper, but it is difficult to define precisely due to the higher layers of preparation. The used mortars consist mainly of sand (quartz) mixed in varying proportions with gypsum and anhydrite while the casing layers consist mainly of gypsum and lime [12].

2.2.2. The Proposed Plan for the Rehabilitation of Heritage Buildings in the Farasan Islands:

Rehabilitation plans include two parts; the first is the required restoration works to preserve the buildings and the second is the reuse to ensure continuous maintenance [17]. Before carrying out the required restoration work, a plan for reuse should be developed to take into account the requirements of new uses when carrying out restoration and conservation works.

First: proposals to reuse heritage buildings in the Farasan Islands:

The reuse of heritage buildings that have lost their function is one of the most important methods of preserving them as this helps prevent them from entering the cycle of damage again especially those buildings that have received a measure of care and restoration before. Reuse means using the building in its first function for which it was established when the community is still in need for this job with applying some required development works to keep up with the times or using the building in a new job different from its original job imposed by the need of society and the status of the building itself with making the necessary modifications in accordance with the recommendations of international charters [18].

After studying the site and its most important components, a group of usages can be proposed to suit the heritage buildings in the Farasan Island as follows:

A set of matrices has been prepared to evaluate the alternatives for the proposed usages according to their suitability for the archaeological and heritage buildings and their urban. Through a comparison between a group of more appropriate usages such as: museum for heritage artifacts, public library, center for cultural seminars and lectures, exhibition of traditional arts, school for handicrafts education, hotel with a special character, office for the General Authority for Tourism and National Heritage, restaurant serving traditional dishes and a laboratory for painting and fine arts.

Then giving estimates of the suitability of these usages for the heritage buildings and their urban (Table 1) by putting numbers that express excellent suitability where "75-100%", very good "50-75%", good "25-50%", suitable "less than 25%", unsuitable "zero", and it was not possible to put a certain percentage because this evaluation process is relative and depends on the personal judgment of the researchers

The study shows that the reuse of the Ottoman Citadel as a center for cultural seminars and lectures, the reuse of the German House as a school for teaching handicrafts, the reuse of Hussein al-Rifai's house as an exhibition

of traditional art, and the reuse of Abdullah Ibrahim al-Rifai's house as a hotel with a special character. These are the best usages of these buildings taking into account the integration among them.



Fig. 14. (a) Collapse of Parts of the Building, (b) Erosion of Mortar Layers and the Building's Limestone



Fig. 15. Al Najdi Mosque from 15a. outside and 15b. inside

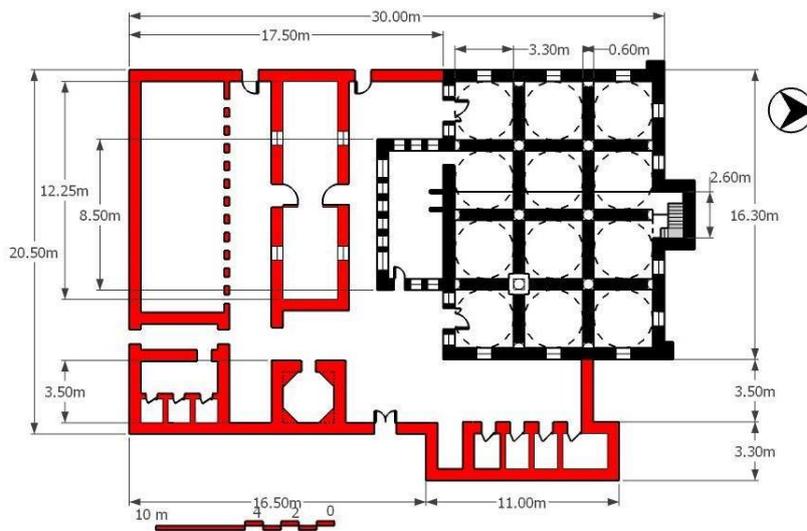


Fig. 16. Horizontal Plan of Al Najdi Mosque



Fig. 17. (a) The Main Entrance of Hussein Al-Rifai's House, (b) The Main Space in the House, (c) The External Courtyard



Fig. 18. Deterioration Phenomena in Hussein Al-Rifai's House: (a) where Parts of the Building Collapsed, (b) The Falling of Casing Layers and Mortars, (c) Inappropriate Restoration Work

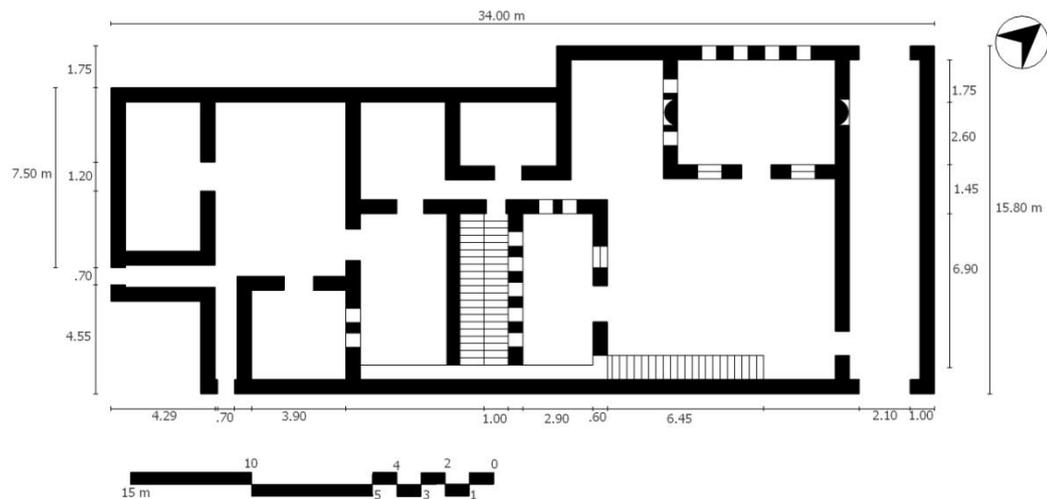


Fig. 19. Horizontal Plan of Abdullah Ibrahim Al-Rifai's House



Fig. 20. (a) Damage on the Facades of Abdullah Ibrahim Al-Rifai's House, (b-d) Spread of Structural and Architectural Problems, (e-g) Collapse of Parts of the Building's Roofs, 20h. Spread of Cracks



Fig. 21. (a-c) shows some elements of Al-Qissar Heritage Village, "Courtyards, Roads and Houses"

Second: The proposed restoration and conservation plan

The aim of all the aforementioned studies whether related to studying building materials and determining their characteristics or developing proposals for the reuse of heritage buildings are necessary to develop a plan for restoration, conservation, management and presentation of the site in a manner that befits its historical, architectural, artistic and aesthetic value.

Restoration and conservation procedures differ in terms of being private or public property or they are still in use or lost their main function [19], as well as differing according to their need for restoration work as follow:

- Urgent cases of high risk: are a result of some sudden effects such as fluctuating ground water movement or earthquakes, or a result of time aging without interfering with restoration works. An example of this is the house of Abdullah Ibrahim Al-Rifai

that needs immediate intervention with quick metal supports to protect the rest of the building from collapsing. Henceforth, these buildings are given a priority in restoration.

- Moderate risk situations: in the case of buildings that have cracks or deflection as a result of a slight drop in the soil but they have been in a semi-stable state for some time and such cases are placed under engineering control for its determination. This type of building needs maintenance and restoration work, but it can be postponed for a specific period of time [20], [21], [22], the German House and Arradi barracks can be considered of this type of building.
- Normal cases or buildings in good condition: in which the deterioration phenomena are resulting from the deterioration factors in a long period of time (the phenomenon of aging). This type of buildings must be preserved in this good condition as much as possible as the case of Hussein Al-Rifai House.

The proposed plan for restoration and conservation

Al Ghareen and Luqman Mountain Sites: these two sites are among the sites that need urgent intervention to preserve the remaining parts and their best method of restoration is anastylosis.

Anastylosis means reconstructing the scattered parts or re-placing the fallen stones to create an accurate and a comprehensive copy of the original building, with the use of minimal new additions to save its shape [23] and [24].

Mahari [25] mentions that anastylosis is the only permissible method in rebuilding the ruins of archaeological sites. This method aims to reconstructing the broken formation and restoring its ancient form as much as possible using the original materials that are in good condition on the site [26].

Al-Aradi barracks and the German House: these two sites contain buildings still standing and others in the form of ruins and it is noticed that all the existing parts in the two sites are vulnerable to collapse and loss due

to the poor structural and architectural condition and weak building materials. To preserve these two buildings, it is suggested to complete the missing parts so that non-intervention does not cause other parts of the building to fall one by one and completion helps eliminate weaknesses in the archaeological buildings as most of the missing parts are mainly concentrated in the lower walls and corners [24].

Completion work will either be carried out with completely missing elements such as: some wooden windows, their architectural details will be extracted from elements found in other buildings dating back to the same historical period, or it is corroded, damaged, missing units and parts, these will be completed according to what is found or left of it [27].

The German House

It is proposed to rebuild the collapsed parts of the German House. The reconstruction works are done in case of extreme necessity and these works must be done with new building materials but similar in their properties for the old materials such as stones, mortars, woods, etc. while using the same traditional building techniques as well as avoiding structural defects that may result from the separation of the new part from the old one in accordance with what was stipulated in international conventions [23].

The Houses of Hussain Al-Rifai and Abdullah Ibrahim Al-Rifai

These two buildings need comprehensive restoration work especially the house of Abdullah Ibrahim Al-Rifai starting from steel supports, immediate reinforcement and ending with rehabilitation and re-use. The restoration work can be summarized as follow: a. Structural Restoration: These works are related to the infrastructure and structural system of the building including restoration, supporting and consolidation. b. Architectural Restoration: Includes completion, reconstruction, and remodeling c. Fine restoration: Related to the restoration of building materials, paints, wood and decorative units [22].

Table 1. Shows the Proposed Usages According to their Suitability for the Heritage Buildings and their Urban Community

Heritage Buildings	Suggested Usages - Suitability Ratio								
	Museum	Public Library	Center for Seminars	Exhibition	School for Handicrafts	Hotel	Office for the General Authority	Restaurant	Laboratory
Ottoman Citadel	77.8	68.6	81.2	78.4	72.8	60.2	64.4	56	78.4
German House	75	64.4	67.2	67.2	75.6	63	58.8	53.2	72.8
Hussein Al-Rifai's House	75.6	74.2	75.6	81.2	72.8	70	61.6	44.8	75.6
Abdullah Ibrahim Al-Rifai's House	88.9	69.4	69.4	80.6	63.9	91.6	63.9	38.9	75

After this brief presentation of the restoration procedures for archaeological and heritage buildings and the rules that regulate them, the details of these procedures are related to the building itself, its condition and its deterioration phenomena. Thus, what have been mentioned above are general guidelines then they are the details when developing a restoration plan for each building Separately.

2.3. Environmental and Natural Characteristics of the Farasan Islands

Environmental conditions have an effective role in shaping archaeological and heritage monuments through geographical location, geological formations, topography and climate (heat, wind, rain). Archaeological and heritage buildings in any site are affected by their local environment that defines their features as well as climatic conditions and surrounding factors that affect their protection and preservation.

2.3.1. The Farasan Islands Location in Relation to Longitude and Latitude

The Farasan Islands are located at the southeastern end of the Red Sea between longitudes 41 ° 20 ' - 20 ° 43' east, and between two latitudes 20 ° 16' - 40 ° 17' north. The Farasan Islands are one of

the largest islands in the Red Sea and their extension comes from the southeast to the northwest [4].

2.3.2. Geology of the Farasan Islands

The geology of the Farasan Islands follows the coastal plain of the Red Sea. This coast consists of a narrow range of thick sequences of sedimentary rocks of the Oligocene period, where they were deposited Several crumb continental deposits above ancient Miocene marine sediments [28].

The Farasan Islands follow the fourth time formations represented by the Pleistocene and Holocene deposits as they consist of reef limestone surfaces that are dotted with snails and fossil marine organisms, which do not rise above the sea level by more than 20 meters on average.

The Farasan Islands consist of reef limestone surfaces that are dotted with fossil marine organisms. The Farasan limestone is formed in layers as follows: a. Popular limestone at the top b. Followed by white limestone, c. Followed by a yellow and pink Marley limestone.

In the north of the Grand Farasan Island, there are series of clay, gypsum, and anhydrite formations of different thicknesses which are known to the island's inhabitants as the gypsum region. The thickness of these

formations varies from one region to another due to their connection to a salt-domed structure in this part of the island [29].

2.3.3. Climate of the Farasan Islands

The Farasan Islands follow the southern region of Jazan and are linked to its climate which is affected by the movement of tropical winds and varies according to the diversity of the surface appearances and the geographical characteristics of the region. The temperature of the coastal plain is moderate in winter and hot in summer where its rates are more than 33 ° C so the Farasan Islands have a special importance as a winter touristic attraction destination.

Relative humidity is an important climatic element for its effect on heritage buildings. If it is combined with a rise in temperature, and it is clear that the monthly average of relative humidity in the Farsan Islands reaches its lowest levels in the summer season as it decreases in July to reach 61%, Then, it increases to reach its highest range in the winter months in January, 74%.

The prevailing direction of wind blowing on the Farsan Islands is the western and southwestern. The monsoons blow in the months of June and August and are loaded with sandstorms - Al Ghubrah phenomenon - . The monsoon speed in the region is about 26 km / h as an annual average then its speed rises to more than 30 km / h during the months of May, June and August [30].

Rains fall in the Jizan region in the summer during the months of July, August and September, and the precipitation ranges between 100 to 450 mm depending on the height of the site. This rain is often dense and heavy and its slope steep towards the coast where the main valley paths in the region often go from east to west towards the Red Sea coast [31].

2.4. The Cultural, Economic and Social Characteristics of the Local Community:

In addition to studying the tangible cultural heritage in the Farasan Islands, the intangible cultural heritage of the islands and the most important cultural, economic and social characteristics of the inhabitants should be presented as they are side by side. This is

seen as the most important means of achieving sustainable development of the Islands.

2.4.1. Cultural Characteristics

The Farasan Islands are rich in a great intangible cultural heritage that varies between customs, traditions and folk arts that take a unique social character such as marriage customs and Hajj (Pilgrimage) ceremonies [30]. That's beside some crafts practiced by the inhabitants which is associated to sea life such as making boats and dyes extracted from whale liver and used as a coating for boats and ships.

The Farasan Islands are famous for many popular games inherited from the ancestors and are still performed in the present day. Among the most important of them are the sailing boat race and the diving race. In addition to the popular artistic heritage in the islands that distinguishes them from others such as the art of Al-Dana is a "singing collective game", the art of Majlis "singing in the reception area" and the poetry of the Kasra "kind of poetic heritage [5], [30].

The Farasan Islands are also famous for their festivals and celebrations that repeat annually and these events happen to be a touristic attraction for the islands. They include the Fish Festival (Al Hareed) (Fig 22) that extends from three to seven days between April and May [5], and the season of migratory birds (Al Jarajih) as they celebrate the arrival of migratory birds annually in the months of April and May of each year [30].

2.4.2. Economic Characteristics

The population in the Farasan area is engaged in fishing, agriculture, and sheep breeding in addition to practicing some simple handicrafts, industries and working in governmental sectors [12]. This is in addition to some activities imposed by the marine environment, such as pearling and its trade and the fishing activity beside the coasts' richness with raw amber [30].

2.4.3. Social Characteristics

According to the report issued by the Department of Statistics and Information for the year 2010, it is clear that the total population of the Farsan Governorate is 18,016 Saudis

and non-Saudis of whom 15,992 are Saudis. The number of those enrolled in the study in the age stage (3 - 30 years old) 5433 individuals of whom 1058 passed the university level. The number of residents who have a university degree is 1467 individuals. The number of those who have a diploma without university is 721 and the number of those who have high school or its equivalent is 3285 individuals. The number of residents (15 years or more) of them on the work force is 7238, and outside the work force 6749 between students and women working as a full-time home worker, retirees and others [33].

This study is needed to be conducted when maintaining the archaeological site as it gives indications for the population increase, determines the needs of the local community and takes the advantage of the available human resources in the rehabilitation and management plans.

2.5. Rehabilitation Requirements for Placing Islands on the Touristic Map of the Kingdom:

In view of the large amount of available data and information on the site, Geographical information systems (GIS) [34] and SWOT analysis strategy [10] are used to organize them in the rehabilitation and management plan. A set of proposals have been developed to rehabilitate the Farasan Islands as follows:

- **Creating a buffer zone for heritage sites**

Article 46 of the Royal Decree on the Protection of Antiquities [35] stipulates that the area for the protection of the urban and archaeological heritage is fixed at a distance of (two hundred) meters around the direct boundaries of the building or the classified site especially the side on which the facade of the building or site is located. It has been possible to benefit from the application of GIS to determine this space so that it is taken into account when proposing any development or rehabilitation work for these sites (Fig. 23).

- **Extending the infrastructure to all inhabited Farasan villages**

By applying GIS, it's observed the uneven distribution of main structure whether infrastructure or superstructure as it is limited to

the Farasan Governorate only. So other villages require these services and the nature of each of them can be determined.

- **Executing some bridges to link the Farasan Islands**

It is suggested to implement some bridges to link the Farasan Islands to each other such as the bridge that connects Farasan and Al Saqeed. So, it is proposed to implement these bridges between Farasan and Qumamah with a length of 3.5 km, between Farasan and Zafar with a length of 5.5 km and between Zifaf and Kira with a length of 1.8 km (as shown in Fig. 14).

- **A proposal to establish a group of hotels and touristic resorts**

It's suggested some suitable sites for that to contribute solving the problems of accommodation in Farasan as well as contributing to providing job opportunities for the upgrading of the local community. Three hotels or touristic resorts (Fig. 24) have been proposed so that one of them is located along the coast between the Qandal Forest and Al Hassis Beach. The second one can be established near the village of Al-Hussein on the southwestern coast of the Farasan Island, and the third one is proposed on the Saqid Island on the coast near the village of Abu Touq.

- **Proposing a touristic path that enables visiting the most important heritage monuments in one day**

This can be done by using the available data about the arrival and departure times of the ferry, determining the shortest path to the heritage sites and determining the time required for the entire trip with a proposal to rehabilitate the "Al-Askala" road linking Al-Ardi barracks with the Ottoman Citadel and AlGhadeer port to connect the three sites.

- **Developing proposals to reuse heritage buildings in proportion to their condition and the needs of their surroundings**

For example, the proposed use of the German House which is located as a single archaeological building on Qumamah Island, differs from the proposed use of one of Al-Rifai houses that is located in the middle of the Farasan Governorate and is surrounded by many heritage and residential buildings.

- **Taking into account the appropriate heights so that extreme heights that contradict the general character of the heritage buildings on the islands are not allowed as it was noticed that Farasan is characterized with its horizontal expansion (Fig. 25).**
- **Highlighting a set of architectural elements (Figs. 26, 27) that can be used to connect between modern and heritage buildings in the same urban such as the use of Mashrabia or Rawshan (a traditional Islamic window), wooden canopies, semicircular and pointed and using stucco to implement some floral motifs as friezes on the facades.**

Preserving and developing traditional handicrafts

Whether the traditional crafts associated with the rehabilitation of heritage buildings such as carving on wood and the implementation of stucco works and decorations, or crafts that the Farasan Islands are famous for such as making boats and painting them, organizing marble or making baskets.

3. Conclusions

The Farasan Islands are rich in many values, such as their historical depth and strategic location which necessitates their care and good management. The environmental conditions in the Farasan Islands have an active role in shaping archaeological and heritage buildings through geographical location, geological formations and climate.

The Farasan Islands include many natural and cultural heritage sites that require quick intervention to reduce the risks and deterioration factors that negatively affect them. The natural heritage sites are exposed to a set of dangers that prevents their preserving such as the difficulty of coordination between the various authorities in the islands, the significant decrease in the number of the Farasani deer and the decrease in the number of mangroves.

The Farasan Islands possess many archaeological and historical assets including archaeological sites. Few of the heritage sites have received some of conservation works while many of them still suffer from many

structural and architectural problems that threaten the loss of many of their elements over time.

The archaeological and heritage buildings in the Farasan Islands vary according to their need for restoration and conservation work between urgent cases of high risk, medium risk condition, normal cases or buildings in good condition and buildings in need of re-use after restoration.

It is possible to make use of geographic information systems to document, update and analyse all data on heritage sites as well as linking them to their spatial data.

4. Recommendations

Maximizing the utilization of the Farasan Island, as it's the second largest island of the Red Sea islands as well as its strategic location making it a suitable destination for investment and the establishment of economic and touristic projects that enhance interest in heritage sites.

The necessity for preserving the natural and cultural heritage sites by clarifying their boundaries, organizing their urban, and studying their characteristics and needs.

The necessity for making use of the tangible folklore, producing it locally and marketing it, for expressing the site and revive the traditions and customs of the people of the islands such as manufacturing sesame "bride's box". The same applies to preserving and reviving the intangible heritage through organizing and displaying it in local and international festivals and celebrations.

Take advantage of the economic and social characteristics of the inhabitants and employ them to serve the site management plan and achieve sustainable development.

The necessity for organizing and limiting the expansion of the urban fabric at the expense of the heritage sites as well as taking into account the general character and not causing disagreement by controlling the heights of new buildings on the site the consistency of the facades and taking into account the use of land.

The need to speed up the intervention of the responsible authorities to protect the heritage

sites in the Farasan Islands and make the best use of them.

Providing guiding and indicative panels outside and inside the site to guide visitors by identifying entry points and parking spaces, suggesting a path to visit during a specific time and providing all available data and information about the site.

The necessity for community participation in rehabilitation and management plans and

supporting the relationship between heritage sites and their communities.

The need to raise awareness of the importance of heritage and a sense of belonging to heritage sites among the local population through conducting educational seminars and workshops at the sites and using various media for this purpose to raise a generation that loves this heritage and is cherished for its value.



Fig. 22. (a, b) The Celebration with Al Hareed Festival [32].

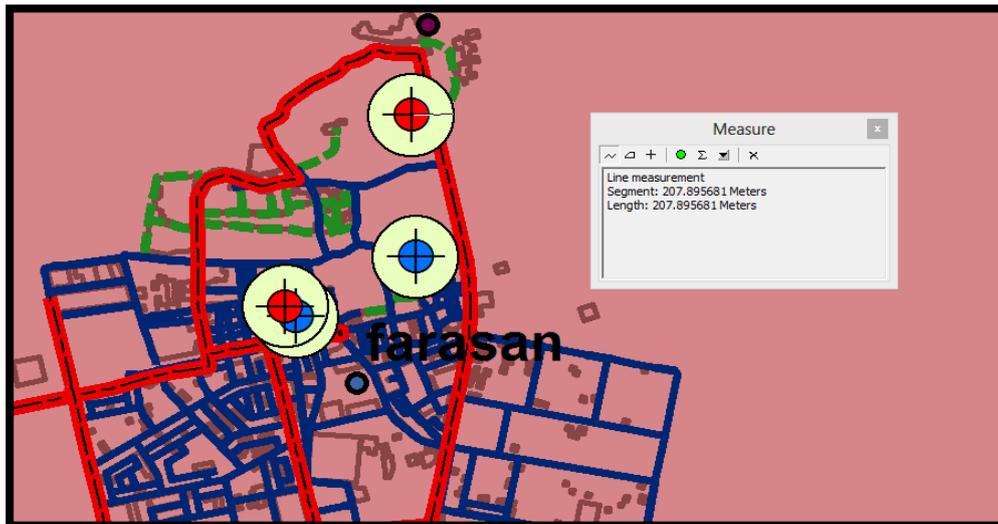


Fig. 23. The Protection Zone around the Archaeological and Heritage Sites at a Distance of 200 Meters.

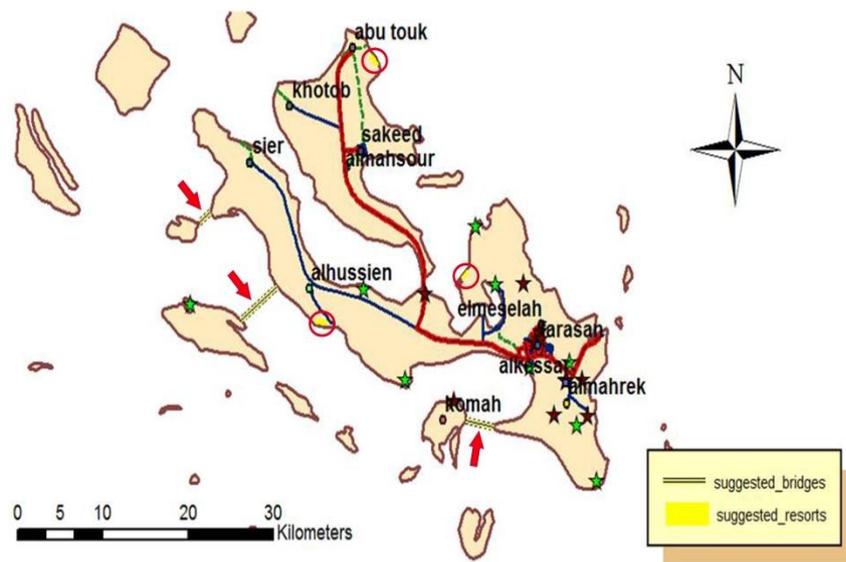


Fig. 24. The Locations of the Proposed Bridges, Hotels and Touristic Resorts

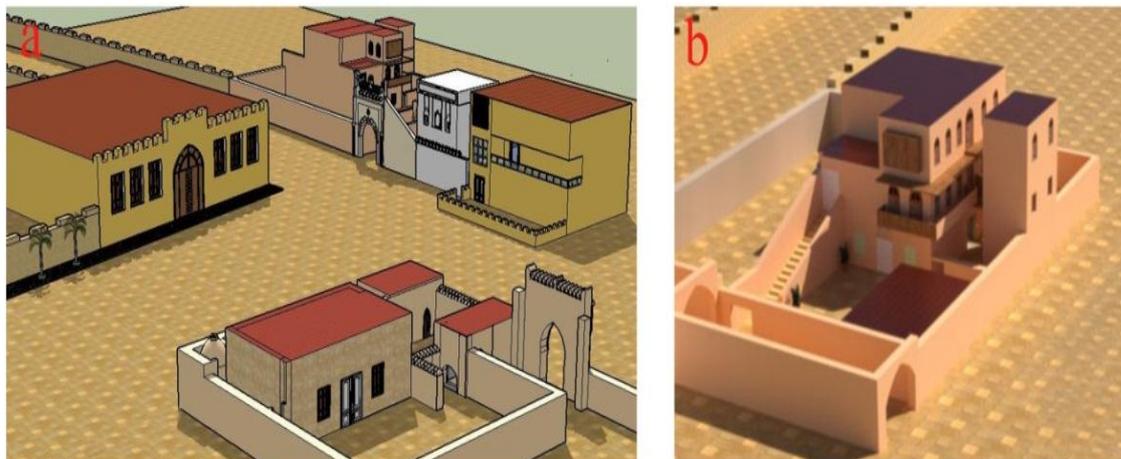


Fig. 25. (a) The nature of the Juxtaposition between private and heritage buildings in terms of heights, (b) An expected view of Abdullah Ibrahim Al-Rifai's House after rehabilitation works



Fig. 26. Proposed Openings for Modern Buildings within the Urban of Heritage Buildings

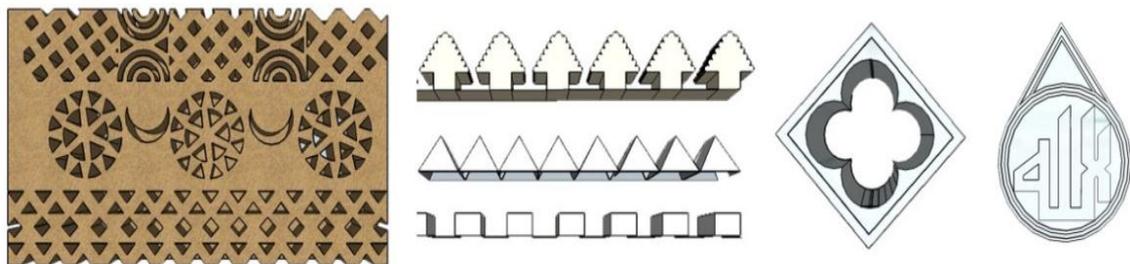


Fig. 27. Some of the Proposed Decorative Units to Give a Farasani Touch

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