Legal Annexes
Kingdom Of Saudi Arabia
Ministry of Finance and National Economy

Law of Antiquity

Issued by Royal Decree No26/M in 23/6/1392H

Second Edition

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The Law of Antiquity
Chapter One
Definition and General Provision

Article (1) The Higher Council of Antiquity

To form the Higher Council of Antiquity of the following:

1. The Minister of Education
2. Deputy Ministry of Education
3. Representative of the Ministry of Finance and National Economy
4. Representative of the Ministry of Interior
5. Representative of the Ministry of Education
6. Representative of the Ministry of Hajj and Endowment
7. Representative of the Ministry of Information
7a. Representative of the Ministry of Municipality and Rural Affairs
8. The Director of Antiquity Directorate.
9. Three members chosen by Chairman of the Council among individuals known for their prominent scientific status and interest in culture and heritage. The period of their membership shall be less than two years subject to renewal. The Council may be reformed by a ministerial resolution based on the recommendation of the Minister of

President
Deputy
Member
Member
Member
Member
Member
Member

The rank shall at least be ten
The rank shall at least be ten
The rank shall at least be ten
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Education and the Chairman of the Higher Council of Antiquity.

Article 2: The aim of establishing the Higher Council of Antiquity is to gather as much expertise as possible in order to reach the desired objective. The Council shall deal with the issues hereunder:

1) Propose the general policy of the Antiquity department in the field of maintenance, restoration, renovation and excavation of archaeological sites.
2) Propose the amendments of the Law of Antiquity and the issued ministerial resolutions for implementation thereof.
3) Sell, gift, exchange, loan and accept donation antiquity.
4) Study the annual report set by the director of Antiquity regarding tasks thereto and recommend his perception regarding the issues therein.
5) Propose the establishment of new museums.
6) Practice authorities thereto indicated in the law of Antiquity.
7) Deal with the other issues in regard to antiquities delegated to it as seen by the Minister of Education and recommended by the director of antiquity.

Article 3: The Higher Council of Antiquity shall have at least two meetings annually. The meetings shall be considered valid if attended by half of the members and the Council shall issue resolution thereto by majority and in case of a tie the president side shall overrule. The director of antiquity shall implement the Council’s resolutions after being approved by the Chairman.

Article (4): The Minister of Education shall have the right to call for an exceptional meeting if needed and based on the request of two-third of the Council’s members and for the general well fare.
Article (4*): A reward shall be paid for the Chairman and the members of the Higher Council of Antiquity in return to their attendance determined by a Ministerial resolution.

Article (5): Movable and immovable properties built, made, produced, modeled or drawn by humane being 200 years ago; or had acquired archeological characteristics due to old natural factors shall be considered as antiquities. The Antiquity Directorate may consider moveable and immovable properties of recent decades as antiquities if acquiring artistic and historical characteristics and it shall be approved by a resolution from the Minister of Education based on a recommendation from the Antiquity Directorate.

Article (6): The Antiquity Directorate in association with other governmental bodies each in the field of profession thereto shall be responsible for preservation of antiquities and archeological sites. It shall also estimate the history of each antiquity. The registration of each antiquity means the government’s approval of its historical and artistic importance and the government’s efforts on maintaining and studying it in order to present it in a suitable appearance according to the regulation hereby.

Article (7): Antiquities are two kinds: moveable antiquities and immovable antiquities:

a) Immovable antiquities are the fixed antiquities as natural caves or engraved antiquities used for ancient man needs. Rocks which was engraved with pictures, patterns and scripts; the remains of cities and buildings buried in hills and historical establishments built for several purposes like: mosques, temples, palaces, infirmary, schools, castles, fences, forts, playground, Hamamats, cemeteries, tunnels, dams and the remains of buildings therein and the related tools like doors, windows, pillars, balconies, ceilings, cornice and crowns ...etc.

b) Moveable antiquities are antiquities made to be separated from the ground or historical buildings which can be moved as sculptures, engravings, scripts, textiles and manufactures of any

substance and the purpose of production and means of usages thereof.

Article (8): Moveable and immovable antiquities and archeological sites existing in the Kingdom shall be considered of the government property except the following:

a) Immovable antiquities owned by individuals
b) Movable registered by their owners at the antiquity directorate.
c) Moveable antiquities stated by Antiquity Directorate not necessarily be registered

Article (9): The Antiquity Directorate with the association of the government relevant bodies shall have the right to drive out commissions or individuals occupying historical buildings or archeological sites. If their occupation of the buildings or locations prove to be done with no violation to regulations hereby, they shall be compensated according to article (21) of the Law herein.

Article (10): The land owner shall not change the moveable or immovable antiquities found in the surface or in depth and he shall not excavate for antiquities.

Article (11): Immovable and moveable antiquities shall not be damaged, changed or deformed by writing or drawing on it or change its features. It is also forbidden for citizens to hang posters or signposts on archeological sites or registered historical buildings.

Article (12): When planning development, expansion and improving villages and cities, preserving archeological sites shall be considered. Planning project in archeological sites shall not be approved unless having the approval of Antiquity Directorate which shall determine the archeological areas and inform the city planning body thereof.

Article (13): Municipality shall not issue restoration or building license in locations close to archeological sites and historical buildings unless approved by the Antiquity Directorate to assure achieving harmony between the new buildings and the traditional style.

* Article herein was added by the Royal Decree no.3/M in 36/1/1990.
Article (14): The Antiquity Directorate in association with relevant departments of land surveys shall determine archeological hills, buildings and sites close to populated areas in order to secure it from being inhabited.

Article (15): The Antiquity Directorate shall work within the scope of the agreements, treaties and recommendations of international institutions to return the smuggled antiquities from the Kingdom and help in returning the foreign antiquities entered into the Kingdom.

Chapter Two
Immovable Antiquities

Article (16): The Antiquity Directorate shall determine the historical buildings and archeological sites and old neighborhood to be preserved and maintained. The Antiquity Directorate shall register the specified antiquities in the record of historical buildings and archeological sites after the approval of the Higher Council for Antiquity and the issuing of the Ministerial resolution of registration. The registration record shall state rights of contiguity concerning the neighboring buildings. Owners and managers of the properties, the governmental bodies and relevant municipalities shall be informed of the Resolution.

Article 17: Ministries, directorates, special committees shall consider rights of contiguity when organizing and planning cities and villages containing historical buildings, and archeological sites, owner shall also consider the rights of contiguity determined by the Antiquity Directorate which require specifying an empty area surrounding the historical buildings and archeological site and determining the style, height, color and building materials of the new buildings in order to match the ancient ones.

Article 18: The Antiquity Directorate shall permits dealing with the historical buildings and archeological sites which are not necessarily registered.

Article 19: Based on a recommendation of the Higher Council of Antiquity, some historical building or archeological sites may be removed from the record. A Ministerial resolution shall be issued in regard and shall be published in a gazette.

Article 20: Individuals who own registered historical buildings may remain their ownership to their properties.
Article 21: The Antiquity Directorate shall have the right to own archeological sites or historical buildings provided that ownership process according to expropriation principles and for public welfare. The Antiquity Directorate shall also have the right to own buildings and lands surrounding the registered immovable antiquities in order to highlight these monuments. An ownership compensation shall be issued regardless of the historical, artistic and archeological value for buildings and occupied sites.

Article 22: The Antiquity Directorate alone shall be responsible for maintaining and restoring registered immovable antiquities in order to preserve them. The owner shall not have the right to object.

Article 23: The registered archeological land shall not be used as storages. No cemeteries, buildings or irrigation system shall be placed land or planting or any removing any trees which cause a change in the land’s feature without a license of the Antiquity Directorate. Remains of historical buildings and ancient ruins shall not be used nor any sands or rocks shall be taken from archeological sites without written approval from the Antiquity Directorate.

Article 24: Whoever discover an archeological site or was informed of a discovery shall inform the closest authorities. The authority in its part shall inform the Antiquity Directorate immediately to overtake the proper action. The discoverer shall be entitled for a reward after an approval from the Ministry of Education and a recommendation of the Antiquity Directorate.

Article 25: Each individual occupying archeological sites or historical buildings shall permit the antiquity employees to investigate the location; study, draw and take photograph.

Article 26: If the owner of the registered immovable property are in demand of settling the property by assignment, he shall state in the contract that his property is registered and shall inform the Antiquity Directorate within one week from holding the agreement.

Chapter Three
Moveable Antiquities

Article 27: Moveable antiquities owned by the government shall not be sold or gifted. Other unimportant antiquities which have many copies may be sold after having a ministerial resolution and the approval of the Higher Council of Antiquity.

Article 28: Exchanging moveable antiquities or models thereto shall be permitted among scientific institutions and museums if it is beneficial. The exchange shall be issued by a ministerial resolution after the approval of the Higher Council of Antiquity.

Article 29: Commissions and individuals shall have the right to obtain moveable antiquities and preserve it in special collections provided that it shall be presented to the Antiquity Directorate in order to be registered. The owner of the relic shall be responsible to preserve it in its original state. If any changes or damages occur the owner of the relic shall inform the Antiquity Directorate immediately. Those restrictions are applicable to all antiquities that were not presented to the Antiquity Directorate in order to be registered.

Article 30: The owner of a moveable antiquity shall inform the Antiquity Directorate or registration in a four month period from the date of the implementation of the law hereby. If any antiquity where found after the date stated, the antiquity shall be seized and penalties shall be enforced.

Article 31: Commissions and individuals who have moveable antiquities shall have the right to keep records for the antiquities they acquire. The Antiquity Directorate shall have the right to check these records as required.
Commission and individuals shall have the right to inform the Antiquity Directorate of any new items.

**Article 32**: Registered movable antiques may be transferred to other owner after the original owner inform the Antiquity Directorate of the new owner's name and place of residence within a year from assignment. If the new owner is a foreigner who is interested in exporting the antiquity to other countries the contract of assignment shall be held after acquiring the exporting license.

**Article 33**: If any one find a moveable antiquity by a chance, he shall inform the nearest authority as soon as possible. The authority shall inform the Antiquity Directorate. If the Antiquity Directorate decides to keep the antiquity they shall pay a reward to the person who found the antiquity suitable to the value of the antiques. If the antiquity is of precious stone or account for more than a thousand SR, the approval of the Higher Council of Antiquity is required. The reward shall be issued by a Ministerial resolution. If the Antiquity Directorate decides on leaving the antiquity with the one who found it, it shall be registered and returned with a written record containing the number of the record.

**Article 34**: Any one who find or hear about a discovered unregistered antiquity shall inform the Antiquity Directorate, and the Directorate in its part shall offer the person a suitable reward determined by the Ministry of Education.

**Article 35**: The Antiquity Directorate by a resolution from the Ministry of Education and the approval of the Higher Council of Antiquity shall be able to buy the registered moveable antiques acquired by individuals or commissions or movable antiques detached from immovable antiques which does not belong to recorded archeological or historical buildings for the general welfare.

**Article 36**: The Antiquity Directorate shall ask individuals who have registered antiques for any antiquity to be studied or projected in any exhibition for a temporary period of time. It shall return it in good state as soon as the task is over.

**Article 37**: Registered movable antiques owned by individuals or commissions shall not be moved from one place to another without a license from the Antiquity Directorate. The Directorate shall offer expertise to transfer these antiques in special technical ways if necessary.

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**Chapter Four**  
**Antiquity Business**

**Article 38**: Antiquity business shall be permitted within the boundaries of the law hereby permitted by an official license from the Antiquity Directorate for one year period subject to renewal in return for an annual fee determined by a resolution from the Minister of Education.

**Article 39**: Antiquities which are subject to commercial exchange are antiques which are registered at the Antiquity Directorate or the one that the Directorate indicate that they shall not be registered. The traders shall have the right to own other antiques however they shall present them to the Antiquity Directorate within a week from date of acquisition and present a valid information about the source of purchases.

**Article 40**: The license of practicing Antiquity's business shall include the name of the trader, title and place of residence as well as the location of his business.

**Article 41**: Each licensee shall consider the following conditions and any other conditions the Antiquity Directorate finds it necessary to be added:

a. Hold official records provided by the Antiquity Directorate for the purpose thereof indicating the content of his storage with details in addition to trade transactions on a daily basis. These records shall be presented to the Antiquity Directorate employees whenever requested.

b. Present any acquired antiquity to the antiquity employees when investigating his place and offer the facilities required.

c. Provide the Antiquity Directorate with a photograph of each acquired antiquity and allow the Directorate to take a photograph thereto.
d. Submit a monthly statement to the Antiquity Directorate about each sold and purchased with details regarding the description of the antiquity and the identity of the owner and the new purchaser.

e. Hang a poster indicating that he is entitled of practicing antiquity trading. Hang a sign indicating that exporting antiquities shall be admitted by the Antiquity Directorate approval written in both Arabic and English language and placed in a visible location.

**Article 42:** Professional Antiquity’s employees shall have the right to investigate any antiquities shops and examine records thereto which include the residential right for antiquity trader whether the resident is for storing antiquities according to the offered license.

**Article 43:** Antiquity trader shall not push someone to excavate for antiquities without having a license, if such act is proved his license shall be canceled.

**Article 44:** The Antiquity Directorate shall have the right to cancel or refuse to renew the license offered to the antiquity trader if he violates regulations hereby or conditions stated in article (41).

**Article 45:** If the Antiquity Directorate canceled the license of practicing antiquity business or refuse to renew, the trader shall stop buying antiquities and shall sell what is within his acquisition within a year subject to renewal in return to the indicated fees in article (38) if he still have some antiquities they shall be treated as registered antiquities owned by individuals according to article (29).

In the previous cases, the trader shall not be offered a license before at least one year of settling his antiquity trading practice.

Chapter Five

Exporting Antiquities

**Article 46:** Exporting antiquities are subject to acquiring a license by the Antiquity Directorate according to the regulations hereby. Directorate herein shall have the right to refuse the exporting of antiquity if proved to be affecting the cultural heritage of the country.

**Article 47:** Individual with interest in exporting antiquities shall submit an application to the Antiquity Directorate including information hereunder:

a. The name, title, profession, place of residence and nationality of the licensee.

b. Port, station or border center the antiquity shall be exported to.

c. The location in which the antiquity will be exported and the name of the received person.

d. The method of acquiring the antiquities to be exported.

e. The description of the antiquities with a list including number, type, measurements and estimated value thereto. The licensee shall present the antiquities to the Antiquity Directorate before exporting them.

**Article 48:** The Antiquity Directorate, after examining the exported antiquities, shall have the right to permit or refuse the exporting of the antiquities or purchase whatever desired with the amount estimated in the exporting application unless the Directorate find big difference between the price in the application form and the price estimated by the Directorate, in that case the Directorate shall adopt the latest provided that a resolution of the Minister of Education shall be issued.

**Article 49:** The antiquities to be exported are subject to the following:
a. If the price of the antiquity to be exported is more than 1000 SR, an approval of the Higher Council of Antiquity shall be acquired according to the Antiquity Directorate recommendation.

b. If the price of the antiquity to be exported is more than 5000 SR, an approval from the Minister of Education based on a recommendation of the Higher Council of Antiquities shall be required. In both cases, the Antiquity Directorate shall be responsible for estimating the real value of the piece.

**Article 50:** If the Antiquity Directorate approves exporting an antiquity the licensee shall be provided with a license from the relevant Administration. The licensee shall pay exporting fees determined as follows:

- 15% of the piece value which is estimated to be less than 500 SR
- 25% of the piece value when it is more than 500 SR

The estimated value determined by the licensee in the application thereto is a basic to complete the fees unless the Antiquity Directorate finds big difference between the indicated price and the actual price for the piece. In this case, the fees shall be completed with the price determined by the Directorate.

**Article 51:** The Antiquity Directorate shall issue exporting license for the following items without completing fees:

a. Antiquity sold to individuals and associations by the directorate.
b. Antiquities to be exchanged with museums and scientific commission inside and outside the Kingdom.
c. Antiquities dedicated to a commission or scientific association as a result of official excavation done.

**Article 52:** The licensee on his expense shall wrap the licensed antiquities to be exported. The Directorate shall seal and stick an official statement indicating No and date of the license.

**Article 53:** The exporter shall submit the exporting license to the customs, postal, security officers and others if requested. Those officials shall seize any unlicensed antiquity for exporting and recorded in an official minute and submit the seized items to the Antiquity Directorate.

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**Chapter Six**

**Excavation of Antiquities**

**Article 54:**

a) Excavation means all process undertaken in order to dig and investigate the existence of movable or immovable antiquities inside the earth or on the surface of the earth, in water flows, lagoons and regional waters.
b) Excavating graves shall not be practiced in order to find antiquities assumed to be buried there.

**Article 55:** The Antiquity Directorate is the only body which shall have the right to excavate and investigate for antiquities in the Kingdom. Commission, scientific association and archeological delegations shall have the right to undertake excavation process with a license according to the regulations hereby.

**Article 56:** The Antiquity Directorate, commission, association or delegation which are licensed to practice excavation process shall have the right to excavate the government, commissions and individuals properties provided that properties which do not belong to the government shall be returned to its original state. The excavator shall compensate the owners of the properties for caused damages, the amount shall be determined by a resolution issued by the Minister of Education after completing the excavation season based on a recommendation of a special committee formed for this purpose. The licensed commission, association or delegations for excavating in institution and individual properties shall have the right to buy the land in which excavation process are taking place. The area shall be of the government properties as soon as being purchased, and shall be registered in the record for such properties.
Article 57.- Excavation license shall not be issued for associations and scientific commission unless proved to be qualified both financially and academically.

Article 58.- The application shall be addressed to the director of antiquity and the following data shall be included:

a) The name and description of the scientific commission or delegation and former experience and the number of employees and qualifications provided that delegation must include surveyor, painter and photographer.

b) The archeological site to be excavated shall be accompanied with a map indicating the border of the excavated area.

c) The excavation program and time

Excavation license shall be signed by the Minister of Education and the director of antiquity.

Article 59.- Commissions, associations and delegations licensed to practice excavation process shall comply with the following:

a) Consider taking photographs and drawing the archeological sites and all discovered antiquities according to the common standards and prepare collection of photographs of excavation process and the important discoveries.

b) Consider registering the antiquities on daily basis in a special record provided by the Antiquity Directorate to be returned at the end of the season.

c) Not to remove any part of the archeological building unless approved by the Antiquity Directorate.

d) Provide the Antiquity Directorate with the required information about the excavation process in approximately every 15 days. The Antiquity Directorate shall have the right to publish the news of excavation process while commissions, associations or delegations shall not have the right to do so unless informing the Directorate in the first place.

e) Present a brief report at the end of each season accompanied with excavation planning. The excavator shall provide data, paintings and photographs about the discovered antiquities and any required information by the Directorate.

f) Provide detailed scientific report valid for publication regarding the results of excavation process in one year period at the end of each season.

g) Accept a representative of the Directorate to completely supervise the excavation process and discoveries to be found as well as checking the antiquity’s record . The representative expenses shall be of the licensee responsibilities.

b) Submit the discovered movable antiquities at the end of each season to the Antiquity Directorate and undertake the expenses of warehousing and transporting it to the specified location provided that antiquities not to be moved from the excavation location without an approval of the Antiquity Directorate.

Article 60.- The licensed commissions, associations and delegations shall permit the visit of representatives of the Antiquity Directorate whenever requested, they shall also permit the visits of archeologists provided that copyrights shall be preserved to excavator.

Article 61.- If the licensed commission, associations or delegations violate any of the provisions included in article 59, the Antiquity Directorate shall stop excavation process immediately. If the violation is severe the Directorate shall cancel the license by a resolution of the Minister of Education.

Article 62.- If the licensed commission, associations or delegations stopped excavation process for two seasons with no proper excuse excepted by the Directorate, the Minister of Education shall have the right to cancel the license and a license may be issued for other delegation to undertake excavation process at the same area.

Article 63.- The Antiquity Directorate shall have the right the stop excavation process if effecting the delegation’s safety provided that a Ministerial resolution shall be issued in regard.

Article 65.- All discovered antiquities found by the commissions, associations or delegations shall be of the government properties and shall not be transferred to others especially which can be formed into collections representing the country’s industry, art and history. However the Antiquity
Article 66: The Antiquity Directorate shall cooperate with the scientific commission in excavation process provided that conditions governing this process shall be determined in regards to financial, technical and scientific level in excavation license as well as special license.

Chapter Seven
Penalties

Article 67: Whoever seize, transformed, damaged or draw on immovable antiquity without a license or a movable antiquity that is not permitted by the Directorate to be settled either of the government or individuals properties shall be subject to one month to 3 years in prison and a financial penalties counting for 250 SR to 10000 SR financial penalties.

Article 68: Whoever steal an antiquity either owned by the government or individual shall be subject 2 to 3 years in prison and a financial penalty from 500 to 1000 SR as well as regaining the stolen antiquity.

Article 69: Whoever commit the following is subject to one of these penalties either from a month to 2 years in prison and financial penalty from 100 to 1000 SR:

a) Undertake excavation process or assist without having a license.
b) Practice antiquity's trade without a license.
c) Practice antiquity trade without following the determined conditions indicated in article (41).
d) Export or assist in exporting antiquities without license.

Article 70: Whoever build on a location of registered archeological site, or violate conditions and rights of contiguity of neighboring archeological sites and historical buildings with the penalty stated in article (69) in addition to enforcing the violator to remove the additional parts and restore the site to its original state.
Article 71:- Whoever committee the following shall be subject to 15 day to a month in prison and financial penalties from 50-500 SR:

a) Acquire a registered antiquity.
b) Transfer the antiquity from one place to the other without a license.
c) Obtain remains, rocks and dust of an archeological sites without a license.

Article 72:- Whoever committee the following shall be subject for one week to one month in prison and financial penalties from 10 to 100 SR:

a) Deformed an antiquity by writing, painting, posting and sticking posters thereof.
b) Entering archeological locations and museums without a license or without paying the required fees.
c) Violate any of the regulations hereby.

Article 73:- Violator in all cases shall remove all violating reasons and return the antiquity to its original state within a period determined by the Directorate on his expenses.

Article 74:- Any moveable antiquity shall be seized if the owner violate any of regulations stated in article (29-33-37-38-39-46-55).

Article 75:- Any antiquity seized in regards to regulation hereby shall be submitted to the Antiquity Directorate.

Article 76:- Common executive authorities based on the Directorate demand shall takeover the responsibility of pursuing violators of regulations hereby, investigate the charges, accuse them of committing violations and file a law suit against them.

Article 77:- Violators of the regulations hereby shall be judged by a committee consisting of there members issued by a resolution of the Council of Ministers. Resolutions issued by the committee shall be final after being approved by the Prime Minister.

Article 78:- The Minister of Education shall issue the executive charter.

Article 79:- The Council of Minster shall explain the law herein.
No 6/M
Date:26/2/1398H

With God’s Help
We King Khaled bin Abdul Aziz
King of Saudi Arabia

After viewing clause (20) of the Law of the Council of Ministers issued by the Royal Decree No (38) in 22/10/1377H.

And after viewing the Law of Antiquity issued by the Royal Decree No 26/M in 23/6/1392H.

And after viewing the Ministerial Resolution No (235) in 21/1/1398H.

Determined the following:

First: the text hereunder shall be added at the end of article (1) of the Law of Antiquity:

(The Higher Council for Antiquity may be reformed by a ministerial resolution based on the Minister of Education, Chairman of the Higher Council of Antiquity’s recommendation).

Second- the Deputy Prime Minister, the Minister of Education, Chairman of The Higher Council of Antiquity shall execute our resolution herein.

Royal Signature
Khaled

Resolution No 235 in 21/2/1398H

The Council of Ministers

After viewing the correspondence herewith including the letter of HE the Minister of Education, Chairman of the Higher Council of Antiquity No 36/1/15/1029/43 in 3/4/1397H which highlights clause (1) of the Law of Antiquity issued by Royal Decree No 26/M in 23/6/1392H based on the Ministerial resolution No 534 in 8/6/1392H where the article states the formation of the Higher Council of Antiquity as follows:

1. The Minister of Education
   President
2. Deputy Ministry of Education
   Deputy
3. Representative of The Ministry of Finance and National Economy
   Member
4. Representative of The Ministry of Interior
   The rank shall at least be ten
   Member
5. Representative of The Ministry of Education
   The rank shall at least be ten
   Member
6. Representative of The Ministry of Hajj and Endowment
   The rank shall at least be ten
   Member
7. Representative of The Ministry of Information
   The rank shall at least be ten
   Member
8. The Director of Antiquity Department
   The rank shall at least be ten
   Member
9. Two members chosen by Chairman of the Council among individuals known for their prominent scientific statues and interested in culture and heritage. The period of their membership shall not be less than two years subject to renewal.

Based on the proposed memo submitted to the Higher Council of Antiquity in its seventh session 1/3/1379H in regard to considering the assignment of an additional member among the Council’s members representing The
Ministry of Municipality and Rural Affairs regarding city planning due to the close relation between the responsibilities of city planning and archeological and historical sites all over the world.

Worth mentioning, the former representative of The Ministry of Interior in the Higher Council of Antiquity is the general manager of city planning prior to the establishment of The Ministry of Municipality and Rural Affairs.

Upon this, the Council of Antiquity, according to the enclosed recommendation of the minutes, has agreed on the request of appointing an additional member among the Council’s members representing The Ministry of Municipality and Rural Affairs-city planning- adding to that the Council proposed additional members with experiences of individuals according to article (9) of the Law of Antiquity as explained above and have 3 members instead of 2, due to the benefit gained through citizens with experiences who are familiar with cultural and heritage issues. The Council proposed the submission of the request to the Council of Ministers.

Therefore HE seeks the approval of the following:

First- adding new paragraph after paragraph (7) of article (1) of the Law of Antiquity as follow:
(17-representative of The Ministry of Municipality and Rural Affairs)
member

Second- amending article (9) of the Law of Antiquity as follow:
(3 members chosen by the Chairman of the Council...etc)
after viewing the memo of The Bureau of Experts No 100/5 in 4/7/1397H in the subject.

The following shall be issued:

1. To add the following text to the end of article (1) of the Law of Antiquity issued by Royal Decree No 26/M in 23/6.

   The Higher Council of Antiquity may be reformed by a Ministerial Resolution based on a recommendation from HE The Minister of Education and the Chairman of the Higher Council of Antiquity./1392H.

2. A copy of a Royal Decree draft regarding the matter is enclosed herein.

Approved as stated.

Prime Minister
Confidential

Draft Antiquities and Museums Law

(V1)

Saudi draft new Antiquity Law
Table of Contents

Chapter 1: (Definitions & General Provisions)........................................3
Chapter 2: (Archeological & Historical Sites and urban Heritage Sites)........................................................................12
Chapter 3: (Underwater Antiquities).................................................13
Chapter 4: (Trading of Archeological Objects & Urban Heritage Objects)....................................................................14
Chapter 5: (Surveying and Excavating for Antiquities)...............18
Chapter 6: (Urban Heritage)..............................................................19
Chapter 7: (Museums)......................................................................24
Chapter 8: (Penalties).......................................................................28
Chapter 9: (Final Provisions).............................................................33

Chapter 1: (Definitions & General Provisions)

Article 1
For the purpose of this law, the following words and phrases shall have the meaning ascribed to them unless otherwise stated:

The Commission: The Supreme Commission For Tourism and Antiquity.
The Board (BoD): The Supreme Commission For Tourism and Antiquity Board of Directors.
Antiquities: moveable, immovable, buried and sunken properties which are built, produced, accommodated and painted by humane being, or acquired archeological characteristics by humane being interaction in ancient ages. Under the title antiquities come historical and archeological sites, architectural heritage, traditional culture and sites.
Immovable Antiquities: immovable antiquities which are fixed on earth like natural or excavated caves used by Man and rocks which was painted, engraved with pictures and scripts. Remains of cities and buried establishment as well as cities, villages, old neighborhoods and buildings build for various reasons ex; mosques, palaces, homes, hospitals, schools,
castles, forts, fences, hamamat, cemeteries, tunnels, dams and the remains of those places as well as doors, windows, pillars, verandas, ceilings, friezes, crowns and ornamentation thereto.

**Moveable Antiquities:** Archeological pieces made to be separated from the earth or from immovable antiquities which can be removed from its original location ex: sculptures, scripts, textiles and other industries and the materials, reason of manufacturing and ways of usages thereof.

Traditional tools which represent national heritage in terms of traditional, artistic, aesthetic, scientific, historical features or priority of usage thereto ex: Hijaz railroad and first elevator used in the Kingdom.

**Urban Heritage:** Cities, villages, neighborhoods and buildings built by human beings with the included spaces, establishments, irrigation tunnels, roads and plazas which have historical, scientific and cultural values even their period extended to the recent decades yet it must not be less than 50 years, although the Commission have the right to consider heritage belonging to recent ages as urban heritage.

**Historical sites:** Locations witnessed famous important historical events unnecessarily including visible or sunken antiquities.

**Sites of Traditional Heritage:** Areas in which social and handcrafts activities related to traditional heritage are practiced, such as: sites of honey production by traditional means, traditional agricultural terraces, sesame seeds mills, ship manufacturing and locations for seasonal and sustainable social events.

**Collections of Traditional Heritage:** All tools used or produced by Man in ancient time in any of the Kingdom’s areas to practice daily lifestyle ex; accommodation, food, clothes, education, self-defense, health care and entertainment means.

**Museum:** all collection of pieces temporarily or permanently projected in a suitable place open for public in fixed opening hours in which projection thereof shall achieve the desired entertainment, educational and cultural objectives, other pieces shall be called special collection.

**Excavation:** all excavation, exploring and diving processes aiming at finding moveable or immovable antiquities under or above the surface of the earth, valleys, lakes and regional water.

**Archeological Survey:** all exploring processes executed above the surface or under sea of the earth in order to discover antiquities.

**Excavator:** individual or individuals scientifically or technically qualified for practicing excavating and searching for antiquities.

**General Provisions**

**Article 2**

All types of antiquities moveable and immovable are public property of the State, except for private properties that are proven by the documents accepted by specialized authorities in the government.

**Article 3**

a. The Commission shall have the right to evacuate individuals or commissions occupying archeological buildings or historical sites in cooperation and coordination with the relevant authorities. If the occupiers commit no violation to the regulations hereby, they shall be compensated for their buildings and properties thereto according to the Disposition of Ownership for Public Welfare.
b. Archeological buildings and sites may remain in the custody of owners and beneficiaries by virtue of a license issued from the Commission and according to its regulations.

Article 4
Ownership of the land does not vest its owner with the right to deal with existing movable or immovable antiquities thereon or buried therein. Excavation for antiquities shall not be carried out in therein. The Commission may carry out the excavation itself or authorize other bodies. Discovered antiquities are a property of the State, and the Commission may relinquish immovable antiquities if deemed necessary after ascertaining their significance and classification, and after documenting and registering them according to this law and its regulations.

Article 5
Any natural person or legal entity occupying an archeological site or historical building shall allow the Commission’s employees access to the site or building.

Article 6
It is prohibited to destroy, damage, disfigure or cause any harm to movable and immovable antiquities, including causing change in features by writing or drawing or sticking advertisements on them. It is also prohibited to put signs and commercial advertising posters with the Commission’s approval.

Article 7
The Commission shall determine the (chronological) age of antiquities and what antiquities to be registered. Registration of an antiquity means: the government acknowledges the national, historical, cultural, and technical significance of antiquities. Registered antiquities shall be studied, maintained, presented and exhibited properly according to the provisions of this law.

Article 8
1. Maintenance of archeological, historical and cultural sites shall be considered when planning, improving and expanding projects for cities and villages. The rights of contiguity shall be considered by providing an protection area surrounding sites and monuments. Planning projects shall not be approved in areas with historical or archeological sites or traditional and urban heritages locations without the Commission’s approval.

2. The Commission shall identify archeological and historical sites, sites of urban and traditional heritage, and shall notify the Department for planning cities at the Ministry of Municipality and Rural Affairs about these sites. License for construction or restoration shall not be issued for locations close to historical or archeological sites or traditional and urban heritages locations without coordination with the Commission to ensure that style of new buildings will harmonize with the ancient style.

Article 9
The Commission must be consulted in every petition and request for title deeds, and it shall not be permitted, in any case, to grant petitions resolutions and title deeds of historical and archeological sites, urban and traditional sites.

Article 10
The Ministry of Municipality and Rural Affairs, Ministry of Agriculture, Ministry of Oil, The Ministry of Transportation or any other relevant
authority shall coordinate with the Commission before implementing any
filed work.
The permission of the Commission must be obtained before licensing
mining and crusher projects and other similar projects. This does not relief
the body working at the site from preserving the existing antiquities.

Article 11
The Commission shall coordinate with the Ministry of Interior and relevant
security bodies in order to create a mechanism for protecting archeological
sites. The Authorities in Provinces and subordinated districts and
administration shall support in protecting antiquities when necessary.

Article 12
Heavy and dangerous industry shall not be permitted close to moveable and
immoveable antiquities and shall be not less than 500 m away.

Article 13
The Commission shall set investment regulations for archeological and
historical sites and urban heritage locations.

Article 14
It is prohibited to organize auctions to sell archeological or cultural objects
without a license from the Commission.

Article 15
The Commission shall work towards retuning antiquities smuggled outside
the Kingdom, and shall assist on giving back foreign antiquities smuggled to
the Kingdom in accordance to international treaties and conventions in this
regard.

Article 16
The Commission shall have the right to own any registered archeological
site or historical building provided that ownership procedures follow
regulations of dispossession for the public welfare. The Commission shall
also have the right to own lands and buildings near registered immoveable
antiquities.

Article 17
A Board of Consultant shall be established in the Commission chaired by the
SG and the membership of a number of members chosen by the SG among
specialist, people with interest and from relevant bodies. Membership term
shall be two years subject to renewal. Professional Consultative group shall
also be formed chaired by the Deputy SG for Antiquity and Museum.
Rewards shall be paid for members of the Board of Consultant and the
consultative group according to the executive regulations under this law.

Article 18
1. The Commission shall establish a register for national antiquities both
moveable and immovable antiquities whether owned by the State,
individuals or private museums. The register shall be called the
Antiquities Register for documenting each moveable or immovable
antiquity approved by the BoD as a national antiquity to be protected
for its scientific, artistic, cultural and historical value. The Antiquities
register includes the following
   • List (a): moveable or immovable antiquities of great
     historical, cultural, scientific, or national value and the
     Commission considers the preservation of such antiquities a
     public benefit.
• List (B): moveable or immovable antiquities of medium importance in the historical, cultural, scientific, or national field.
• List (C): moveable or immovable antiquities of low importance in historical, cultural, scientific, or national fields in addition to sites where there are strong indications of sunk or buried antiquities.

2. Resolutions registering or (fully or partially) canceling the registration of an antiquity shall be published in the Official Gazette.

3. Partial or full registration of an antiquity may be canceled based upon valid reasons from the owner or by an initiative from the Commission. The BoD shall issue the resolution of cancellation.

4. The Commission shall set classification and registration lists to be approved by its Board of Directors.

5. The Commission’s Board may accept the ownership of archeological, historical, or cultural Real Estates or archeological objects through granting or selling by basic price and placed under the Commission’s responsibility.

6. All government bodies and owners of private properties shall preserve and maintain the registered antiquity owned by them, under their authority or operate, maintain, restore and utilize the property properly approved by the Commission. They may receive revenues resulting from public visits to the registered antiquity in order to cover maintenance expenses. Fees may not be collected from government bodies or similar organization.

7. The owner shall not restore or operate his registered cultural building without obtaining a license from the Ministry of Municipality and Rural Affairs and the Commission’s prior consent.

Article 19
The Commission may allow dealings with archeological areas and historical buildings which do not necessarily need to be registered. The Commission may, upon a resolution from its Board, register any archeological site or building based upon a recommendation by the SG.

Article 20
A fund shall be established at the Commission entitled The Antiquities Protection and Development Fund to finance the preservation, maintenance and utilization of antiquities and to support the private sector efforts as individuals, legal entities, institutions and private associations aiming at achieving the desired objectives indicated in the Law herein. Financial resources includes the following:

- Contributions, donations, subsides and grants offered by individuals, public and private institutions and international, regional, Arab and private commissions. The BoD of the Commission shall approve foreign donations.
- Special allocations for the fund from revenues of projects managed by the Commission.
- The Commission shall issue the rules and regulations regarding managing, spending, and depositing money in the Fund.
Article 21
The Commission may establish non-profitable associations (groups) for friends of heritage and antiquities with the right to benefit from the Fund. The executive regulations under this law shall set out the provisions related to these associations.

Chapter 2: (Archeological & Historical Sites and urban Heritage Sites)

Article 22
It is prohibited to trespass to archeological sites in any form including changing features of the site, using the existing remains, taking rocks, soil or any other material from the site without a license from the Commission.

Article 23
Whoever discovers or hears about a discovery of an antiquity shall inform the closest relevant authority as soon as possible. The authority shall inform the Commission immediately. The discoverer or the informer of an unregistered important antiquity may receive an appropriate reward according to the executive regulations under this law.

Article 24
The following works within the boundaries of archeological sites shall be subject to the Commission’s prior approval. Response to the request shall be issued within a period of two months as of the date of application. The same works shall also be subject to the technical supervision by the Commission during implementation:

- Partial and full demolishing works for any building within the boundaries of archeological sites.
- Roads, gas, electricity and water network supplies and whatever might deform the features of buildings and antiquities sites or disturb the archeological layers.

Article 25
Registered historical sites and urban heritage sites in the Antiquities Register shall be governed by protection regulations related to archeological sites set out in this law.

Chapter 3: (Underwater Antiquities)

Article 26
Underwater (sunken) antiquities both moveable and immovable whether discovered or undiscovered in Regional and Interior waters shall be are properties of the State. The Commission reserves the right to reclaim underwater antiquities – whether in the custody of individuals or institutions - through appropriate means and in accordance to this law and its regulations.

Article 27
a) Whoever discovers an archeological site under water, wreckage of a drowned ship or moveable antiquity objects shall keep them in their original locations without causing damages or changes, and immediately notify the Commission or the closest authority in order to inform the Commission.
b) Whoever accidentally captures an antiquity object out of water shall notify the Commission, or submit the object to the Commission or the nearest authority within one week of capture. The discoverer may receive a reward according to the executive regulations under this law.

Article 28
If antiquity objects under sea are subject to damages or endangered, the Commission shall take the necessary precautions to rescue the antiquities as it sees fit.

Article 29
The Commission shall coordinate with the General Authority for Ports, National Commission for Wildlife Protection and development, and the Public Administration of Border Guards and other relevant bodies to form a mechanism that guarantees the protection of underwater antiquities. These authorities shall inform the Commission of any discovered antiquities or about intruders who are caught with antiquities extracted from the sea.

Article 30
The Commission shall have the right to offer other commissions, scientific associations and foreign missions the permission to excavate underwater antiquities after coordinating with the concerned bodies according to special conditions set for this purpose set out in the executive under this law.

Chapter 4: (Trading of Archeological Objects & Urban Heritage Objects)

Article 31
1. It is permitted, upon a resolution by the Commission’s Board, to exchange duplicated moveable antiquities or replicas that belong to the Commission with museums, scientific institutions inside and outside the Kingdom. The executive regulations under this law shall set out the procedures organizing the exchange.

2. It is permitted, upon a resolution by the Commission’s Board, to lend moveable antiquities to be exhibited in international museums and exhibitions for a period that does not exceed a year subject to renewal. The executive regulation under this law shall set out procedures organizing this.

3. The Commission may organize exhibitions for antiquities inside and outside the Kingdom.

Article 32
The Commission may accept archeological objects offered as gifts or permanent or temporary loans. The Commission keeps these antiquities and records the name of presenter. These objects may be exhibited in the Commission’s museums or other museums under the name of the owner.

Article 33
The Commission may pay to whoever accidentally discovers an important moveable antiquity a reward (if he/she wants). The reward shall be proportionate to the value of the antiquity. The Commission shall set the regulation for this.

Article 34
The Commission may leave the antiquity accidentally discovered in the custody of the discoverer after registration. The discoverer may not deal with the antiquity without the Commission’s approval.

Article 35
Restoration of archeological objects may not be carried out with a license from the Commission.
Article 36
Urban heritage objects classified as national heritage (national antiquities) are subject to special protection, and the Commission shall assist in the documenting, studying, and exhibiting these objects. The Commission shall also support efforts of individuals and institutions interested in the documentation and scientific research.

Article 37
A license shall be obtained from the Commission to repair, maintain, or restore registered moveable heritage tools owned by the private sector.

Article 38
Registered moveable antiquities owned by the State may not be sold or gifted except after an order from the Chairman of Council of Ministers.

Article 39
1. Any kind of ownership of archeological is not permitted unless legally verified.
2. Commissions and individuals may—without contradicting the provisions of this law—own and preserve moveable antiquities after registration at the Commission. Owner registered antiquities is responsible for preserving and maintaining the antiquities. If the antiquities are lost or damaged he shall notify the Commission immediately according to the procedures specified in the regulations.

Article 40
The Commission may—upon a resolution from the SG—purchase or exchange a moveable antiquity in the custody (care) of individuals or commissions.

Article 41
It is permitted to trade with and import moveable antiquities represented in artistic, porcelain objects, paintings, coins, and collections of urban heritage, and heritage tools after obtaining a license from the Commission according to the terms and provisions set out in the executive regulations under this law.

Article 42
With a license from the Commission, it is permitted to exchange archeological objects and collections of urban heritage registered at the Commission as national heritage or owned by individuals or private institutions within the boundaries of the Kingdom only. The individual who sells or gifts an archeological object shall notify the Commission about the deal, and shall inform the purchaser or receiver about the registration and protection resolution. The Commission shall have priority to purchase any archeological object.

Article 43
Any who enter the Kingdom with an archeological or heritage object shall comply with international rules and regulations organizing this, notify Custom Officers about the object, and register the object at the Commission or any of its branches in the Provinces within three weeks of entering the Kingdom. The owner shall have the right to take the object out of the Kingdom after obtaining permission from the Commission.

Article 44
Prior approval from the Commission shall be obtained when wishing to copy (duplicate) an archeological object for commercial purposes.
Chapter 5: (Surveying and Excavating for Antiquities)

Article 45
The Commission only has the right to excavate, dig, survey, or dive in search for antiquities. National scientific commissions, institutions, and associations, individuals interested, or foreign exhibitions may carry out such works with a license issued according to the provisions of this law and its executive regulations.

Article 46
Licensed scientific commissions and associations or institutions have the right to excavate in public and private properties after notifying the owners. If there is a necessity to reserve (maintain) the discovered immovable antiquities, private owners shall be compensated for the land value where the antiquity is discovered according to disposition law for public welfare. If there is no intention to own the land, compensation shall be paid for any damages caused when excavation works end.

Article 47
If an excavation licensee violates any of the provisions of this law or its executive regulations, the Commission shall have the right to stop excavation works immediately until the violation is removed or rectified. The Commission may also cancel the license by a resolution from the SG.

Article 48
All discovered antiquities –discovered by the Commission, a foreign association or exhibition, or individuals- are properties of the State, and they may not be relinquished. The Commission Secretary-General may grant (offer) the excavating party or individuals linked to a scientific organization some moveable antiquities similar to what have been discovered in the same excavation area according to the executive regulations under this law.

Chapter 6: (Urban Heritage)

Article 49
Urban heritage sites are classified in the National Antiquities Register as A, B, C of high, medium and low level of importance in national, scientific, artistic, cultural and historical fields. The classification shall include:
- Building or site or part of them including moveable antiquities related to them
- Urban areas consisting of several buildings and forming an urban texture of cities, villages and neighborhoods including areas surrounding the registered sites which are necessary to preserve, present or use the registered building or site.
- Natural areas surrounding urban sites or the integrated area completing the planned environment such as parks and gardens.

Article 50
1. Protection area shall be 200 m immediately surrounding the immovable urban and archeological heritage of a registered site or building. It shall extend until the areas viewing the building in order to maintain the visual environment of the registered antiquity. The area may be extended or reduced by a resolution from the Commission.
2. Protection requirements shall be canceled if already located within a preserved area of urban heritage development.
3. Protection area may be altered under the supervision of the Commission and by a resolution from it within the regulations of the protection of architectural heritage, planning preliminary architectural structures or detailed architectural designs provided that the requirements of protection areas are included in the documents mentioned.

Article 51
Construction regulations shall not be applied on classifies urban heritage buildings and sites if application of these regulations contradict protection and classification requirements.

Article 52
Classified immovable antiquities in the National Antiquities Register (A, B, C) and their protection areas shall be included in plans for organizing cities structure and details, and in the plans for the protection and development of urban heritage.

Article 53
By classifying urban heritage sites or buildings within the National Antiquity Register as (a, b, c) the government shall be responsible of preserving and protecting them if owned by the government and shall contribute in the process if owned by the private sector. It shall be expropriated by the government according to regulations hereby if preservation conditions are not available as being owned by the private sector.

Article 54

(A) By classifying urban heritage sites or buildings within the National Antiquity Register as (a, b, c), it shall be preserved, maintained, restored and appropriately operated provided that no alteration will be done to the features of the classified building or the site unless it were necessary for the purposes of operation.

(B) No operation or utilization process shall be undertaken without the Commission’s permission and supervision provided that the Commission is notified three months in advance before the work commencement and also including a clarification of the nature of the work.

(C) No alteration shall be done to the preservation area that will cause any harm or disfigure the classified building or site or obstruct operation or use.

Article 55
The Commission or the Ministry of Municipality and Rural Affairs or both parties shall contribute 50% of restoration, fixing and maintenance expenses for the urban heritage site or building or area classified as (B) class in the National Antiquity Register. This percentage may reach 100% if the owner was absolutely unable to provide any amount specified for this purpose.

The Commission or the Ministry of Municipality and Rural Affairs participating in the efforts to preserve buildings listed in class (B) in the National Antiquity Register may contribute in maintaining and developing it by providing 30% of maintenance expenses and 50% of restoration expenses.

Article 56
Notwithstanding the relevant regulations, it is prohibited to sell or transfer the ownership of any urban heritage site or building classified under the National Antiquity Register (A, B) and owned by the government to the private sector unless the Commission approves so. The buyer or new owner shall comply with the classification conditions stipulated in the Law.

**Article 57**
The preparation of detailed structural urban plans and designs shall comply with the preservation requirements for buildings and sites classified under the National Antiquity Register class (C). In case it were necessary to review this classification the matter has to be transferred to the Commission. The Commission then reaches a resolution in regards to this matter within 90 days or else the classification will be void.

**Article 58**
By classifying a building under class (C) of the National Antiquity Register the government shall contribute in maintenance with no more than 30% of maintenance fees in case being owned by the private sector.

**Article 59**
"The preservation area for urban heritage " shall be identified in cities and villages if the Commission considers it significant from scientific, artistic, cultural and historical aspects that justify its preservation. A resolution from the Commission BoD shall be issued and the Commission shall issue a resolution in regard to classifying these areas in association with the Ministry of Municipality and Rural Affairs and the Ministry of Interior. The resolution includes the plan for urban heritage preservation and development. The full or partial classification for the protection area may be canceled in virtue of a resolution issued by the Commission BoD.

**Article 60**
The Commission in coordination with the relevant sectors shall develop a plan for urban heritage preservation and development corresponding with an overall comprehensive and integrated program for the development and protection of the specified area. The plan for urban heritage protection shall identify the classified locations and buildings as well as protection requirements and implications, intervention method guidelines including: urban restoration, rehabilitation and revitalization, construction regulations, parameters for land, intervention methods regarding buildings and height limitations, transportation, traffic and service plans etc.

**Article 61**
As a result of issuing the resolution that identifies a "protected area for urban heritage preservation and development", the urban heritage protection plans shall be integrated with the detailed organizational and structural urban plans and replace them in regards to the classified area.

**Article 62**
Any amendments to the urban heritage protection and development plans shall not be allowed without the Commission’s approval.

**Article 63**
Construction, maintenance, restorations work as well as the division of classified and protected urban heritage buildings; villages and neighborhoods shall obtain an approval from the Commission. These operations are subject to the technical and scientific supervision and monitoring of the Commission during execution according to regulations set by the Commission in association with the relevant bodies.
Article 64
It is not allowed to work in the restoration and maintenance filed for heritage buildings without obtaining a license and classification from the Commission according to the executive regulations under this law.

Chapter 7: (Museums)

Article 65
Individuals or establishments may establish private cultural, scientific or traditional museums or others regarding them as a cultural or investment project or both.

Article 66
Museums shall be established according to conditions, regulations and procedures stipulated in the executive regulation of the law herein under the supervision of the Commission.

Article 67
“Saudi Museum” symbols shall be approved by the Commission to be a distinguished title given to individuals, institutions, commissions and associations by a resolution from the Commission BoD and based on the recommendation of the SG. The symbol shall also be transferred with the museum, if ownership is transferred. The executive regulations stipulate the conditions of granting, canceling and withdrawing the symbol by a resolution from the Commission BoD, if the museum owner requested withdrawal, or if the museum violated one of the conditions listed above and the Commission notified the owner of the museum and he did not rectify the situation within two years after notification.

Article 69
A museum holding the Saudi museum symbol shall undertake the following tasks and responsibilities:
1. To preserve, restore, maintain, study and enrich the collections the museum owns.
2. To display its collections and make accessible to the biggest number of visitors.
3. To implement cultural and scientific activities in coordination with relevant bodies.
4. To participate in scientific research and contribute in the development and dissemination of knowledge and information.

Article 70
The Commission holds the right to visit and inspect the museum holding a Saudi museum symbol.

Article 71
Any museum carrying the Saudi museum symbol shall have the right to benefit from the Commission’s experience, receive its scientific and technical support in the fields of: exhibitions, preservation, maintenance, and restoration of exhibition items, operation and management. It shall also have the right to benefit from international experts in these fields within the frame of a joint cooperation program between the Commission, international museums, and specialized international organizations. The Commission will
also support the museum and provide it with required governmental and private funding resources in order to receive loans and endowments to help develop and improve the museum.

Article 72
Admission fees for museums may be set and determined in order to attract the biggest number of visitors and encourage them to visit the museum.

Article 73
Any museum carrying the Saudi museum symbol shall not be permitted to acquire (obtain) any antiquity items whether by purchase, gift, grant, or exchange without verifying legitimacy of ownership.

Article 74
The Commission may register the exhibition items in the museum that comply with the specifications of an national antiquity item in the National Antiquities Register. No museum shall offer registered items for sale or take these items outside the Kingdom without a prior approval from the Commission.

Article 75
Museums that carry the Saudi museum symbol may participate in exhibitions organized outside the Kingdom, and in joint activities with other international museums after obtaining prior approval from the Commission.

Article 76
Museums that carry the Saudi museum symbol may accept financial grants and gifts that are given in kind and presented by individuals, commissions, institutions, and private or public companies working in the Kingdom.

Similar gifts and grants offered from outside the Kingdom may be accepted after obtaining an approval from the Commission.

Article 77
Museums Friends Association (MFA) shall be established on the national level in each Province in the Kingdom. Membership shall be available for all citizens and residents who are interested and pay the annual membership fee according to the Association’s regulations.

Article 78
A Saudi Museum Fund shall be established at the Commission. The financial resource of this Fund shall be from the support provided by the Commission, donations presented by individuals as well as local institutions and companies, and foreign companies working in the Kingdom. Amounts may be paid from this Fund to establish new museums, and support existing governmental and private museums holding the Saudi museum symbol.

Article 79
The National Museum shall establish a Board of Trustees chaired by the General Secretary of the Commission and with the membership of a number of specialists and interested individuals from relevant bodies in both private and public sectors assigned by the Commission upon the recommendation of the SG. This Board shall propose programs to operate the museum and follow-up on all its affairs and different scientific activities and cooperation areas with museums inside and outside the Kingdom subject to the SG ‘s approval.

Article 80
Individuals, institutions and companies working in the Kingdom may fund the purchase of antique or heritage items and collections for museums that hold the Saudi museum symbol. In return, the companies will receive discounts when paying due taxes to the government according to relevant set regulations.

**Article 81**
All governmental and private museums carrying the Saudi museum symbol shall have to coordinate in advance with the Commission if the museum is transferred to another location, or if any dramatic changes occur in the exhibits.

**Article 82**
If a governmental or private museum wants to terminate its activity or suspend it for an extended period of time, then the Commission shall have the right to present its point of view regarding the future plans for the museums exhibit items and may also object if these plans may endanger the safety of these items.

**Article 83**
Any restoration to an antique item registered in the National Heritage list and owned by the museum shall not be allowed except after consulting the Commission. The relevant rules and regulations shall also be determined.

Chapter 8: (Penalties)

Article 84
Notwithstanding any harsher penalties set out in other laws, the penalties for violating any provisions of this law shall be as follows:

1. A fine not exceeding (5000 S.R) for anyone who:
   - A- Does not provide the Commission with a statement about the antiquities he/she owns after two years from enforing this law.
   - B- Possesses an original antique item without a registration or license .
   - C- Possesses an antique item with no certificate of origin according to provisions of this law.
   - D- Does not notify the Commission of any sale for registered and protected movable or immovable antiquities.
   - E- Obstructs the work of the Commission task forces in archeological and historical sites, and in traditional and urban heritage sites owned by individuals.

2. A fine not exceeding (15,000 S.R) for any one who:
   - A- Makes antiquity models or replicas and uses them for commercial purposes without a license from the Commission.
   - B- Refrain from delivering antiquities that were discovered or found to the Commission whether or not he carries a license for survey or excavation.
   - C- Exports a movable antique or deals with it in methods that violate the provisions of this law.

3. A fine not exceeding (20,000 S.R):
   - A- for anyone who builds in a registered archeological site with proof that the person knew that the land is a registered archeological site, or
if a person violates the rights of custody set on surrounding lands adjacent to archeological sites, in addition to enforcing the violator to remove what he built and return the site to its original status on his personal expense and under the supervision of the Commission.

B- Any one who violates the licensing terms for construction and restoration of archeological and heritage buildings and the relevant provisions.

4. Imprisonment for a period not exceeding one month, or a fine not exceeding (20.000 S.R), or both if one of the following violations are committed:
   A- Move remains, rocks, or sand from an archeological site without a license.
   B- Dispose of waste or litter in archeological sites.

5. A fine not exceeding (25.000 S.R) for anyone who:
   A- Forges or intended to forge an antique deliberately.
   B- Provides false information or documents to obtain a license or a permit by virtue of this law.
   C- Changes, sells, grants a building or a classified site or changes the surrounding environment that might cause harm without notifying the Commission. The Commission may claim compensation for any losses or resulting damages based on an amount estimated by a committee formed according to the executive regulations, and force the violator to rebuild the site or building on his own expenses and implement the penalty stipulated in paragraph 4/C of this article.

6. Imprisonment for at least six months, or a fine not exceeding (50.000 S.R), or both for changing, damaging, destroying, or demolishing an inmovable antique or part of it, or a movable antique which the Commission does not permit dealing with it whether owned by individuals or the government.

7. Imprisonment for at least 2 years, or a fine not exceeding (100.000 S.R), or both for any one who steals an antique owned by the government and force the person to return the stolen antique.

8. Imprisonment for at least 3 years, or a fine not exceeding (150.000 S.R), or both for any of the following violations:
   A- Excavation with no license.
   B- Smuggling antiquities outside the Kingdom.

Article 85
Any sold antiquities may be confiscated (seized) by power of a court order if the owner violates any of the provisions in this law or its regulation, and shall be delivered to the Commission.

Article 86
Violations shall be sited by authorized employees from the Commission. As for urban heritage, Municipality employees are in charge of this task along with Commission employees. Violations must be reported to the Commission.

Article 87
Investigation and Public Prosecution Corporation shall be in charge of investigating violations that impose penalties according to this law and present a claim before the committee specialized in reaching verdicts regarding violation cases.

Article 88
In case of violating trading regulations, the license shall be terminated permanently or temporarily suspended according to regulations of this law.

Article 89
Notwithstanding other penalties set out in this law, anyone who causes irremediable damage to a protected archeological or historical site or traditional and urban heritage site shall be forced to pay compensation estimated according to the damages.

Article 90
A- A special committee shall be formed by a resolution from the Commission’s BoD to look into violations, transgressions and enforcing penalties according to this law. The committee shall be chaired by a judge from the Ministry of Justice with the membership of a representative from the Board of Grievance and another representative from the Commission as well as a specialist.
B- The penalty order shall be approved by the Commission’s SG and the violator shall be informed about the verdict in a period of no more than 30 days.
C- The violator has the right to appeal to the Board of Grievance within 30 days from the time he was informed about the verdict.
D- The executive regulations of this law stipulate the working procedures of this committee and the method of issuing orders and rewards to members.

Article 91
According to the executive regulations of this law, financial rewards shall be granted to anyone who:
- Helps in seizing an antique item found or dealt with among individual/s or bodies in a way that violates the provisions of this law or its regulations.
- Provided information that led to the discovery of any violations to this law or its regulations.

Chapter 9: (Final Provisions)

Article 92
The law herein shall replace the Law of Antiquity issued by the Royal Decree No. 26/M in 23-6-1392 H and shall overrule any contradicting regulations.

Article 93
The Commission shall issue the executive regulations for the Law herein.

Article 94
This law shall hereby be enforced within 90 days from publication date in the official gazette.

Article 95
Individuals who are subject to the law herein and its executive regulations shall amend their positions in accordance with regulations hereby within two years from publication date in the Official Gazette.
(1) Royal Order Supporting the inscription of the Saudi sites on the World Heritage List
(2) Urgent Circular from HRH Prince Sultan bin Abdulaziz, Acting Minister of Interior, N° 28059, dated 4/4/1423 AH (25/06/2001 AD), concerning the deferral of historic building demolitions until SCTA assessment
(3) Notification from HRH Prince Sultan bin Abdulaziz, Prime Minister, N° 5947/1, dated 6/6/1424 AH (14/08/2002 AD), concerning the importance of preserving urban heritage, and the role of SCTA
(4) Circular from HRH Sultan ibn Abdulaziz, Second Deputy to the Head of the Council of Ministry, Chairman of the SCTA, dated 5/8/2003, concerning the preservation of urban heritage. (Arabic text and English translation)
(5) Circular from HRH Prince Miteb bin Abdulaziz, Minister of Municipal and Rural Affairs, s.d., concerning the new rules for the demolition of buildings prone to collapse (with an attached report)
(6) Circular from HE Dr. Muhammad bin Ibrahim al-Jarallah, Minister of Municipal and Rural Affairs, s.d., concerning cooperation with SCTA for the preliminary agreement on the demolition of urban heritage buildings prone to collapse.
(8) Circular from Dr. Mansour bin Miteb bin Abdulaziz, Deputy-Minister of Municipal and Rural Affairs, s.d. (after 10/6/1428 AH - 25/06/2007 AD), concerning the implementation of the coordination with SCTA for the preliminary agreement on demolition of urban buildings.
(9) The Council of Ministers Resolution No. 78 dated 16/1/1429 H (March 24, 2008), otherwise known as the Statute of the Saudi Commission for Tourism and Antiquities.
(10) Telegram from HRH Abdulaziz bin Fahd bin Abdulaziz, Head of the Council of Ministers, N° 9859/T, dated 7/3/1430 AH (4/3/2009 AD), concerning the role of SCTA in heritage protection, the role of private owners in heritage conservation and the issue of compensation of private owners and expropriations.
(11) Royal Decree n° 66, dated 2/032009 AD, concerning the role of SCTA and the procedures to favour the protection of urban heritage. (Arabic text and English translation)
(12) Jeddah Municipality administrative document, dated 14/01/2013 acts concerning the transmission of the 50 million SR for the conservation of the old city of Jeddah in the framework of its nomination for inscription on the World Heritage List. (Arabic text and English translation)
(13) Jeddah Municipality Communiqué, No 330518014, dated 26/11/2012 AD, concerning priority projects list in historic Jeddah and confirming the effective coordination between JM and SCTA on the five main “tracks” guiding SCTA activity in Jeddah.
HRH Crown Prince and Deputy Chairman of Council of Ministers and Minister of Defense, Aviation and Inspector General.

Copy to HRH Minister of Interior
Copy to HRH Minister of Interior and President of General Commission for Tourism
Copy to HRH Foreign Minister
Copy for HE Minister of Education
Copy to HE Secretary General Council of Minister.

With reference to the order no. 17997 dated 7/9/1422H regarding the suggestions of the Council of Ministers, very few number of Ministers studied and asked HE the Minister of Education to send the first list of important archaeological sites in the Kingdom to send them to the organization of UNESCO in Paris to study the possibility of registering these sites on the World Heritage List. With reference to your Highness telegram no.1/1/4/5603 dated 16/11/1426H regarding the report of the Committee of the Minister's meeting deputed to study this matter and according to the telegram of HRH the Head of the Bureau of the Council of Ministers no.12303 dated 20/3/1427 and with reference to the letter of His Excellency Secretary General of the Council of Minister letter no. 514 dated 18/3/1427H that the General Committee of the Council of Ministers restudied the subject in the presence of HE the Minister of Education as per advise of the Council of Ministers, the General Committee of the Council of Ministers decided to postponed the discussion on the subject. Also with reference to your Highness telegram no.1/1/4/1943 dated 4/5/1427 regarding detailed and comprehensive study conducted on this subject, and according to the letter of HRH Secretary General for the Supreme Commission for tourism, the matter was resubmitted to the Council of Ministers with the suggestion to shorten the registration at this stage to three sites only that are Madain Saleh, Dir'iyyah and Historic Jeddah. The Secretary General of the Council of Ministers vide letter no.1406 dated 14/7/1427 H informed that the Council of Ministers reviewed in its meeting held on 13/7/1427 the recommendations of the General Committee on this subject and the Council approves the registration of the sites of Madain Saleh, Dir'iyyah and historic Jeddah on the World Heritage List of UNESCO.

We wish you to execute the matter and take necessary steps in this regard and process the matter accordingly.

Abdullah Bin Abdulaziz
President of the Council of Ministers
Kingdom of Saudi Arabia
Ministry of Interior
Deputy Ministry of Regional Affairs
General Directorate of Public Affairs

Urgent typed Circular
By Telegram

His Royal Highness, the Governor of Province …
His Royal Highness, the Governor of the Northern Border Province
Cc to His Royal Highness, the Assistant Minister of the Interior for Security Affairs/Civil Defence
Cc to His Excellency, the Minister of Municipality & Rural Affairs

Peace be upon you

His Royal Highness, General Secretary of the Supreme Commission for Tourism had telegraphed us No.(406/23/2B) dated 16/3/1423.A.H (attached copy) concerning the significance of preserving architectural heritage for tourism development, as an attractive feature for tourists. The demolition of what remains of heritage buildings would lead to unsightly, empty areas and the Supreme Commission for Tourism needs to be given a chance to see those heritage relics and specify which are architecturally important for tourism. Until the selection and assessment criteria are applied to those buildings in practice, paving the way to issue a national list of Saudi architectural heritage, the Supreme Commission asks that all decisions to demolish heritage buildings be deferred.

We wish you to notify the officials concerned to coordinate with the Supreme Commission for Tourism before demolishing any of the previously mentioned buildings.

With best wishes

Sultan bin Abdulaziz
Acting Minister of the Interior

Kingdom of Saudi Arabia
High Commission for Tourism
President of Head Board

His Royal Highness, Minister of Municipality & Rural Affairs
Cc to His Royal Highness, Minister of the Interior
Cc to His Royal Highness, General Secretary of General Commission for Tourism

Peace be upon you

Initially the significance of preserving architectural heritage sites, represented by ancient buildings and traditional villages, centres of towns and historical neighbourhoods, must be stressed. These are an important feature for tourist development and as representations of architectural designs and social life and they document the history and civilization of Saudi Arabia.

This notification is based on the previous cooperation between the Supreme Commission for Tourism and the relevant institutions, the circular of His Highness, the Minister of the Interior No.(29/28056 dated 4/4/1423.A.H and the circular of His Excellency, the Minister of Municipality & Rural Affairs No.(22637) dated 23/4/1423.A.H; including the significance of coordination with the Supreme Commission for Tourism before ruining or demolishing buildings prone to collapse. However, trespasses took place in some areas and these circulars were not complied with.

This notification is also in light of the decision of the Council of Ministers, instructing that the Deputy Ministry of Antiquities & Museums be merged with the Supreme Commission for Tourism and in recognition of the significance of architectural heritage for architectural and tourism development.

We wish you to notify the officials concerned in all areas to coordinate with the Commission for Tourism and Antiquities before demolishing any architectural heritage buildings prone to collapse and to carry out programs to preserve the architectural heritage and develop the buildings architecturally for tourism.

With best wishes

Sultan bin Abdulaziz
Prime Minister of the Council of Ministers
The Head of Board, the Supreme Commission for Tourism
Onward from the importance of conserving the sites of Urban Heritage resembled in buildings and traditional villages, and city centers and traditional districts for being one of the major components for tourism development, and what it represents from urban and social meaning that documents the kingdom’s history and civilization.

And building on the past coordination between the Supreme Commission for Tourism and related entities resulted in a circular from H.R.H Deputy Acting Minister of Interior number 29/18056 dated 15 July 2002. And the Circular by H.E Minister of Municipal and Rural Affairs number 22637 dated 13 July 2002 containing the importance of coordination with the Supreme Commission for Tourism before commencing any removal for rundown buildings, for we see the existence some encroachments in some area and no compliance thereof.

And in the light of the Council of Minister’s decision for the annexation of the Deputy Ministry of Education for Antiquities and Museums to the Supreme Commission for Tourism. And onward from the importance of Urban Heritage in urban and tourism development.

We advise to you to whom you appointed in the regions to coordinate with the General Amenity of the Supreme Commission for Tourism before commencing any removal of rundown heritage buildings, and to work on executing programs for the preservation of Urban Heritage and its development urban and tourism wise

With our regards,

Sultan Ibn Abdulaziz
Second Deputy Premiere to the Head of the Council of Ministers
Chairman of the Supreme Commission for tourism
Circular

To all secretariats of the regions: Riyadh, al-Qassim, Asir
Municipalities of provinces and governorates: Taif, Ahsa, Hafar al-Batin

His Royal Highness
His Excellency

Peace be upon you

Further to and to comply with the circular No.(3329/1/A) dated 23/10/1403.A.H based on the Royal Command No.(20131) dated 23/8/1403.A.H; concerning buildings prone to collapse, to which is attached the technical report including the criteria and technical principles for buildings prone to collapse.


We forward herewith a Form for a Building Inspection Report (to be prepared by the Committee of Buildings Prone to Collapse) to show all data requested by the Committee of Buildings Prone to Collapse about the building, its location, ownership, current status and the reasons which caused it to be unstable, and the recommendations and views of the Committee. We enclose a copy of the special instructions for unstable buildings with safety instructions for demolishing and removing buildings.

Find herewith a copy of the list of safety instructions for demolishing buildings prone to collapse and road ditches, issued by the Ministry of the Interior.

We wish you to consider and append this circular to those you have received previously concerning the subject, to abide by and follow these requirements, as well as to notify other institutions of yours and those connected to you, to encourage the Committees of Buildings Prone to Collapse to do their duty and to be careful when reporting and following up the removal of relics as per the laws and instructions which you have been given.

Miteb bin Abdulaziz
Minister of Municipal & Rural Affairs

Circular to
Secretariats and directorates of Riyadh regions, Qassim, Asir, Municipalities of regions and Taif governorates, Ahsa and Hafar al-Batin

His Excellency

Peace be upon you

From his Royal Highness, General Secretary of the Supreme Commission for Tourism, we received the letter No.(619/22/S.T/2) dated 3/3/1422.A.H. concerning a request for co-operation and coordination with the Supreme Commission and we have been notified of the decision of the Committee of Buildings Prone to Collapse in towns and villages of Saudi Arabia, that enough time is granted to ensure that a building is not listed as architecturally significant for tourism, before any demolition occurs.

Since antique and heritage buildings are considered to be part of the architectural backbone of cities, it is thus very important to preserve them as representations of past architecture and social life, and as significant landmarks for the history of the city. In coordination with the Supreme Commission for Tourism, the preservation of these buildings may generate public interest.

We wish you to ask your specialists to provide the Supreme Commission for Tourism with a copy of the decision of your Committee for Demolishing Buildings Prone to Collapse, in enough time before starting to demolish any building, so as not to put any person or property at risk, as well as to ensure that these buildings are not listed as architecturally significant for tourism, within the span of the time limit specified for demolition and removal.

With Best wishes

Minister of Municipal & Rural Affairs

Dr. Muhammad bin Ibraheem al-JaraAllah
Inspection Report on Buildings Prone to Collapse

Owner's name:……………………………..
City:…………………………………………………………

Licence for Construction

Schematic Design:………………………………..Date…./…./…………………….
Licence No.:………………………………………………...Date…./…./…………………….

Date of Building completion…./…./………………………………………………………

Building Age:………………………………………………………………………..

Type of Building:…………..Traditional:…………..Concrete:………….
Number of storeys:…………..

Method of Construction:………….. financed by: Real Estate Development Fund.
By owner:…………..

Suitable Drawing of Building Location, showing size of streets, buildings bordering and north direction

Status of Building

Are there schematics for building?   Yes ☐(attached copy)   No. ☐ (Reasons be mentioned)
Reasons:………………………………………………………………………..

Is the house built as per to schematic designs?   Yes☐ No. ☐(Differences be mentioned)
Differences:………………………………………………………………………..

Is building restored or has annexations?   Yes ☐ No. ☐

Kingdom of Saudi Arabia
Ministry of Municipality & Rural Affairs
Secretariat/Municipality/complex
Are these refurbishments and annexations licensed? Yes. □ …… No. □ …………………

Was the area of land ever tested? Yes. □ …… No. □ …………………

Recommendations of the Technical Report concerning this building (if any):
……………………………………………………………………………………………………………..
……………………………………………………………………………………………………………..
……………………………………………………………………………………………………………..
……………………………………………………………………………………………………………..

Is the neighbourhood served with Surface Water Drainage? Yes □  No □

Is the neighbourhood connected to the Sewage Drainage System? Yes □  No □

Septic tank is built: inside the building □ Out of building □ how far is it from building? ………

Status of Construction: …………………………………………………………………………………

Does the house have a garden? No □  Yes □

Method of irrigation adopted: ……………………………………………………………………………

Impact on house: ………………………………………………………………………………………

Was the house unstable previously? No □  Yes □(be attached with the previous report)

Materials of construction used in building:
☐ House built of mud with mud foundations
☐ House built of concrete blocks with stone or cement foundations
☐ Concrete skeletal house

General description of House:
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

Has the Committee technically tested the house to ensure its safety? No □  Yes □(give
details below):
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

Main reasons causing instability to the house in the viewpoint of the Committee:
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

Percentage of damage caused by instability of the house with explanations:
1. Owner: %
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

2. Designer: %
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

3. Contractor %
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………

4. Other factors: % (be shown)
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
Deputy Ministry of Technical Affairs  
General Administration of Engineering Affairs  
Department of Architectural Projects

Coordination between the Supreme Commission for Tourism  
Before ruining or demolishing architectural heritage buildings that are prone to collapse

Circular to all secretariats

His Royal Highness  
His Excellency

Peace be upon you

Further to both circulars: No.(28550/4D.T) dated 6/5/1424 A.H and No.(22637) dated 23/4/1422 A.H. concerning buildings prone to collapse,

And in reference to the copy of the letter of His Royal Highness, General Secretary of the Supreme Commission for Tourism No.(2520/2B) dated 10/9/1428 A.H concerning coordination with the Secretariat General at the Supreme Commission for Tourism before ruining or demolishing architectural heritage buildings that are prone to collapse, as well as to carry out such programs to protect and develop the architectural heritage architecturally and touristically. The two circulars stated that the Secretariat General at the Supreme Commission for Tourism noticed there were trespasses which took place by some municipalities demolishing some heritage buildings without coordinating with the General Commissions and these municipalities had not abided by the two circulars.

We wish you to consider and append this circular to those that you have previously received concerning the issue, to abide by and notify the other departments of yours and confirm that it is necessarily to coordinate with and to provide the Supreme Commission for Tourism with a copy of the decision of your Committee for Demolishing Buildings prone to Collapse, with enough time before starting demolition of any buildings to make sure that those buildings to be demolished are not listed as architecturally or touristically significant.

With best wishes

Dr. Mansour bin Miteb bin Abdulaziz

Deputy Minister of Municipal & Rural Affairs
Article One:
The following terms and phrases, wherever mentioned in this Statute, shall have the meanings expressed next to each of them, unless the context requires otherwise:


Commission: General Commission for Tourism and Antiquities.

Board of Directors: Board of Directors of the Commission.

Chairman: Chairman of the Board of Directors.

President: President of the Commission.

Public Tourism Areas: Public natural areas (not privately owned) such as beaches and the like, in addition to areas designated by the Commission and approved by the Council of Ministers.

Tourism Accommodation Facilities: Hotels, furnished accommodation units and other units prepared for tourism accommodation in accordance with the Hotel Law.

Tourism Activities and Professions: Travel and tourism agencies, tourism recreational activities, tourism service providers, tour operators, tour guides, in addition to other activities and professions closely related to tourism, unless they fall under the jurisdiction of other agencies.
Antiquities: Movable and immovable objects, buried or submerged, within the Kingdom and its territorial waters, whether constructed, made, produced, adapted or inscribed by man, or which have certain archeological characteristics formed through the intervention of mankind over the ages. The term antiquities shall include historical sites, urban heritage sites, and traditional heritage sites and objects.

National, Urban and Traditional Heritage: All buildings and tools created, made or used by man in latter times in any of the Kingdom’s provinces to facilitate the way of life – including food, clothing, housing, education, self defense, maintenance of physical health, as well as recreational tools.

Archeological Excavation: All acts of digging, probing, exploring and diving carried out on scientific basis, for the purpose of discovering antiquities, whether under or above ground, in streams, lakes or in territorial waters.

Article Two:
The Commission shall be an independent corporate entity reporting to the President of the Council of Ministers. Its Head Office shall be in the City of Riyadh. It may establish branches or offices in the Kingdom’s provinces, as necessary.

Article Three:
(a) The Commission’s main purpose shall be to promote tourism in the Kingdom through organizing, developing and marketing it. The Commission also aims to enhance the role of tourism as an important resource of the national economy, help overcome obstacles to its growth in a manner consistent with the Kingdom’s status and values, care for and preserve the Kingdom’s antiquities and ensure their contribution to cultural and economic development, care for museums and advance archeological work in the Kingdom. The private sector shall play the primary role in the construction of tourism investment facilities.

(b) Public tourism areas shall be protected by law and may not be privately owned. They are to be exploited and invested directly by the State or leased to the private sector through public tender.

Article Four:
In order to achieve its objectives, and without prejudice to the jurisdictions of other agencies, the Commission shall have the following jurisdictions:

(1) Proposing general policies for development and improvement of tourism, antiquities and museums, as well as plans and programs necessary for their implementation and overseeing implementation of the same, in coordination with agencies concerned, each according to their jurisdictions.

(2) Licensing tourism activities and professions as well as tourism accommodation facilities and overseeing them.

(3) Working jointly with relevant agencies to organize tourism activities and professions related to the jurisdiction of such agencies.

(4) Working jointly with the Ministry of Interior and the Ministry of Foreign Affairs and other agencies concerned to regulate the issuance of tourism visas.

(5) Organizing and classifying tourism accommodation facilities and monitoring their performance.

(6) Assessing infrastructure projects for tourism areas in various provinces of the Kingdom, providing programs necessary for their completion, in cooperation with relevant agencies, and discussing the same with the council of each province.
(7) Conducting a comprehensive survey of tourism areas and assets in the Kingdom, updating it on a periodic basis in cooperation with the agencies concerned, evaluating tourism potentials of each province, and discussing the same with the provincial council.

(8) Overcoming obstacles to tourism activities and proposing the provision of facilities and incentives to investors.

(9) Working jointly with relevant government agencies to preserve public tourism areas.

(10) Devising media and marketing strategies related to tourism and implementing them to promote investment in tourism and encourage tourism activities, in coordination with relevant agencies.

(11) Supporting efforts aiming at assisting the development, promotion, maintenance and conservation of tourism sites and antiquities, national urban and traditional heritage, folk handicrafts, and traditional souks.

(12) Coordinating efforts between governmental and non-governmental agencies in order to achieve the Commission's objectives.

(13) Strengthening cooperation and coordination between the Kingdom and other countries to achieve the Commission's objectives in accordance with applicable rules and instructions.

(14) Encouraging the private sector to establish companies that plan, develop and invest in tourism areas, and referring to the Supreme Economic Council whenever the need arises to establish companies, wholly or partially owned by the State. Said companies shall undertake to plan, develop and invest in tourism areas.

(15) Establishing a registry of antiquities in the Kingdom and setting controls therefor, and determining the antiquity of movable and immovable objects as well as their approximate age.

(16) Working to protect, maintain, conserve and restore antiquities and prepare them for visitors. Conserve and develop urban heritage, including towns, districts, villages, buildings, handicrafts and historical monuments and utilize them culturally and economically.

(17) Establishing and managing museums as well as licensing and overseeing private museums.

(18) Conducting archeological surveys and excavations and licensing those carrying out such activities, in coordination with relevant agencies.

(19) Conducting research and studies, documenting and logging, and encouraging scientific research in the fields of tourism and antiquities.

(20) Promoting awareness of the significance of domestic tourism and the conservation of antiquities through publishing and encouraging publication of books, brochures, magazines, specialized periodicals and others.

(21) Working to recover national antiquities from abroad, in coordination with the Ministry of Foreign Affairs.

(22) Organizing or participating in travel, tourism and antiquities exhibitions. Holding of relevant meetings, symposia, conferences and exhibitions; establishing ties with international organizations concerned with tourism, antiquities and museums, in accordance with applicable rules and instructions, in coordination with the Saudi Export Development Commission regarding travel and tourism exhibitions.

(23) Working to preserve, restore and develop privately-owned historical buildings and archeological sites, and propose their expropriation for public interest in accordance with the Eminent Domain Law. This includes buildings and lands adjacent to such sites for the purpose of their protection, utilization and display of their distinctive features.
Article Five:
The Commission shall work jointly with the provincial council and the board of directors of the Chamber of Commerce and Industry in the province to explore means for promoting tourism activities in the province and overcome possible obstacles.

Article Six:
The Commission shall have a Board of Directors consisting of the following:

(1) President Chairman
(2) Deputy Minister of Municipalities and Rural Affairs Member
(3) Deputy Minister of Interior Member
(4) Deputy Minister of Foreign Affairs Member
(5) Vice President of the General Presidency of Youth Welfare Member
(6) Deputy Minister of Finance Member
(7) Deputy Minister of Education Member
(8) Deputy Minister of Commerce and Industry Member
(9) Deputy Minister of Culture and Information Member
(10) Deputy Minister of Economy and Planning Member
(11) Deputy Minister of Hajj Member
(12) Deputy Minister of Agriculture Member
(13) Secretary General of the National Commission for Wildlife Conservation and Development Member
(14) A number of members interested in tourism or antiquities, not less than three and not more than seven, to be appointed pursuant to a resolution by the Council of Ministers for a period of three years upon nomination by the Chairman, provided that they are not involved in tourism investment activities.

Article Seven:
(1) The Board of Directors shall be the authority controlling and managing the Commission’s affairs and shall issue all decisions necessary to realize its objectives within the provisions of this Statute, and shall have specifically the following powers:

1/1. Approving general policies for the development of tourism, antiquities and museums that are consonant with the objectives set forth in this Statute, prior to submission to the Council of Ministers for approval.

1/2. Approving plans and programs necessary for implementing the general policies for the development of tourism, antiquities and museums that are approved by the Council of Ministers.

1/3. Proposing policies for investment in public tourism areas by the private sector in coordination with relevant agencies, each according to their jurisdictions, and bringing the same before the Supreme Economic Council for approval.

1/4. Issuing the administrative regulations for the Commission, as well as the financial regulations upon agreement with the Ministry of Finance.

1/5. Reviewing periodic reports submitted on the Commission’s work progress.

1/6. Approving the Commission’s draft budget, final account, and auditor’s reports and submitting the same to the competent authorities.

1/7. Proposing draft laws related to tourism, antiquities and museums; reviewing existing laws and regulations and proposing
amendments thereto; and submitting the same to the competent authorities.

1/8. Proposing regulations necessary for the implementation of this Statute and regulations pertaining to tourism, antiquities and museums sectors in matters falling within the Commission’s jurisdiction and not conflicting with the jurisdictions of other agencies, in cooperation with relevant agencies, each according to their jurisdictions, and submitting the same to the competent authorities.

1/9. Determining the financial charges for services provided by the Commission within its jurisdiction, in accordance with the financial regulations mentioned in paragraph (1/4) of this Article.

1/10. Drafting regulations for the purchase, exchange, loan and donation of antiquities, as well as regulations for the sale, purchase, exchange, donation, importation and exportation of private collection pieces, and bringing the same before the Council of Ministers for approval.

1/11. Approving the organization and participation in travel, tourism, and antiquities exhibitions, as well as programs and seminars related to the Commission’s activities, in accordance with applicable rules and instructions, in coordination with the Saudi Export Development Commission with respect to travel and tourism exhibitions.

1/12. Setting controls for outsourcing studies and research necessary for the Commission’s objectives to local and foreign experts and consultant offices, in accordance with applicable rules and instructions.

1/13. Setting rules for conducting archeological surveys and excavations and issuing licenses therefor, in coordination with relevant agencies.

1/14. Approving plans for the establishment of new museums, drafting regulations for the licensing of private museums, and bringing the same before the Council of Ministers for approval.

1/15. Approving the acceptance of gifts, aids, grants, bequests and donations without prejudice to the rules governing receipt of cash or in-kind donations by government agencies.

1/16. Approving the Commission’s annual report at the end of each year, prior to bringing it before the President of the Council of Ministers.

(2) The Board of Directors may form, from its members or from others, standing or ad hoc committees to be assigned tasks determined by the Board. The committee's formation decision shall name the chairman and members and determine its powers. The committee may seek the assistance of any party it deems fit to carry out the task entrusted to it.

(3) The Chairman may, at his discretion, invite any person to attend the Board’s meetings to provide information and clarifications, without having the right to vote.

(4) The Board of Directors may, pursuant to its resolution, delegate some of its powers to the Chairman.

Article Eight:
The Board of Directors shall convene periodically, at least twice a year. The Chairman may call for a meeting, as necessary.

Article Nine:
The Chairman shall preside over the Board of Directors' meetings and a meeting shall not be valid unless attended by a majority of members. All
resolutions shall be issued with the consent of the majority vote of members present. In case of a tie, the Chairman shall have the casting vote.

Article Ten:
(1) The Commission shall have a President with a rank not lower than "Grade Excellent", to be appointed by a Royal Order.
(2) Except for the President, the Commission's employees shall be subject to the Provisions approved by High Order No. 5464/MB dated 20.04.1426H.

Article Eleven:
(1) The President shall be the executive officer in charge of managing the Commission and administering its affairs in accordance with this Statute and the Board’s decisions. The President shall specifically:
(a) oversee the Commission’s work in accordance with the approved regulations, plans and programs.
(b) oversee the drafting of the general policies pertaining to development of tourism, antiquities and museums as well as plans and programs necessary for the implementation of such policies and submit the same to the Board of Directors.
(c) oversee the drafting of the annual budget and submit it to the Board of Directors.
(d) represent the Commission before government agencies and other relevant entities and institutions inside and outside the Kingdom.
(e) propose the organization of and participation in travel, tourism and antiquities exhibitions as well as relevant programs and symposia.
(f) draft regulations necessary for running the Commission’s work and approve the work procedures based on the regulations and resolutions issued by the Board of Directors.
(g) authorize expenditures from the approved budget and follow all financial procedures in accordance with the laws and regulations in force.
(h) prepare reports on the implementation of the Commission’s plans, programs and studies, and submit the same to the Board of Directors.
(i) issue licenses for private museums in accordance with the Antiquities Law and the regulations for licensing private museums, and propose the establishment of new museums.
(j) approve the conduct of research, studies, recording, documentation, scientific publication, archeological surveys and excavation in accordance with the rules set by the Board of Directors.
(k) approve the maintenance, restoration, preparation and display in archeological sites and buildings.
(2) The President may, pursuant to his decision, delegate some of his powers to other officials of the Commission as he deems fit.

Article Twelve:
The Commission shall have an independent budget prepared and issued in accordance with the arrangements for the issuance of the State’s General Budget. Allocated funds shall be spent pursuant to the instructions for the State’s Budget. The Commission’s funds shall consist of the following:
(1) Funds allocated for the Commission in the State’s budget.
(2) Gifts, aids, grants, bequests and donations accepted by the Board of Directors.
(3) Other revenues approved by the Board of Directors.

(4) Any membership fees determined pursuant to a resolution by the Board of Directors and collected from investors benefiting from the facilities and services rendered by the Commission.

(5) Financial charges for services rendered by the Commission within its jurisdiction.

Article Thirteen:

The Commission’s fiscal year shall commence and end with the State’s fiscal year.

Article Fourteen:

Without prejudice to the powers of the General Audit Bureau to audit the Commission’s accounts, the Commission’s Board shall appoint one or more auditors licensed to practice in the Kingdom and determine their fees. In case of multiple auditors, they shall be jointly liable to the Commission.

The auditor’s report shall be submitted to the Board of Directors, and upon the Board’s approval, a copy thereof shall be furnished to the General Audit Bureau.

Article Fifteen:

The Commission shall submit its final account to the Council of Ministers within a maximum period of three months as of the end of the fiscal year. The Commission shall also submit an annual report on its work to the President of the Council of Ministers within ninety days as of the end of the fiscal year. The General Audit Bureau shall be provided with a copy of the Commission’s final account as well as a copy of the annual report.

Article Sixteen:

(1) This Statute shall supersede the current Statute of the Supreme Commission for Tourism and its amendments issued under paragraph (1) of the Council of Ministers’ Resolution No. (9) dated 12/01/1421H.

(2) This Statute shall enter into force as of the date of its publication in the Official Gazette.
Telegram

From the Cabinet of the Council of Ministers
Outgoing Number: B/9859
Outgoing Date: 4 March 2009
Attachments: 2

HRH Chair of the Saudi Commission for tourism and Antiquities with God's Save
Copy to the Ministry of Municipalities and Rural Affairs
Copy to the Ministry of Education
Copy to the Ministry of Islamic Affairs, Endowments, Da'wa and Guidance
Copy to the Ministry of Civil Service
Copy to the Ministry of Finance
Copy to the Ministry of Economy and Planning
Copy to the Ministry of Agriculture
Copy to the Ministry of Culture and Information
Copy to the General Observer Cabinet
Copy to the General Commission for Investment
Copy to the General Secretariat of the Council of Ministers
Copy to the Experts Body in the Council of Ministers
Copy to the Cabinet of Ombudsman
Copy to the National Center for Archives and Manuscripts

Peace be unto you from God and His Mercy and blessings

I send to YRH a copy of the Council of Ministers Decree number 66 dated on 2 March 2009, with the following ruling:

First: the Saudi Commission for Tourism and Antiquities shall undertake dealing with how to act in the urban heritage sites in accordance to the guidelines mentioned in this decree.

-Sheikh Ahmed Bin Naif Al-Sheikh, President of the Saudi Commission for Tourism and Antiquities

Kingdom of Saudi Arabia

Historic Jeddah, The Gate to Makkah

VOLUME 2 - LEGAL ANNEXES

p. 177
Second: The Saudi Commission for Tourism and Antiquities is to study the procedure that permits proprietors to exchange urban heritage property owners to conserve the necessary properties and expedia them to residents through the restoration of the ancient areas and the temporary ownership of the property issued by the Royal Decree number (8/2020) dated 15 May 2020, so that the compensation costs for the properties will be subject to the requirements of the compensation law, the temporary ownership of the properties, and the compensation costs for the properties. With the approval of the decision, the Minister of Culture, and the administrative and financial procedures for the compensation for the properties will be based on the requirements of the temporary ownership law, the compensation law, and the administrative and financial procedures for the compensation for the properties. The decision will be published in the official gazette once the decision has been issued.
Decree number: 66
Dated on: 2 March 2009

That the Council of Ministers
And after review of the incoming dealings from the Cabinet of the Presidency of the Council of Ministers with the number 16032/8/4 dated 5 June 2003, including the Communiqué of the Saudi Commission for Tourism and Antiquities number 1/23/437 dated 4 July 2002 regarding the study subject of the archeological and urban heritage sites owned by citizens, and the proposition of suitable means for its compensation, and solving the problem of compensating its owners.
And after reviewing the Antiquities law, issued under the royal decree number 26/M dated 4 August 1972.
And after reviewing the compensation laws for the public benefit and temporary ownership of the property, issued by the royal decree number M/15 dated 13 June 2003.
And after review of the Magistrate circular decree number (MB/2075) dated 20 February 2007.
And after reviewing the recommendations of the general committee of the Council of Ministers number 828 dated 21 January 2008.

Had decided the following:
First: The Saudi Commission for Tourism and antiquities shall deal with the how to act in sites of urban heritage, according to the following:

a) If the owner of the urban heritage site wishes not to keep and invest it in accordance to the criteria to be highlighted in what will be mentioned in the article (Second) from this decree, he has the right to sell it, and all who wishes in the right of ownership including the relative government agency, with the commitment of the buyer to the followed criteria for its preservation of the site.
b) If the site's owner wishes to keep and invest it, he will be treated in accordance to what is mentioned in the article (Second) of this decree.

Second: The Saudi Commission for Tourism and Antiquities shall study the procedures that enables through which the encouragement of urban heritage site owners to keep the properties and maintain and rehabilitate it, through the following:

a) Coordination between the Saudi Commission for Tourism and Antiquities and relative government agencies for the provision of services and needed amenities to up-grade chosen villages and districts.
b) Issue to the owner of building/site a permit to practice certain activities that achieve investment opportunities suited to the nature of the building, and to coordinate such between The Saudi Commission for Tourism and antiquities and other relevant governmental agencies.
c) Issue the building's owner a loan form the Saudi Credit Bank - in accordance with its system - to renovate the building, maintain and rehabilitate it.

Third: The Saudi Commission for tourism and antiquities shall update and finalize all specific data to the archeological and urban heritage sites (incomplete) issued in the appended Committee's report to The Saudi Commission for Tourism and Antiquities communiqué number 1/23/437 dated 4 June 2003,
to prepare the final compensation assessments liable to the owners of aforementioned (incomplete) properties in accordance to article (Seven) of the Properties compensation system for the public benefits and temporary ownership of the property issued under the royal decree number 15/M dated 13 May 2003 depending on that the total costs for compensation of these properties, and the actual spending from these costs under the condition of completing the legal procedures of compensation, taking into account that the owners of the sites mentioned have the right for equal amount for the period from the date of handing their properties to the date of acquiring the compensation for the origins of their properties.

Head of the council of ministers
Number: 3400025928
Dated: 14 January 2013
Attachments: 1

Subject: Regarding cash flow approval of for the historic district

(Important and Urgent)

HE Vice Mayor for Strategic Planning

Peace be unto you from God and His Mercy and Blessings,

In reference to your communique number 3400025928 in 16 December 2012 regarding YE request to provide you with a copy of the communique on the cash flow of the Development and rehabilitation of Historic Jeddah Project. Therefore we would like to inform you that the project is approved under number (935/19/30/14) under the name (Development and rehabilitation of the Historic district UNESCO Existing requirements) and this project costs are approved with a total amount of 500,000.00 Riyals only, and no cash flow for it was approved.

With my best regards,

Planning and Budget Department Manager
Ahmad A. Khalfi
Number: 3400015938
Dated: 14 January 2013

Subject: Requesting a copy of the communiqué regarding the approval of cash flow for the historic district

Important and Urgent

To: HE General manager of the General Administration for Managerial and Financial Affairs

Peace be unto you from God and His Mercy and Blessings.

Hoping from YE generosity and gracefulness in an urgent matter to provide us with a copy from the communiqué regarding the approval of cash flow for Jeddah prefecture for this year 2013/2014 approved by the Finance ministry regarding the endorsement of the development and rehabilitation of the historic district.

Please accept my best regards and appreciation.

Vice Mayor for Strategic Planning
Dr. Abdulqader O. Ameer


<table>
<thead>
<tr>
<th>اسم ورقم المشروع</th>
<th>التكاليف المحتملة</th>
<th>الميزانيات الفعلية للداخلية في عام 1433/1434</th>
<th>التكاليف المحتملة</th>
<th>الميزانيات الفعلية للداخلية في عام 1433/1434</th>
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</tr>
</tbody>
</table>

الميزانية السنوية المالية

الباب الرابع

فصل (1) وزارة الأمانة العامة والدفاع
فرع (2) أمانة محافظة جدة
قسم (3) أمانتين محافظة جدة
المشرف

التوزيع المالي في عام 1433/1434

الباقي من التكاليف

الميزانية الفعلية للداخلية في عام 1433/1434

التكاليف المحتملة

الميزانية الفعلية للداخلية في عام 1433/1434

التكاليف المحتملة
### Fiscal year budget 2013/2014

**Fourth Chapter**

Chapter: (019) Ministry of Municipal and Rural Affairs  
Branch: (005) Jeddah Prefectural Municipality  
Division (001) Jeddah Prefectural Municipality  
Projects  

<table>
<thead>
<tr>
<th>Project Name &amp; No.</th>
<th>(A) Approved Costs</th>
<th>Financial status till the end of the fiscal year 2012/13</th>
<th>Financial status for Fiscal year 2012/2013</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>(B) Actual amount spent until the end of 2012/13</td>
<td>(C) Actual amount spent in 2012/13</td>
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<tr>
<td>Projects under execution</td>
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<tr>
<td>Total</td>
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<td>113,000</td>
<td>16,338</td>
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Communique No 3300518014  
Dated: 26 November 2012  
Subject: Regarding the Priority Projects List in Historic Jeddah  

H.R.H Prince Sultan ibn Salman ibn Abdulaziz  
Chairman of the Saudi Commission for Tourism and Antiquities  

Peace be upon you, and a mercy from Allah and his Blessings;  

In reference to your honorable letter No.13022 dated on 15th November 2012, indicating to the meeting held with in chair on 17th October 2012, and the recommendations and decisions from this meeting regarding the Priority Projects List in Historic Jeddah, likewise the recommendations of the Previous Studies and Plans Review Workshop for Historic Jeddah held on 16th October 2012. And based on Y.H Decision No. (1583) Dated on 15th October 2012 containing the determination of (5) Work Tracks for Historic Jeddah.  

Based on the aforementioned, it would be my pleasure to inform Y.R.H with the following:  
The following schedule, names the Amana candidates in light of the Work Tracks mentioned:  

<table>
<thead>
<tr>
<th>No</th>
<th>Track</th>
<th>Assigned member from SCTA</th>
<th>Assigned member from Jeddah Amana</th>
</tr>
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<tr>
<td>1</td>
<td>Enlisting Historic Jeddah in W.H.L Track</td>
<td>Prof. Ali Al-Chabban</td>
<td>Dr. Abdulqader Ameer</td>
</tr>
<tr>
<td>2</td>
<td>Renovation, Development &amp; Infrastructure Track</td>
<td>Dr. Mshari Al-Nu’aim</td>
<td>Eng. Nasser Al-Murib</td>
</tr>
<tr>
<td>3</td>
<td>Investment Track</td>
<td>Dr. Hamad Al-Smaiel</td>
<td>Eng. Sami Nawar</td>
</tr>
<tr>
<td>4</td>
<td>Endowments &amp; Control Track</td>
<td>Dr. Faisal Al Fadhel</td>
<td>Eng. Mohammad Al-Jaffi</td>
</tr>
<tr>
<td>5</td>
<td>Property Owners Track</td>
<td>Mr. Mohammad Al-Omari</td>
<td>Eng. Awadh Al-Malik</td>
</tr>
</tbody>
</table>

Regarding providing the needed financial amount for the preparation of the listed Priority Projects Terms of Reference, we have appointed H.E Director of Historic Jeddah Municipality.  

- As for the coordination with H.E the Director of the National Center for Urban Heritage regarding the preparation and approval of the master plan and executive projects Terms of Reference inside the boundaries of Historic Jeddah, we have appointed H.E the underseretary for strategic planning Dr. Abdulqader Ottman Amir.  

For Y.H Review and Information,  
May God protect Y.H and sustain your grace and support  
And please accept Y.H my best regards  

Jeddah Prefecture Mayor  
Dr. Hani Mohammad Abu Ras  

---  

Number: 13022  
Dated on: 3 November 2012  
Attachment: Envelope  
Subject: Regarding the Priority Projects List in Historic Jeddah  

HE Mayor of Jeddah Prefecture  

Peace be unto you from God and His Mercy and Blessings  

Based on the decisions and recommendations of the meeting held by YE chair on 10 October 2012 (Attached) regarding the review of the priority projects list in Historic Jeddah, and the recommendations of the review workshop for the previous plans and studies for Historic Jeddah, and from which the importance of preparing and approving a general plan for the rehabilitation and development of historic Jeddah, to be observed as a planning document in which all development stakeholders abide by, where noticed the multiple plans and studies that were previously prepared and the existence of absenteeism in its content which require its unanimity and completion of what remains from the attached general plan elements through a consultant appointed by the municipality for such. And where five work tracks in Historic Jeddah have been identified in accordance to our decision number (1583) dated on 15 October 2012 (attached) that indicates the track and the name of the official from the Commission for the track who will work with whom YE nominate from the Municipality.  

We wish from YE to direct the execution of the decisions and recommendations of the meeting and workshop aforementioned, and to name the officials from the Municipality in accordance for the indicated work tracks, and to allocate the needed amount to prepare a Term of Reference for the Priority Projects (attached), and whom YE direct can coordinate with the Urban Heritage Center Manager Dr. Mshari Al-Nuaim on the following addresses (Phone: 011808845, e-mail: NuaimM@scta.gov.sa) in respect of the preparation of the Terms of Reference, the approval of the General and detailed plans and executive projects under the Jurisdiction of Historic Jeddah.  

For YE our Salute.  

SCTA Chair  
Sultan Ibn Salman ibn Abdulaziz
<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
<th>Author/Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>(TA.1)</td>
<td>Restoration Manual for heritage buildings in historical Jeddah</td>
<td>p.4</td>
<td>Ecole d'Avignon, 2006</td>
</tr>
<tr>
<td>(TA.2)</td>
<td>Al-Balad historic district survey</td>
<td>p.60</td>
<td>Tecturae, 2012</td>
</tr>
</tbody>
</table>
TA.1

Restoration Manual for heritage buildings in historic Jeddah

Ecole d’Avignon 2006
RESTORATION MANUAL FOR HERITAGE BUILDINGS IN HISTORICAL JEDDAH
ARCHITECTURAL AND STRUCTURAL ELEMENTS CHARACTERISTICS, PATHOLOGIES & RESTORATION TECHNIQUES AND SOLUTIONS
...Then they found in it a wall which reached the point of falling, so he put it into a right state. »

The Holy Quran Chapter 18 Al-Kahf verse 77
CONTENTS

FUNDS

FOREWORD AND ACKNOWLEDGEMENTS

METHODOLOGY FOR THE REHABILITATION OF THE OLD CITY OF JEDDAH

THE MANUAL: METHODOLOGY, USES AND LIMITATIONS

THE CHARACTERISTIC ELEMENTS OF THE OLD BUILDINGS IN AL BALAD

FORWARNING: THE CHOICES

A. STRUCTURES

A.0 METHODOLOGY FOR FLOOR SHORING AND DEMOLITION

A.1 REINFORCING FOUNDATIONS

A.2 LIMITING THE CAPILLARY EFFECTS OF GROUND-WATER

A.3 FILLING AND MENDING A CRACK - LINKING THE WALLS

A.4 INJECTING GROUT IN A CRACK OR MASONRY

A.5 DISSASSEMBLING AND REBUILDING A STONE FACING

A.6 RECOVERING WOODEN WALL TIES

A.7 MIXED FLOORS, WOOD AND CONCRETE - CONNECTED FLOORS

A.8 SURFACING MIXED FLOORS - WOOD/CONCRETE

A.9 WATERPROOFING TERRACE ROOFING

B. SURFACING

B.0 SURFACING: PREPARATION AND IMPLEMENTATION – WORKS OF REHABILITATION

B.1 MAKING LIME PASTE

B.2 PREPARATORY LAYERS

B.3 SMOOTHED RENDERING FINISHING

B.4 LIMEWASH PAINT

B.5 STUCCO RENDERING

B.6 SGRAFFITO

C. JOINERY AND WOOD WORK

C.0 THE PATHOLOGIES OF WOOD

C.1 REMOVAL / DISSASSEMBLING

C.2 WASHING, PICKLING AND SCOURING

C.3 MAKING A GRAFT, A PATCH

C.4 RESTORING A MOUCHARABIEH PANEL

C.5 RESTORING AN INSIDE DOOR

C.6 RESTORING A ROSHAN

C.7 MAINTAINING IRONMONGERY AND HARDWARE

Author
Ecole d’Avignon, 6 rue Grivolas 84000 Avignon France

Editorial Coordination
Patrice Merot-Sir

Texts
Jean-Jacques Algros, Catherine Scherrer Robin, Norbert Aigoin, Xavier Casanovas, Jean-Yves Ginel

Drawings and sketches
Catherine Scherrer Robin

Photographs
Ecole d’Avignon

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Martine Lambert

English version
Stephan Caso

Arab version
Dr. Adnan Abbas Adas, Salma Atassi

Printer
Leo digital press, Branch 'Terzian

The ECOLE D'AVIGNON would like to thank:

Eng. Adel bin Mohamed FAKHEI, Jeddah’s Mayor
and Dr. Adnan Abbas ADAS, Development and Revitalization Department Manager of Old Jedda.
This manual is the outcome of a two years work and would not have been created without Dr. Adnan Abbas ADAS involvement nor Jeddah’s Mayor trust.

Michel NIETO and Alain MARQUER
The role of the French Consulate Cultural Department in Jeddah, represented by Michel NIETO then Alain MARQUER, is a perfect example of the French state services support to a cultural structure abroad.
This support is materialized through the French version of this publication as well as the funding of the exhibition, which gives a greater dimension to our work.

Jean-Claude BESSAC:
Professor Jean-Claude BESSAC was the first one to pronounce our name in Jeddah, thus we owe him our first contacts with the City of Jeddah.

Christophe GRAZ:
In charge of the international projects at the Ecole d’Avignon at the time, he was the first one to get in touch with Dr ADAS in August 2006.
Later, the last explorative mission we led together in Jeddah in December 2006 allowed us to define the frame of our collaboration with the Municipality.
Foreword

Historical Jeddah possesses a unique and rich built-up heritage that must be preserved and maintained. In order to unlock the potential of the historical area, a comprehensive programme of restoration and rehabilitation is needed to secure its preservation and reuse and bring about greater international recognition of its historical significance.

In its efforts to achieve these overarching goals, the Municipality of Jeddah engaged an internationally renowned French non-profit consultancy, Ecole D’Avignon, to prepare a technical manual for the repair and restoration of the city’s historic buildings. The manual is based on field studies and internationally accepted methods of rehabilitation and also on focused research on Jeddah’s historical buildings and the traditional construction methods and materials.

The Municipality of Jeddah is making the manual available to the professional community as part of its ongoing efforts to promote:
- the use of appropriate repair and restoration techniques and methods;
- professionally accepted methods of rehabilitation;
- the introduction of new building systems into historical buildings;
- optimization of the restoration process technically, socially, and economically.

It will become an invaluable reference tool to all those who are interested in and responsible for the preservation and conservation of Jeddah’s built-up heritage such as local architects, engineers, craftsmen as well as professionals from other related disciplines.

During the period when the manual was being developed we arranged a programme of intensive on-site training for local apprentices. The training covered a wide range of restoration methods, with theoretical as well as practical elements. The apprentices who attended included local artisans, architects, designers, historians and engineers. Those persons are intended to form a nucleus of local restoration professionals who will be active and focused on the repair, restoration, and rehabilitation work needed in historical Jeddah, which, God willing, will ensure the transfer of expertise to future generations, and hence help to preserve and treasure this vital component of our cultural heritage.

Acknowledgements

The department of Historical Jedda Urban Rehabilitation & Development of the Municipality of Jedda first and foremost acknowledges His Excellency the Mayor engineer Adel M. Fakeih for all his kind words of support during the preparation of this manual, for all his precious time listening to the many presentations during which he gave his guidance and continuous encouragement to push forward and chart new grounds. Secondly, the department acknowledges the return and support of all those who participated in its success with the preparation of this technical manual, principal among them were:

1. Dr. Adnan Abbas Adas – Director
   Urban Development & Regeneration
   Jeddah
   From the Department of Urban Development &
   Rehabilitation of Historical Jeddah

2. Dr. Ahmed Basyoni, Landscape Architect
3. Osama Alturki, Urban Planner

From Jedda Urban Development & Regeneration Company
1. Mr. Tareq Telmesani, CEO
2. Dr. Waleed Abdulaal, Vice-President

From the Ecole D’Avignon & Cultural Section
1. Mr. Patrice Morot-Sir
2. Mr. Michel Nieto
3. Ms. Salma Attasi

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2. Dr. Waleed Abdulaal, Vice-President

From the Ecole D’Avignon & Cultural Section
1. Mr. Patrice Morot-Sir
2. Mr. Michel Nieto
3. Ms. Salma Attasi

Methodology for the rehabilitation of the Old City of Jeddah

The rehabilitation process of the Old City of Jeddah begins with political decision : the Municipal Administration has drawn up a survey of the problems affecting the urban environment, the architectural fabric of the city and its population. The main objectives of the rehabilitation project are to enhance the quality of the urban environment and architectural fabric : preserve and develop its cultural and heritage value; improve the quality of life of its inhabitants ; adapt the Old City to more modern standards. This rehabilitation must be carried out in successive stages, according to mid-term and long-term objectives, within the framework of a global revitalization program of the Old City.

The keys to a successful rehabilitation and revitalization process are :

- INTEGRATION. By understanding the Old City as a part of a larger-scale territory, while preserving its historical characteristics and uniqueness, avoiding isolating it into an enclave, and ensuring the continuity of the old center with its surroundings.
- GLOBALISATION. By developing a multi-sector approach, taking into account the economic, social and environmental aspects of the project, beyond a mere technical or urban planning perspective. By defining a strategy that balances collective heritage and higher living standards for the inhabitants of the historical center.
- COORDINATION. By building an operational framework in which every stakeholder and player (political players, decision makers, experts, social agents, etc., as well as citizens) is involved in the process. By seeking consensus as a basis for action, as a true guarantee of sustainability.
- FLEXIBILITY. By accepting that such a long rehabilitation process calls for adaptation. The rehabilitation strategy may evolve in time, due to unforeseeable social and economic changes, as well as the technical requirements of building or architectural processes.

Like any worldwide rehabilitation program of a historical centre, there are 5 main stages in the full-scale project :

1. ORIENTATION
2. DIAGNOSIS
3. STRATEGY
4. ACTION
5. FOLLOW-UP
**Methodology for the Rehabilitation of the Old City of Jeddah**

### A Orientation

The project policy will include some preliminary political decision-making, which is indispensable to successfully organize and implement the rehabilitation program. This will set the limits of the area acted upon, determine the nature of the actions that should be carried out, and define a governable framework that will coordinate the role and sphere of activity of every player taking part in the rehabilitation program, including inhabitants.

The success of the rehabilitation process is narrowly linked to the capability of local government as well as public services to solve a wide range of interrelated and complementary issues of the following nature:

- **URBAN.** By upgrading a deteriorating environment, revitalizing the urban fabric and improving the standards of housing, enhancing public spaces, by renewing and improving existing infrastructures.
- **ECONOMIC.** By revitalizing and diversifying economic activity, and making the old city more attractive and better integrated into the whole city ensemble.
- **ENVIRONMENTAL.** By improving environmental conditions (water pollution, better heating and street lighting, etc.) as well as by optimizing energy and utilities (waste disposal, water supplies, sewage systems, etc.).
- **HERITAGE.** By preserving and enhancing architectural and cultural heritage, and by upgrading this heritage to modern-day standards of living, uses and requirements.
- **SOCIAL.** By fighting poverty, encouraging social unity, by avoiding social exclusion and meeting the social and cultural needs of inhabitants and users.

For the application of the rehabilitation programme to be effective, it is highly recommended to give the Old City a specific legal status, to ease decision-making, optimize program management and enhance the efficiency of all actions. The stakeholders and players involved in the process are: local government and authorities, teams of experts, trades and professionals, officers, inhabitants and users.

### B Diagnosis

Before deciding on an operational strategy, it is necessary to have a thorough understanding and knowledge of the Old City: this calls for a comprehensive, multi-sector survey that includes a diagnosis of the heritage, environment and especially a study of the policy and course of action. The survey constitutes the very basis for the « Integrated Diagnosis » and for the subsequent missions, it should include all priorities and objectives. The aim is to constitute a global vision of the city center and to the definition of infrastructures.

A technical team is in charge of coordinating the diagnosis. Its first task is to determine and draw up the surveys that must be carried out and make sure the project is coherent and well coordinated. Another role of the technical team is to manage the contributions of local civil society (artisans, small industries and trades, services, inhabitants and users, etc.) and preserve the best interest for all throughout the diagnosis. The diagnostic development programme will specify the time-frame, level and form of the different surveys (all aspects: sociological, mobility, psychological, etc.). Ultimately, the technical team will draft the diagnosis and a digest of the diagnosis that highlights the crucial points (key points and critical problems, flaws and solutions) of the project.

**During the diagnosis it is necessary to define the legal framework for all actions as well as manage urban planning issues. It is important to determine the extent and limits of public action, within the legal framework of urban planning: urban planning actions generally supersede individual interests and are a key for the success of the whole operation.**

Several specific sectors must be surveyed in the diagnosis for a full understanding of this part of the city. The project is divided into three main stages:

- a first phase: collecting data (field work, consultation of official statistics and/or existing indicators, reference to existing works and documentary sources, consultation of territorial officers or servants),
- a second phase: analyzing the data,
- a third phase: interpreting, presenting and managing the surveys.

Here are a few highly recommended surveys:

- **URBAN AND ARCHITECTURAL APPROACH**
  - Territorial context, integration and continuity of the fabric
  - Analysis of the relation and articulation of the Old City with its bordering neighbourhoods
  - Urban structure
  - Analysis of the area of intervention on the basis of its physical configuration. Morphological characteristics of the settlement, buildings, open spaces and infrastructures
  - Uses of the area
  - Description of the different uses of the Old City as a basis for discussion for suitable, sufficient and sustainable solutions
  - Building and residential typologies
  - Comprehensive study of the different typologies in the area
  - Urban tensions and states of conservation
  - Description of the state and state of conservation of the buildings and of any critical points of her urban nature
  - Heritage values
  - Identification of the value of the heritage, taking into account the value and characteristics of local traditional architecture
  - Construction and formal values
  - Identification of all construction systems, materials, and stylistic and composition resources of the buildings (from the roof, openings in the façades, projections, finishes, and doors and windows...)
  - Mobility and accessibility
  - Analysis of mobility in the area, as it is closely related to the morphological structure of the city center and to the definition of infrastructures

- **SOCIO-ECONOMIC APPROACH**
  - Demography
  - Analysis of the structure of the population of the area
  - Social values
  - Analysis of social habits
  - Cultural values
  - Study of the values of the architectural space from an anthropological point of view
  - Economic parameters
  - Analysis of aspects linked to economic activity
  - Real-estate dynamics
  - Analysis of the constructions from a real-estate point of view

- **HISTORICAL AND GEOGRAPHICAL APPROACH**
  - Historical context
  - Description of the historical context in the area

Here are a few highly recommended surveys:

- **URBAN AND ARCHITECTURAL APPROACH**
  - Territorial context, integration and continuity of the fabric
  - Analysis of the relation and articulation of the Old City with its bordering neighbourhoods
  - Urban structure
  - Analysis of the area of intervention on the basis of its physical configuration. Morphological characteristics of the settlement, buildings, open spaces and infrastructures
  - Uses of the area
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- **HISTORICAL AND GEOGRAPHICAL APPROACH**
  - Historical context
  - Description of the historical context in the area
C. Strategy

A series of potential actions will be defined on the basis of the “Integrated Diagnosis”, the Old City of Jeddah, through a strategic reflection. The Action Plan will list all the actions that must be carried out. The Plan must then be validated and agreed upon by social consensus and approved by political decision-makers. The Plan will then be structured according to a legal framework, including instruments, tools and means, and all the proposed projects and policies.

This stage of the process should lead to the definition of a course of action that is politically, socially and economically feasible. A technical reflection and definition of the course of action should focus on a balance between the strategic aspects (long term/short term, global/local and public/private) and the primary objectives of sustainable rehabilitation (quality of life, preservation of heritage, social cohesion, economic vitality and environmental efficiency).

The priority objectives of sustainable rehabilitation should be:

- **Environmental Efficiency**
  Rehabilitation must take into account environmental criteria in the rehabilitation of buildings and in the transformation of the urban fabric or planning.

  The Action Plan synthesizes all the strategic materials, and is designed to group and monitor all the programmes and policies towards a common objective: the achievement and success of the full-scale project. While defining actions, the Plan will also define the framework of operational policies and professionals in charge of the implementation, models of public and private financing, etc. as well as a need for a clarification or adaptation of the legal framework (urban planning instruments, specific ordinances, rehabilitation manuals, etc.) for a good completion of the rehabilitation.

  The Action Plan is to be drafted by the technical team, and, though it must be validated by official decision-makers, who must endorse and support the project, it must also be backed by maximum social consensus. The various actions (urban, social, etc.) will be coordinated, organized and scheduled according to an agenda. It is essential to estimate the beginning and timeframe of each stage, to harmonize each phase with the other actions, and to set up and validate intermediary goals and objectives.

- **Development of Cultural Heritage**
  The prime goal of rehabilitation must be to preserve the cultural heritage and to transmit a society’s collective memory, while taking into account new needs, requirements and demands.

- **Promotion of Economic Vitality**
  Another objective of rehabilitation is to promote the vitality and economic autonomy of the area, promoting a diversity of uses and activities beyond mere tourism, combining habitation with traditional businesses, artisans and craftsmen.

- **Improving Residents’ Quality of Life**
  Rehabilitation must focus on improving the quality of life of the inhabitants of Al Balad, raising the level of accessibility to public services (health, education, etc.) and guaranteeing higher dwelling standards (safety, comfort and ease of access).

- **Improving Social Cohesion**
  The overall objective of rehabilitation is to fight against poverty and social exclusion, and establish social harmony.

D. Action

This phase is the implementation phase of the Action Plan, where one carries out all the actions it has set up.

All actions must comply with the Plan, and use the tools, instruments and regulations defined in the legal framework. All actions must be carried out according to the guidelines (order, duration, financing, etc.) established in the Action Plan.

The implementation phase of the Action Plan is not limited to carrying out a series of projects and policies; in accordance with the stipulations of the operational framework, it also includes a series of awareness-raising campaigns addressed to the general public and inhabitants, as well as the development of rehabilitation programmes, technical and professional training programmes, etc.

E. Follow-up

All actions will undergo continual and persistent assessment and evaluation. Evaluation will be carried out while actions are under way, as well as after they have been achieved. It is essential to make sure actions are in compliance with the objectives established in the Action Plan and global strategy.

A technical follow-up team will be created to evaluate the Plan, along with a series of tools (polis, reports, population surveys, etc.) to validate achievement and intermediary goals.

The Manual (technical handbook) is at stage II of the rehabilitation project of the old center of Jeddah: Diagnosis. It constitutes a first technical approach, proposing the best immediate solutions to repair or treat the most common pathologies found in the buildings of the Old City. The solutions are specific and targeted, preparing the way for the following phases: strategy and action.

The manual will be completed, updated and supplemented by the field work in Al Balad.
The first part of the Manual for the rehabilitation of the Old City of Jeddah introduces « the characteristics of the architectural elements of the buildings in Al Balad ». The heart of the manual is constituted by three booklets : « Structures », « Surfacing » and « Joinery and wood work », divided into a series of data sheets, presenting solutions to repair the main pathologies and damages found in the buildings of Al Balad. For clarity purposes, the data sheets were all displayed according to the same layout.

Solutions are based on two leading principles :
- every action on a structure can weaken it : the building is more vulnerable during the extent of the restoration,
- every restoration must be reversible.

The methodology presented in the manual is based on two abiding rules :

1. A GENERAL METHODOLOGY ASSOCIATED TO SAFETY RULES AND CONDITIONS FOR THE WORKERS AND STRUCTURES

The world of construction is a field that pays a heavy toll in the event of accidents, both in terms of material damages and human lives. Though risk is impossible to elude entirely, prevention and a good organization of working conditions can considerably reduce risk.

A good work site methodology is the first rehabilitation tool that should be implemented. Case studies of accidents that occurred on construction sites show that a lack of methodology always proves costly, first on a human level, and then on an economic level. Following global safety measures, in the right order, is the first way to decrease the level of risk.

We mustn’t lose sight of the fact that the old buildings of Al Balad are extremely vulnerable and dilapidated. Every rehabilitation must begin with a preparatory phase, consisting in a demolition or deconstruction, as well as an elimination or dismantlement of additional installations or elements. During this phase, the building is more fragile and vulnerable, and that remains true until the new works are completed... thus calling for shoring and propping before any demolition or disassembling. Disassembling or demolition leads to localized overload before the rubble is evacuated : it is therefore recommended to clear away debris as demolition advances...

2. WITH AND WITHOUT THE MANUAL, REFLECTION AND SEEKING PERFORMANCE

Reflection and analysis are key to defining and implementing rehabilitation projects. To guarantee quality and control materials and costs, it is essential to understand the framework of the project, and ponder on all choices, suppliers, organization, planning, management and implementation of the works.

Seeking highest performance is not explicitly set as a target in the sheets of the manual. It is, however, continually implied through every stage of implementation, preliminary works, and through every formula and specific caution notes.

The concept of quality work is of the essence, throughout this handbook.
The rehabilitation of the buildings of Al Balad raises a vast array of questions and issues. The manual brings answers to those targeted technical problems that were identified by its authors and advisors.

The manual for technical assistance
The purpose of this manual is to provide technical assistance for the rehabilitation of the old city of Jeddah, Al Balad. Our approach is fully expressed in the words: rehabilitation + ; rehabilitation encompasses all works of improvement of architectural heritage, as well as upgrading it to modern quality of living standards.

The propositions drawn up by the Ecole de Jérusalem respect the existing heritage and are fully adapted to the highest level of preservation of heritage. Furthermore, every piece of advice is based on a survey containing the unique architectural and technical characteristics of Al Balad. They are along the lines of international heritage policies (EINEC and ICOMOS, in accordance with the various charters of preservation and rehabilitation).

The history of the old city, characterized by impressive vernacular architecture, whose buildings have been dilapidated in time and tremendously weakened by the actions undertaken throughout the 20th century, remains unknown and neglected. Studies and surveys constitute our best chance to setting up the right objectives and actions for the preservation, restoration, rehabilitation and new planning of the city. Without an in-depth and comprehensive analysis of the construction, it is impossible to draw up the most rational definitions or to plan the work.

If the upstream part of the project doesn’t seem to be a problem, we must ensure that the downstream part, particularly when related to its structure. Connected floors, for example, can come in a large variety of materials, dimensions, techniques...

This manual does not deal with the preliminary development program, nor the project, preliminary surveys, technical and architectural diagnosis and preliminary recommendations for each operation of rehabilitation. This must be dealt with in studies with developers and project managers - architects, engineers and designers - whose tasks and experience are perfectly well adapted to architectural heritage.

If the upstream part of the project doesn’t seem to be a problem, we must ensure that the same quality work is carried out in the diagnosis part. It is crucial that the surveys and on-site observation and probing be accurate and comprehensive in the technical diagnosis.

A pathology cannot be directly associated to a remedy; a comprehensive survey of the building will connect the diagnosis to coherent solutions for repairs. The dialogue between the building owner, project manager and the craftsmen is vital to choose the best possible actions, from a technical and economic point of view, according to the specificities of the pathologies that must be treated according to their environment. The history of the old city, characterized by impressive vernacular architecture, whose buildings have been dilapidated in time and tremendously weakened by the actions undertaken throughout the 20th century, remains unknown and neglected. Studies and surveys constitute our best chance to setting up the right objectives and actions for the preservation, restoration, rehabilitation and new planning of the city.

The nature of the construction materials and their physical characteristics are significant to determine how they age and the sort of pathologies they endure.

The manual first defines the characteristics of the construction in Al Balad from a technical and sociological, constitute the key, the missing link to our understanding the city. Studies and surveys constitute our best chance to setting up the right objectives and actions for the preservation, restoration, rehabilitation and new planning of the city. Throughout the survey of the buildings of Al Balad, many have noted and reported a great deficiency of rehabilitation in the old city, a lack of experience and local know-how: the very insufficient documentation provided to us is a most revealing factor of this deficit. This leads us to state that, in Al Balad, all who work in field of the rehabilitation, in every professional field, must reassess their skills and know-how. Though they can meet the needs of modern architecture, modern skills are unadapted, insufficient, or sometimes even invalid when applied to ancient architectural heritage in Al Balad. We feel strongly there is a great need for training.

Assembling these materials has its own rules (weight, loads and load bearing capacity, etc...). All these characteristics, together with the structural characteristics, stimulate solutions for the repairing, reinforcement and improvement of performance of each individual building.

Recipes for the best of recommendations
Every recipe requires ingredients: tools and materials, conditions of implementation, skilled labour, personnel in charge of monitoring and control. Every recipe thus has a cost according to every above mentioned condition.

This manual: a selection of recipes
The technical solutions described in the data sheets of the manual are numerous and varied. However, the co-writers wanted to avoid making a lengthy, inapplicable catalogue on the subject. They chose the technical knowledge that is relevant and adapted to the old city of Jeddah.

The authors propose a selection of techniques that are, of course, adapted to the construction of Al Balad, but also to the professional world, for the artisans and craftsmen, planners and developers, supervisors... taking into account climatic conditions, and determining the best conditions for implementation to reach optimal quality and results on the traditional masonry of the city.

According to the conditions of realization and the budget, the joined forces of recommendation and the manual lead to the best technical choices and to an optimal use and adaptation of the data sheets.

The manual: a technical handbook for the rehabilitation of Al Balad
The manual first defines the characteristics of the construction in Al Balad from a technical point of view, through a survey of its materials and their building sets. The nature of the construction materials and their physical characteristics are significant to determine how they age and the sort of pathologies they endure.

It is also important to determine the materials and techniques that can be annotated, at this question is important in all works of restoration and rehabilitation.

This technical diagnosis is essential to determine the works that are necessary for the restoration of the buildings of Al Balad: the following data sheets cannot replace the surveys or replace recommendations.

This manual is a tool that develops specific aspects in the chapter on the characteristic elements of the old buildings in Al Balad. Moreover, it specifies the compatibility or incompatibility of materials, the best conditions for implementation, as well as the factors that can help improve the quality of the work.

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Rehabilitation practices will evolve in Al Balad, through experience and improvement of technical skills, widening the understanding and experience of the players, increasing their potential, leading to better and more numerous technical choices.

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The characteristic elements of the old buildings in AL BALAD Pathologies and rehabilitation principles

Introduction

Al Balad is characterized by impressive buildings bearing a great array of specific elements: massive architectural shapes, vertical patterns, openings with specific structures, as the famous moucharabiehs and roshans, that embellish and dress the façades.

The profiles of this architecture may seem alike at first glance, but it is actually rich and has developed variations through time and evolution. But it remains little known: a comprehensive survey will help draw up a global perspective, an approach for the rehabilitation of the old city.

The heart of this manual focuses on the smaller scale of the building rather than that of the city. It is mainly technical; this chapter will thus introduce the key features of the buildings of the old city.

The characteristics described concern the materials and assembled elements making up the walls, floors, terraces and renderings.

All these more or less old elements have eroded or worn down in time, causing damage and deterioration. To cure every pathology we will propose solutions and treatments that are adapted to the buildings of Al Balad, taking into account local aspects: on a human, material and economic level.

Materials

A.1 Mineral Materials

- Stones

The stones in Al Balad are limestone, soft to hard, porous, with a rather coarse texture, the typical coral stones are called Mangabi stones. The stones are more or less squared on one facing, and usually beveled roughly. The module is regular, in a shape nearing a square, never in long shapes which could be used as header binders in the masonries of Al Balad. It is important to note that the courses are not parallel, but are in a trapezoidal shape, thinning down inside the wall.

Other less common stones are used: finer, more porous and softer limestone, that is infrequently used for moldings and ornaments; some volcanic stones are also used for certain surfaces, particularly for road or street elements.

Limestone and brick tend to pit or develop porosity, mainly under the action of soluble salts contained in ground water (brackish water, waste water, leakage from air-conditioning systems). The material is destroyed on the surface by the tensile efforts of crystallization or hydration of the salts:

- Ground water capillarity must be treated. Electro-osmosis can be used. The traditional finishing of these materials are renderings, washes and paints. They must be formulated with hydrated lime. Cements are not appropriate. Worn out facings can be maintained by applying a rendering and limewash paint.

- Stone modules can break under pressure, particularly when the pointing is decayed, generating punching.

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- Stone modules can break under pressure, particularly when the pointing is decayed, generating punching.
Wood is also the choice material to make joineries and carpentry work. According to the
element, its role and practice, the wood can be either hard or soft. Hard wood (teak, juniper...) is
used for the structures of heavy work : roshans, doors... Soft wood (pinewood, cypress...) is
used for the smaller wood work, it is easier to shape and carve the more elaborate elements,
to make the mountanthesize, for example.

Wooden elements, namely floor frameworks or joinery, can be changed, tied, reinforced and protected in many ways... deteriorated wood can be replaced by new wood or another material, reinforced with resin, or even reinforced with concrete for structural needs.

It can be treated against termites and other insects, or impregnated for reinforcement.

● Other organic materials
Certain local natural organic materials have probably been used to make paints and adhesives or as additives in rendering mortar (for the waterproofing of cisterns, for example), stucco work or limewash paint. These organic binders were usually animal glue, byproducts and grease derivatives, resin, sap and gum, oil, fibers (animal hair or plant)...

Where necessary, while conducting further research on organic materials, these products can easily be replaced with modern organic chemical products.

### A.2 Organic materials

#### Floors

Wood, usually in the form of tree trunks, is used for the floors to make beams and joists, boards, laths. Palm tree leaf is used to make woven fiber mats. The rough trunks are debarked and exceptionally dried and squared.

The quality of the wood is good, but the regular round beams used in the masonry are often understood for wide spans.

The wood can rot when there is moisture, as is the case for the foundation and it is often attacked by termites. Finally, according to its own imperfections and constraints, the wood can bend, sag or break.

The non-continuous wooden wall ties is neither even nor effective ; cracks appear at the edges of walls, increasing the exposure and demolation of the wood. Rotting causes a loss in volume, generating a sagging of the masonry.

Broken stones can be replaced or laid again, with or without dismantling the wall.

#### Mineral binders

Clay is the binding material of the earth mortars used to lay and fill the masonry of the old city, as well as the binder for the compacted earth of floorings.

Clay is not very resistant and has a relatively low elasticity modulus. It is a widespread weak point of the masonry in Al Balad.

Nowadays, there is a great availability of hydrated limes, which helps upgrade techniques and resistance. It is recommended to give up earth mortars and switch to lime mortars. Lime grout, injected inside the masonry, improves the resistance of the masonry filled with earth mortar.

Hydrated lime, both hydraulic and air types have been made from Mangabi stone and used to build and render, to make floorings and finish floors.

Air lime paste was used as limewash paint. It is more fragile than natural hydraulic lime.

However, the material is easily preserved in water and has good plastic properties, making it an interesting material.

It can be used for the finishing of renderings, particularly : smoothed rendering, stucco and the sgraffito. It is the binding material of limewash paints. Additives can be mixed with the quicklime, at the moment of hydration, this produces very good results.

The use of plaster for interior renderings and the sculpted decorations is recent and modern. Using cement for renderings and organic synthetic paints on the traditional masonry of Al Balad is unnatural and must be avoided.

#### Foundations

The foundations of the buildings of Al Balad are built with the same materials as the walls. However, they undergo far superior stress and constraints : direct contact with the ground and soil, as well as variations in the level of ground water, and ground water capillarity.

The differential settlement of the ground can often explain the sagging of the masonry. Downward loads are not evenly distributed ; the ground can be of irregular density and quality. Variations in the limits of ground stress and constraints can affect the structural stability of the building : variations in the level of ground water, moisture or drying, pipe breakage and loss of filler into the ground, nearby works or digging, over-concentration of the loads in certain spots...

Reinforcing the foundations can be carried out in various manners : micro piles, foundation raft, underpinning... In Al Balad, grout injection seems a well-adapted remedy and solution for both the buildings and the soil (ground structure). The original soil and subsoil suffers less stress than a constructed area that has undergone a natural consolidation, through the compression of construction and loading of a building.

Grout can be injected, either with pressurized micro-fine mineral binders or with expansive resin.

Ground water capillarity must be dealt with and stopped. An electro-osmosis process can be adapted to this purpose.

#### Walls

Small stone walls - under 30 cm - are laid in a five thick layer of lime mortar, filled with small elements and earth mortar. They are at least 30 cm wide at the base. The stones are crossed...
at mid-level to avoid diagonal cracking. The loads are distributed along wooden wall ties, in variable lengths, nailed and bended. They are connected to the facings at regular intervals with wooden elements, making up headers or bonders.

- Pillars
There are many pillars in the buildings of Al Balad and many openings in the façades. Moreover, there are zones of inserts in the walls to fit niches or storage room. This also explains why and how the walls play the structural role through successive pillars.

- Arches
Arches are very common in the masonry of Al Balad. In addition to the shape they give the facings, they are different from the masonry of other walls because of the number of wooden headers. The header elements also distribute the lateral thrusts of the masonry. There are multiple pathologies in the vertical structures of the old buildings of Al Balad: sagging, swelling and dissociation of double facings, cracks: all are a result of the loads and thrust withstanded by the masonry, as well as of the specific characteristics of Jeddah’s masonry :
- the earth mortar filling offers very little resistance to compression: the loads of the masonry are distributed on the stone facings;
- the stone courses are slightly askew and the two facings are not linked by stone header binders: they are only linked by random wooden header binders;
- the wooden wall ties are not continuous: they can be deteriorated (destroyed, broken, rotten, unlinked to the header binders...).

Hydraulic grout can fill the voids in the masonry, as a first reinforcement, alongside choring, wood-bracing and site preparation. The grout should not be too hard, and therefore not be made with cement. Disassembling and rebuilding the stone facings is a technique that fixes and mends damaged zones and swelling while consolidating the facings.

Failing or replacing wooden wall ties is an extremely efficient reinforcement technique. It can be carried out several ways:
- by replacing the identical, with new wooden elements, with underpinning. The advantages of this solution are that it uses the same materials and preserves the characteristics of the building. There are, however, shortcomings:
  - it’s a long operation, the underpinning in this type of work is technically complex, the results are random because they combine nailed and screwed elements. This technique is best used for smaller specific cases rather than for the larger structures and ensembles of the old city;
- by replacing wall ties with reinforced concrete ties: this is inexpensive and easy to implement on a full building scale: it can be entirely rendered traditionally.
- a connected floor technique can be implemented using the same materials and the same tools. A full floor connection, tied into the walls of every storey level, reinforces both the floors and the structure. The cracks in the walls of the most dilapidated buildings in Al Balad can be fixed effectively with wall clips. There are two processes using steel: steel bars sealed in a ready-made, non-shrinking mortar, or steel rods sealed in a casted concrete reinforcement and smoothed on the surface.

The position of the steel reinforcement and different techniques are to be used according to the shape and position of the cracks, as well as implementation constraints.

B.2 Horizontal structures

- Floors
The floors are made with wooden beams, load-bearing from wall to wall, or made with main beams bearing the joisting. This main framework is often covered with jarred boards, with or without battens or strips; or plant mats with earth and lime flooring on top. A few richly create under-tiers can be found, consisting of a suspended board ceiling, fixed against the laitinh. These ceilings can be decorated and painted (geometrical or floral patterns).

The underlying rehabilitation program would be an opportunity to uncover ancient ornamentation, where possible, as must have probably been covered by more recent layers of rendering or painted layers.

The structure of the wooden floors of Al Balad is often understood. Beams can be broken, destroyed by insects or rotten.

It is better to replace beams where possible: beams are usually undersized, rough, mud, untreated. Replacing the beams is preferable to a partial repair or reinforcement (stitching, masonry, ties...).

Re-using beams is highly recommended when possible; the storage of demolition materials should be a part of the rehabilitation policy of Al Balad. Replacing floors or doubling the number of beams is a heavy, inadvisable operation, especially from a heritage and aesthetic point of view; some have been implemented in a few previous rehabilitation campaigns in Al Balad.

The best, most affordable way to reinforce flooring is to connect the floors. The technique consists in making a thin, reinforced concrete floor, with steel connections, sealed or screwed onto the beams of the floor.

The reinforcement can be completed by connecting the structure to the peripheral masonry.

The flooring can be surfaced manually, by smoothing the floor like the original one, or mechanically with a power float: the aspect will be identical or close to that of traditional floors, while improving the resistance of the surface; there is no need for any another modern type of coating.

- Vaults
There are few vaults in the constructions of Al Balad. Scarce wood supplies and high costs are probably the reason. The few vaults in Beit Nassif are located on the ground floor or lower level (basement). They do not seem affected by any pathology.

In the event of cracks, the methods used for vertical masonry can be appropriate, like clamping and connected floor techniques: a survey and diagnosis of the building should help choose the most appropriate solution.

Cupolas are only found in mosques.

- Roofing
The roofing in Al Balad are terrace roofs, built like the floors described above: earth slabs on wooden floors; waterproofing is made with lime rendering. Roofs are flat and scarcely sloped. Rain goes down through wooden waterspouts or glazed terracotta pipes into cisterns.

Cupolas are only found in mosques.

The pathologies, besides those specified for floors, are a deformation or a reversal of the cracks, as well as implementation constraints.
due to the structural movements of the building, or to cracks generated by sagging floor beams. They lead to faulty waterproofing and leakage.

Repairing flat terrace roofing consists in making a connected floor with a reinforced concrete flooring, reshaped with an outgoing slope, equipped with a tight membrane and a heavy protection layer on top of the membrane. The final layer can be a stucco finishing, made manually or mechanically: the result will be very close to traditional finishing.

SPECIFIC CLOSURE AND ELEMENTS

C.1 Joinery work and wood work

- Roshans

Wooden joinery constitutes a main feature of Al Balad. Most of these elements are carved and elaborate, quite ancient (sometimes 2 centuries old) and are a testimony to the rich history of the city of Jeddah, as well as to the art and skill of its craftsmen.

The particular assembly and jointing of the elements of the façade keep make them quite flexible, resisting buckling and structural imbalance — to a certain extent, of course... But the smaller elements of the structure, while conferring beauty to the unit, make it all the more sensitive to external attacks.

The pathologies identified on these elements are the same pathologies as those linked to wood in general. Several external elements are especially damaged by lack of maintenance and neglect. Sagging and warping prevent mobile elements from playing their role: sliding, swiveling... these damages or malfunctioning have not been addressed, however, and show no sign of restoration.

Today, a significant number of elements must be repaired: the solution goes from clamping or patching existing elements to adding new ones. But generally, the best response to this deterioration is in regular maintenance.

- Wooden elements

In addition to Roshans, all the external and interior doors, balconies, canopies, closet doors and wall surfaces, mobile panels, painted ceilings or terrace kiosks, carved wooden elements, bear the same traces of poor maintenance and neglect.

C.2 Specific elements

- Wall rendering and finishing

- The finishing on the lime renderings walls of Al Balad is traditionally carried out with limewash paint. Porosity and flexibility are essential characteristics for good results.

Pathologies are linked to very long term rendering delaminating, and to the dissolution of the surface lime under the effect of water.

It is highly recommended to repair renderings with an identical process as the surface (tool smoothed, sgraffito and limewash paint), using hydraulic grout for partially delaminated rendering, and using impregnation to fortify the richest ornamentation.

- Recent synthetic paint should be removed, using the fastest and most efficient technique (scaling, striping, scouring).

- Sculpted plaster ornamentation only emerged in the 20th century.

- Staircases

Staircases were added onto a central pillar, and prove to be a very meticulous type of masonry. Local experts have stressed this point. Staircases are built into several flights and level sections.

They are connected to the floors, made with rough trunks, covered with a plant sacrifice formwork and some masonry work, made of small elements. The steps are finished with an squared wooden edge, with surfaces similar to the floor, laid with mortar.

They do not seem to withstand any particular pathology: they are simply more worn away than floors because of greater passage.

The best way to address this wearing away is in changing the edge of the step and repairing the surface by adding hydraulic mortar, laid in the same way as the original one.

If floor pathologies are found, it is recommended to seal steel connectors into the peripheral masonry and into the landing sections.
Traditionally, builders have always used locally available materials and resources. Thus, in Jeddah, masons used Mangabi stone, a very porous coral limestone with low resistance. To overcome its disadvantages, masons inserted wooden wall ties (lengthwise and as header-binders) to consolidate the walls. They also rendered the wall facings to protect the soft stone from erosion.

As the stone blocks were rather small, double facing walls were preferred, laid with lime and earth mortar, filled with earth and smaller modules. The stones were rough-hewed: only the visible face was really dressed.

Equipments and tools stayed simple and basic on the construction site. Everything was conceived for resources and means to remain affordable.

The construction of the walls was quite methodological, using the cubit as the measuring units; the height of the masonry between two ties was of four cubits.

The masonry unit was the height of the wall, from the ground to the supports of the windows and roshans. The second unit reached the level of the lintels of the doors and the third was the lintels of the roshans. At this stage, the floor was laid on the first level. Then, the fourth unit went up to the supports of the roshans of the first level. Every unit was linked to a particular element. All the units were crowned with wooden ties, to ensure wall stability.

Walls were build on foundations that were dug in the ground, roughly the same width as the walls. On the ground floor, the thickness of the walls reached 70 - 80 cm. This thickness thinned down floor by floor (10 to 15 cm), as the top floors were less load-bearing than the first levels.

This proves that builders had an extensive knowledge of the performances of their materials and the reactions of their masonry; they developed elaborate practices through centuries of experience and craftsmanship, combining simplicity and economical intelligence, in an architecture that successfully adapted to stringent climatic conditions.

Nothing was left to chance.

Roshans could be connected to the masonry, thanks to wooden ties, distributed regularly along the openings (at the base, in the middle and at the top). As the teak structures were heavy, the overhang on the street was limited, whereas they developed all along the facades. The floor, whose thickness was also a cubit, was laid on the roshans that overhung onto public spaces. The size of structures (or rooms) was limited by the available length of the beams.

Jeddah suffered from a great lack of wood. As the wood had to be transported, it was very expensive. So, to save on the material, builders developed small wooden sections. Moucharabiehs are generally a trait of the Muslim world and plenty of admirable examples can be found in Jeddah; moreover, in this instance, the craftsmen of the city adopted its techniques as they were particularly adapted to the environment, elevating it to a remarkable level.

Today, although the practices carried out in the old city no longer display the full array of this art and know-how, the architectural heritage still testifies to the true mastery in building arts of its masons.

A. Foundations dug in the coral layers.
B. Inside floor, made with compacted sand and terra-cotta tiles.
C. Mangabi stone modules laid in lime and earth mortar, filled with earth and rubble.
D. Every six rows, the walls are reinforced with horizontal, longitudinal and transversal wooden ties that act as header-binders, linking the two faces and strengthening the walls.
E. The floor is made with wooden beams on which the builders lay planks or mats which are covered with earth and a finishing layer.
Forwarning : the choices

When Al Balad was built, the males depended on local resources and supplies: a shortage of fuel wood led to limiting the use of binders that required firing lime, a shortage of forging nails, there was a lack of long span of wood, etc.

Today, construction is no longer limited by the same constraints: there is a wide availability and choice of materials, and techniques have evolved. The modern world has made the transport of materials easy; for example, one seldom works only with local resources.

However, in the rehabilitation projects in Al Balad, one should favor techniques that remain close to traditional techniques and perspectives. A rehabilitation builder must therefore make his choices carefully.

Choices must be made on two levels:

- a respect of the characteristics of the traditional building, by choosing among the most appropriate techniques available today,
- a respect of the fundamental principles guiding the technique, to make a logical and coherent choice at every stage and aspect of a rehabilitation project.

Typical choices

- Al Balad was built with a binding material we would today define as a NHL, natural hydraulic lime. This binding material is no longer found. It must be made with a mixture of binders, to reach an equivalent binding material (approximately 3 volumes of powder air lime for 1 volume of cement).
- If the mortar is apparent, white cement should be used to obtain a color close to the traditional rendering. On the other hand, if the mortar is used to lay stones or grout, regular gray cement is suitable.

- Traditionally, wooden wall ties were rendered. Rendering doesn’t cling well on wood; thus, maintaining the facades was recurrent and expensive. To avoid this maintenance, wooden wall ties were gradually left bare, apparent. This leads to a faster agency of the rendering and to a deterioration of the wall ties. Today, there is a simple way to make the rendering on wall ties: stainless steel mesh, with a relatively large pattern, can be nailed into the wooden elements and coated with rendering.
  - The steel mesh must be chosen carefully: two aspects must be followed for a good long-term result:
    - The mesh must be stainless steel to avoid it getting destroyed by basic rendering (water, rust).
    - The meshing must enable the rendering to cling to both the wooden elements and the masonry.
- It is difficult to reconstitute all the wooden wall ties. But we mustn’t forget it is the ingenious system that preserved the architectural heritage of Al Balad through the centuries. Without these wall ties, most constructions would undoubtedly not have lasted as long, due to the poor quality of the stone materials.
  - It is thus essential to find wall tie solutions... together with bracing and header binders. Partial wall ties would be ineffective in this type of masonry.

As specified in the chapter introducing this manual, choices should be made according to the preliminary diagnosis. Choices are always related to a specific environment and must follow a global operational logic.

Beyond a respect for existing buildings and structures, the choices result from the comprehensive analysis of all the aspects constituting the rehabilitation site. Every day work, on a building site, consists in relentlessly seeking the best solutions and results.
A.0 Methodology for Floor Shoring and Demolition

The methodology presented here deals with the demolition of the building and not deconstruction. Both operations, however, require specific attention and care.

Many accidents can occur during a demolition phase; accidents are often both substantial and serious. It is therefore essential to be particularly cautious, even when procedures may seem simple.

The calculation and preparation of a demolition must be carried out by specialized engineering departments. Follow-up and controls must be consistent throughout the works.

One must make sure that the appropriate calculation and dimensioning have been carried out for every shoring element to guarantee a good stability of the structures.

This calculation must be systematically carried out for each building, and must take into account each and every characteristic. Though it is tempting to trust that general principles apply and are enough, every case must be considered as unique and dealt with in particular.

The processes of both shoring and demolition are clearly defined and must be strictly respected.

The stages should be carried out in the following order:
- always shore upwards: from the ground floor to the higher levels (towers);
- block up the openings and joinery work;
- demolish partition walls and floor coverings, from top to the bottom, evacuate the rubble immediately and gradually; and make sure the shoring can bear the loads of the structure after the demolition and clearing up of materials. Initial shoring was calculated for an initial load which is constantly modified after demolition and clearing up; it is essential to readjust the shoring and propping as work progresses along;
- reinforce the structures upwards, from ground level to the higher levels;
- carry out the new works as planned;
- disassemble the shoring and props from top to bottom.

Strictly vertical shoring or props can be obstructive and get in the way of your works. It is possible to incline elements after having calculated the angle of every element and the structural resistance of the building.

In this case, the shores can be propped up against peripheral walls, while making sure the horizontal efforts will be transferred, either with a slab/floor, or with a network of stress using the openings. The top of the shoring must also be blocked with a strut, joining one prop to another.
DESCRIPTION OF THE CONSTRUCTION ELEMENT

The foundations of buildings, when they exist, are usually laid on a lumpy and sandy ground, containing a large amount of silt and coral fragments.

On the level of the foundations, the ground has a bearing capacity of 1.5 kg/cm²; the constraint under the very foundation can be slightly higher, due to a compaction and consolidation of the ground during the construction phase.

The foundations do not constitute a particularly special element, they are identical to the wall they support (stone masonry laid with earth mortar) but they go down into the ground, at an average depth of 0.70 to 0.80 cm.

DESCRIPTION AND CAUSES OF POSSIBLE PROBLEMS AND PATHOLOGIES

When the foundations no longer support the building as they should, several symptoms can be observed:

- cracks appear, showing that the walls are unevenly supported,
- the building or part of the building tends to subside and can collapse.

Several causes are possible:

- the five level buildings of Al Balad represent a considerable load, not to say excessive, for the ground on which they are built,
- the structures, because of their concept and many openings, behave as posts or pillars: loads are not distributed evenly but are often concentrated,
- the materials used are fragile,
- the transformations carried out through time and the changing uses of the buildings have an impact on the behavior of the structures,
- the level of the water table is very near the surface and the foundations are affected by changes in dampness,
- there may be differential subsidence in the ground,
- demolition works in neighboring buildings often affect the stability of an already precarious balance.

Some of these causes are usually combined. As most of these issues are permanent, it is important to track them and integrate them in the repair campaign solutions.

LEVEL OF COMPETENCE FROM 1 TO 4 : 3 FOR THE INTERVENTION. 4 FOR THE DIAGNOSIS (STRUCTURAL ENGINEER, PROPERLY TRAINED IN REHABILITATION TECHNIQUES : DIAGNOSIS, RECOMMENDATIONS AND OPERATIONAL FOLLOW-UP)

A.1 Renforcing foundations

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LEVEL OF COMPETENCE FROM 1 TO 4 : 3 FOR THE INTERVENTION. 4 FOR THE DIAGNOSIS (STRUCTURAL ENGINEER, PROPERLY TRAINED IN REHABILITATION TECHNIQUES : DIAGNOSIS, RECOMMENDATIONS AND OPERATIONAL FOLLOW-UP)
DESCRIPTION OF THE MAINTENANCE AND/OR RESTORATION

There are several methods to consolidate the foundations. They are all complex and often expensive to implement.

a. Widening the foundation

This traditional process consists in carrying out a new foundation below the existing one. In order not to further weaken the existing structure, this method is carried out in careful successive stages:

1. Dig a trench on each side of the existing foundation, around 1 to 1.5 m wide and around 70 cm deep below the existing foundation.

2. Pour concrete in these ditches, drown the steel reinforcement while keeping some steel jutting out, envelope the foot of the existing foundation up to around 10 cm, minimum.

3. Repeat this operation every 4 to 6 m maximum.

4. When this operation is carried out on the whole length of the foundation, go back between each hole and dig a new trench; fill with concrete as described above.

5. Make two reinforced concrete longitudinal beams, on each side of the foundation, on top of these widened slabs; bind them to the steel reinforcements that are jutting out, connecting them to the initial foundation with properly profiled steel.

b. Making a raft foundation

This process consists in creating an interior raft foundation, surrounded and connected to a longitudinal beam that is connected to the masonry. Like the previous process, this operation increases the contact zone with the ground, thus decreasing the load bearing stress onto the foundation.

c. Injecting expansive resin or micro-thin mineral mortar

This process consists in injecting products below the existing foundation to stabilize the ground, thus increasing the load bearing capacity of the existing structure. Read the manuals or recommendations provided by the manufacturers.

CAUTION!

Carry out a thorough structural survey of the building before choosing a procedure. These interventions are expensive - a detailed study will help determine the exact zones that need consolidation.

A.2 Limiting the capillary effects of ground-water

DESCRIPTION OF THE CONSTRUCTION ELEMENT

Ground-water is carried up through the pores of the stone, through capillary strength. The amount of water infiltrated into a masonry is related to the diameter of the pores in the stones: the smaller the diameter, the greater the amount and rising level of dampness. The limestone in traditional Al Balad masonry is porous, whether it is Mangabi stone or fine-grained limestone, which is used as ashlars or for sculpted elements.

DESCRIPTION AND CAUSES OF POSSIBLE PROBLEMS AND PATHOLOGIES

Ground-water can carry the soluble salts contained in the ground (brackish water, leakage from water networks, utilities or waste water, leaks in higher levels on drainage pipes; waste water or air-conditioning discharge). Water either goes up through capillarity strength, from the ground into the masonry, or migrates towards the outside. Once in open air, water evaporates and deposits soluble salts on the surface of the load bearing elements, slowly but surely destroying this surface. The rendering and lime washes or paints are the traditional remedy for this degradation.

Capillarity-related damages in the masonry of Jeddah are primarily due to the poor condition of underground utility networks or of piping near the walls (water supply, rain water or waste water collectors, air-conditioning discharge).

LEVEL OF COMPETENCE FROM 1 TO 4 : 4
DESCRIPTION OF THE MAINTENANCE AND/OR RESTORATION

There are several methods to stop the capillary action in masonries: they are both complex and costly.

a. Ventilation
This traditional process consists in creating ventilation along the foundation bases, to dry out the masonry. It requires the partial or entire destruction of the slab. This is a good choice when repairing the flooring is part of the rehabilitation project.

Two principles are retained:
1. creation of a box lintel, along the foot of the walls: The wall will thus be air and blow ventilation.
2. ventilated slab with hollow modules, hollow blocks used with prefabricated beams. The hollow modules will be laid upside down and will channel the capillary water of the masonries and the ground.

b. The ground-water dam
This process consists in introducing a tight barrier, horizontally, into the thickness of the wall, stopping the pores that attract ground water.

Two possible techniques:
1. The ground-water dam can be made with a sealing liquid (cement mortar with water repellent, cast asphalt or resin injection) injected with low pressure or simply poured in a series of borings, using a funnel (diameter of the holes: 2,5 cm, approximately every 15 cm, on both sides of the wall, the depth can vary according to wall thickness).
2. The dam can be made using tight material film (lead, copper, resin, tar membrane, etc.) after sawing the masonry, in successive alternate lengths of about 80 cm.

c. Electrical techniques and liquid sealing
Electro-osmosis is recommended when ground-water must be evacuated from an important building. This technique is based on electric tension which forces the water to migrate in the opposite direction of the capillary effect, downwards. The water charged with salts, nitrates, sulphates… always moves from the positive pole towards the negative pole.

Thanks to copper electrodes inserted in the wall, and iron electrodes in the ground, the wall-ground polarity is reversed. As a result, the reversal of electrical current prevents moisture from increasing. The masonry can thus be drained and dried.

Together with electro-osmosis, pressurized liquid sealing - specific phreatic products - can be injected into the masonry. Filled into the wall, the liquid will seal the capillary porosity, creating a ground-water dam. After a certain time, when a ground-water dam is created at the base of the wall, the system can be removed.

These operations should only be carried out by very highly qualified professionals.

CAUTION!
Carry out a methodical survey of the building and materials before choosing a treatment. No matter which solution is chosen, the treatment for this pathology is very expensive.

To: loddie, the very small amount of water which does not explain water-related damages, which remain somewhat limited, mainly due to leakage from the water supply network.

A.3 FILLING AND MENDING A CRACK - LINKING THE WALLS

DESCRIPTION OF THE CONSTRUCTION ELEMENT

The walls of old Al Balad constructions are made of stone masonry laid in lime and earth mortars. They are often cracked at wooden tie level. Horizontal movements and structural stress are caused by a lack of supporting structures. When these walls are not well contained by wall ties, cracks appear.

Because of the structural weaknesses of the masonry, cracks also appear at the link of the walls (wall intersections, angles...)

DESCRIPTION AND CAUSES OF POSSIBLE PROBLEMS AND PATHOLOGIES

Stone walls are subjected to strains which can cause various forms of deformation, amongst which cracks - more or less vertical cracks, step-shaped cracks, 45° angle cracks.

Cracks are common on load-bearing walls. The stone material is harder than the lime mortar binder, cracks appear at the joints. But cracks should not be assessed on their external appearance alone: a crack, even quite large, does not inevitably and immediately threaten the structure of the wall. However, a quick treatment of the cracks is essential to prevent the weak point from creating a fragile zone on the facing, which would weaken the whole building.

In the buildings of Al Balad, the main causes for these cracks are: a relative settlement of the ground/foundations and insufficient wooden ties. Observation shows that cracks always go around the ends of wooden ties or through ties that no longer play their role, due to poor condition – ties subjected to ageing pathologies: breaking, rotting, tearing of the wood, termite attacks...

LEVEL OF COMPETENCE FROM 1 TO 4: 3 FOR IMPLEMENTATION. 4 FOR THE DIAGNOSIS (STRUCTURAL ENGINEER, PROPERLY TRAINED IN REHABILITATION TECHNIQUES: DIAGNOSIS, RECOMMENDATION AND OPERATIONAL FOLLOW-UP)
**DESCRIPTION OF THE MAINTENANCE AND/OR RESTORATION**

A crack is always the consequence of a disorder in a construction: the disorder and its cause must imperatively be detected and fixed before treating the crack.

Cracks come in many shapes and various forms: they are the marks of the pressure and strain the wall has been submitted to.

The cracks which no longer evolve - a good follow-up technique of the cracks helps measure any evolution - can be simply filled with a slow drying mortar with low shrinkage (properly dosed with white lime binder and aggregates).

It is possible to fill the cracks with rendering, if the facing must be rendered again. This operation can be enough for minor cracks. But it is often necessary to mend cracked masonry. This operation consists in bonding the two facings of the masonry, on both sides of the crack, in order to improve the homogeneity of the masonry and restore the physical characteristics of the structure, particularly resistance to tension.

Before mending a crack, you must fill the voids by injecting grout: see data sheet A.4: Injecting grout. This operation could be described as a continuity of “filling a crack”, but it can be of use in other situations without cracks, and is the subject of a specific data sheet.

### a. Filling a crack

1. Break off the layers of rendering around the cracked area using a small pick, or a chisel and hammer. Be sure to remove any detached elements to clear the surface for the new rendering.

2. Clean the mortar pointing along the cracked area. Carefully curve with a chisel or a graver with a hammer: The new pointing must be deep enough to reinforce and hold new mortar.

3. Prepare a white lime mortar (1 volume of binder for 2 to 3 volumes of coarse sand) to fill the gap of the crack to surface level, keep borings if you are to inject grout.

4. You can also reinforce the surface with galvanized or synthetic wire netting, the meshing should be over 2 cm (under meshing improves rendering adhesion and setting).

5. For the repairing of lime plaster - see data sheets: B.2 Proprietary Layers and B.3 Smoothed rendering finishing.

6. The last stage may be filling the voids inside of masonry - see data sheet A.4 - Injecting Grout in a crack or masonry.

### a. Mending a crack

This technique recreates a through, like two blocks of masonry, using concrete steel backing that is sealed in the facings. The clamping can be on one side of the wall or both sides. This solution is adapted to opening the crack: the shape and positioning of the steel can differ according to the nature of the crack and operational possibilities, especially if it is possible to bore holes. The steel can be in one solid piece, held across the crack, or connected at crack level. The steel can be sealed into deep grooves, filled with concrete, or in the borings filled with non-shrinking mortar. Combining techniques remains, of course, an option.

**Carrying out, with concrete and reinforcement**

The depth of the opening should be about 70 to 80 cm on each side of the crack, where possible, this may be difficult at the angles of the masonry. The cutting must keep room around the steel, to pour about 3 cm of concrete around the reinforcement. It must be at least 12 cm deep. It should be clean and dampened. The steel is positioned with spacers to make sure the coating of concrete is regular.

The external curved wall is put into formworks to allow a proper filling and vibration of the concrete. The concrete dose ratio is 350/400 kg of cement for 1 m3 of dry aggregates. You can add fibers and organic binders.

The mortar must be raised into a smooth plastic material, though not too liquid, and is poured into the formwork. Vibrating the concrete improves the coating of the steel, resistance to compression and adherence onto and into the masonry.

After filling, once the concrete begins to set, the formwork is dismantled and the protruding concrete is removed and smoothed down to wall level.

**Boring and filling with non-shrinking mortar**

The boring holes, often about 25 mm wide, are adapted to the diameter of irons, often about 8 to 10 mm, approximately 80 cm long, inclined downwards to ease filling and sealing.

Choosing the exact place of the borings is determined by the best sealing capacity: avoiding areas, when possible, with large amounts of mortar.

After clearing out the borings, blowing dust away and dampening the holes, fill with non-shrinking mortar.

The steel is positioned into the fresh mortar, without vibrating, to avoid the aggregates in the mortar from sticking. If the steel reinforcements are connected in crossed loops, the carving must be deep enough at connection level to allow for a good coating: 12 cm deep, minimum, 15 cm high, 25 cm long. The techniques for filling and sealing this deeper boring are the same as those described to carve out walls.

**CAUTION !**

The binder used to fill cracks must absolutely be a white lime binder, or the like.

When making concrete and mortar, the quantity of water in the mixture is very important because it’s one of the parameters that determines the quality of the sealing:

- the consistency of the concrete must be very plastic: from 10 to 12 cm on the slump cone,

**Concerning the fluidity of non-shrinking mortars**

- follow the recommendations and instructions in product specification sheets.

Very large diameter bits increase the volume of non-shrinking mortar necessary to fill the hole, thereby wearing material. The results and quality of the operation are related to the care and attention given to each stage of the implementation.
A.4 INJECTING GROUT IN A CRACK OR MASONRY

DESCRIPTION OF THE CONSTRUCTION ELEMENT

The walls of the old buildings in Al Balad are made of stone masonry laid in lime or earth mortar. Cracks are often found at the limits of wooden ties. The two facings of a wall can also sometimes be dissociated.

DESCRIPTION AND CAUSES OF POSSIBLE PROBLEMS AND PATHOLOGIES

The wall ties in the buildings of Al Balad are fragmentary; they undergo many ageing pathologies: breaking, rotting, tearing of the wood, termites…

The survey of the buildings in Al Balad has reported that cracks always go through the ends of wooden ties or through wooden ties that are too deteriorated to play their role.

Faulty toothing is often caused by horizontal movement and by tensile stress in the building structure. When this stress is not contained with good wall ties, cracks appear.

The cracks in Al Balad lead to a loss of resistance to compression, due to the voids within the masonry and a loss of tensile strength due to faulty or failing stone toothing.

LEVEL OF COMPETENCE FROM 1 TO 4: LEVEL 2 FOR IMPLEMENTATION, 4 FOR THE DIAGNOSIS (STRUCTURAL ENGINEER, PROPERLY TRAINED IN REHABILITATION TECHNIQUES: DIAGNOSIS, RECOMMENDATIONS AND OPERATIONAL FOLLOW-UP)
A.4 STRUCTURES

DESCRIPTION OF THE MAINTENANCE AND/OR RESTORATION

The technique described in the data sheet consists in filling the gaps within the pointed wall, to regenerate the mortar and harmonize the masonry: it distributes vertical pressure while slightly increasing resistance to compression.

Preliminary operations – see data sheet A.3: Filling and mending a crack / Linking the walls – consist in filling the cracks, making the inside of the wall into a tight volume.

Conditions prior to implementation

A preliminary survey and diagnosis must be drawn up before any operation on old Al Balad structures, carried out by a professional structural engineer, trained in heritage techniques and capable of making relevant recommendations.

Implementation

Implementation consists in boring holes to inject grout, at regular intervals, into the wall facing that needs reinforcement. Holes should be bored every 50 cm – preferably in the pointing with little cracks, and as deep as the wall filling. When the pointing is carried out, you can keep the holes: they are all the more efficient for injection when they are in large hole or void areas.

Making the grout

The grout must have several essential properties: stability and resistance to chemical aggression in sea-side environments (sulfur, magnesium carbonate...), a good lime quality to the original stones and mortar, liquid enough to be poured by low pressure gravity force alone, resistance comparable to healthy masonry, so as to distribute loads downwards, plasticity to avoid creating hard spots.

Grout formula

The ideal grout consists of: 1 volume of natural hydraulic lime (NHL or NHL-Z); categories 2 to 5 for 1 volume of water. A mixture of air lime and cement with a ratio of approximately 3 volumes of air lime for 1 volume of cement can also be used as a mineral binder. An air lime alone does not carbonate inside masonry (for lack of CO2). Holes are large, add aggregates (fine sand for example) to the grout. Adding aggregates decreases shrinking and increases the strength of the mortar.

Injecting the grout

The grout is injected by gravity force alone, into the bootings. These holes are approximately 50 cm apart, both horizontally and vertically. The filling should be carried out from bottom to top. A filling is complete when the grout comes out of a control hole, pierced opposite the injected hole.

A.5 DISASSEMBLING AND REBUILDING A STONE FACING

DESCRIPTION OF THE CONSTRUCTION ELEMENT

The facings of old Al Balad constructions are generally composed of Mangabi stone, hewn stone, cut and dressed flat on one facing, in a slightly truncated shape. Lime mortar is used to lay the courses and bind the stones; earthen mortar is used for the filling of interior masonry. Masonries are usually constituted of double layer hewn stone walls with right facings.

At the time of the construction of the old city, a lack or scarcity of fuel wood limited the production of lime. Lime was therefore used sparingly and replaced with earth mortars. This lead to a very common and widespread shrinking problem, triggered during the drying phase, and leading to a low resistance of the walls to compression and tensile stress.

Pieces of wood were soaked into masonry, every 4 or 5 course, constituting wall ties that are unfortunately neither continuous nor consistent. Here again, due to a shortage of natural raw material, the pieces of wood are usually too short and are nailed together.

DESCRIPTION AND CAUSES OF POSSIBLE PROBLEMS AND PATHOLOGIES

Several factors (the earth mortar, the shape of the hewn stones, unparallel beds and courses, lack of header binders and non-continuous wooden wall ties...), damage or deform the stone masonry, generating cracks, swelling and settlement of the facings, even a partial or total collapse of the wall.

When facings disassociate, they tend to move apart from one another. Building is an extremely serious pathology as it considerably weakens the resistance of the wall: it is imperative to intervene. A lack of header binders enhances and worsens this pathology. It seems that nature of Mangabi stone, a coral limestone, does not allow to shape long enough modules to bond the two facings. The tensile strength of Mangabi stone is low; floating stones are replaced with wooden ties in the masonry of the openings in the walls.

LEVEL OF COMPETENCE FROM 1 TO 4: 2 TO 3 ACCORDING TO THE AMOUNT OF DAMAGE
DESCRIPTION OF THE MAINTENANCE AND/OR RESTORATION

1. Shore up the masonry and/or floors in the peripheral area around the works; keep room to access the masonry.

2. Number the stones of the course, in order, to reposition them exactly as they were.

3. Clean the stones and clear the void from dust and other rubble. Reusing stones is the most obvious solution if any are missing. These blocks can be cut manually, with tools and traditional techniques, carefully imitating the texture of the existing masonry, where necessary.

4. Use white lime mortar: 1 volume of lime for 2 to 3 volumes of clean sand.

5. Dust and dampen the surface of the support as well as the stones. The part used for the course of the new masonry can be grouted before reassembling the masonry.

6. Align the stones on the laying mortar, course by course, using wedges or struts, where necessary. Fill up the inside of the wall. Repeat this operation going from bottom up.

7. Point the masonry up to the next course (top face).

8. For the last course, inject grout or non-shrinking mortar – see data sheet A.4: Injecting grout in a crack or masonry.

9. Disassemble any shoring or strutting when mortars are dry. During this operation, you can create header binders by sealing concrete steel bars, thereby linking the two faces of the stone wall.

CAUTION!

Do not disassemble the masonry before shoring has been safely set up, where necessary. Avoid using cement or artificial lime in the construction or in the pointing. They are too hard and insufficiently porous; they tend to delaminate easily (peel off) and damage the stone around the pointing.

The wooden ties or any other material must also be restored or replaced. Additional ties, going through the wooden anchor, can be made with threaded iron or threaded steel; these will replace header binders. In this case, the masonry is not disassembled but reinforced by filling the voids with grout injections.

Linking the two facings of the wall with iron or steel, creating a header binder, can also be a complementary operation when reassembling a stone wall or double facing walls.

A.6 Recovering wooden wall ties

DESCRIPTION OF THE CONSTRUCTION ELEMENT

The walls of the old buildings in Al Balad are made of stone masonry laid in lime or earthen mortar. This stone masonry, made with rather small modules, with the low-level resistance, is tied or bound with round wooden elements, sealed horizontally within the wall course, every four or five courses. The wooden ties give the masonry resistance to tensile stress.

The wooden elements are usually nailed together: the inside and outside ties are sometimes bound together with intermediate wooden modules, around the same size: these wooden modules then play the same role as a header binder, linking the two facings of the stone wall.

DESCRIPTION AND CAUSES OF POSSIBLE PROBLEMS AND PATHOLOGIES

The wall ties in the buildings of Al Balad are fragmentary; they undergo many ageing pathologies: breaking, rotting, tearing of the wood, termites...

Field surveys have shown that the cracks in Al Balad always go through the ends of wooden ties or through wooden ties that are too deteriorated to play their role.

The cracks lead to a loss of resistance to tensile stress while the wall is already considerably weakened by faulty or failing stone tooting.

LEVEL OF COMPETENCY 1 TO 4: 2 TO 3 WITH A CARPENTER
A.7 MIXED floors, wood and concrete - Connected floors

DESCRIPTION of THE CONSTRUCTION ELEMENT

The horizontal structures in the upper floors of the buildings and Al Balad are made of main beam frameworks supporting a joist frame. This framework is usually covered with planks and, very often, with floor mats. A final earth and lime slab usually covers the floor, smoothed with a tool.

DESCRIPTION and CAUSES of POSSIBLE PROBLEMS and PATHOLOGIES

The floors are worn and old - they aged through weight and use, deflected, and need to be only flexible. The wood of the beams has sometimes been attacked by termites, or rotted, split or broken, consequently weakening the whole of the floor.

The buildings in Al Balad were planned for domestic use, for a family with the fittings and appliances of the time.

The use of those buildings often evolved, adding pressure and heavier utilization. Today’s standards require much more resistant floors than those in the past.

When wooden floors are deteriorated or when resistance is no longer adapted to today’s standards, « traditional » solutions often consist in changing or adding beams : wooden or metal beams, laid parallel to the existing beams or assembled. Modern techniques, using carbon fiber glass and resin epoxy are not adapted to the round Al Balad beams, for many reasons : high cost, difficult implementation, fire-proofing standards. Those solutions, though they may improve the resistances of the floor, do not help reinforce the stability of the whole building.

Moreover, such choices are very perceptible and quite unsatisfactory.

On the other hand, you can reinforce the structure : after having disassembled the earth and lime slab of the floors, change the worn wooden beams, pour a thin new reinforced concrete slab, use steel rods going into the peripheral walls. You can reach today’s standards, both in terms of resistance - 400 kgs/m² for Beit Nassif, and finishing is in the spirit of the traditional stucco floors of ancient Al Balad buildings, and is warmly recommended from a heritage point of view.

LEVEL of COMPETENCE from 1 to 4 : 3 for implementation. 4 for preliminary surveys (structural engineer, properly trained in rehabilitation techniques : diagnosis, recommendations and operational follow-up).
DESCRIPTION OF THE MAINTENANCE AND/OR RESTORATION

- **Conditions for implementation.**
  - The architectural program and project are a great opportunity to complete the installation of networks and equipment that are to be embedded or framed, to determine the height of the floor and choose a finishing.
  - The floors must be adapted to:
    - Load bearing properties.
    - Spacing, size and size of the beams.

  The preliminary study must determine the following:
  - The dimensions, spacing, steel slab diameters, the reinforced steel and slab connectors.
  - The thickness of the slab and the dose ratio of the concrete, type of reinforcement. A qualified engineering and design department must provide the necessary leveling plans.

  Best results are obtained when work is carried out in good climatic conditions. The lowest possible temperatures and adequate preparation.

  See « Methodology for floor shoring and demolition » for masonry preparation techniques.

- **Tools**
  - Specific tools to connect the slab to the floor.
  - A small impact drill (power drill or jumper) adapted to masonry, with bits ranging from 80 to 100 cm in working length, 25 mm diameter. Normal drill for wood, wood bit working length of approximately 10 cm, with a diameter adapted to the connectors.
  - Mixer ; measuring instruments and/or scales.
  - Tools to make concrete and to make the slab.

- **The stages of implementation**
  - Remove the underface of the floor.
  - Demolition of the old earth or lime slab and disposal of rubble.
  - According to each case, partial or total demolition of the old floor (boards and/or plant floor mat).
  - Replace defective wooden elements (beams, boards, ties and slats). Replacing is better than repairing : small rough round wooden elements are not adapted for grafting, assembling and other repairs.
  - Laying or restoration of the sacrifice formwork of the reinforced concrete slab. Geomembrane fabric is a good material to replace traditional vegetable floors (jardin P.V.C. film, it is not microporous and likely to generate condensation). In certain cases and according to the structural survey, the framework can, in certain cases, be carried out after setting up in wood on the beams and connectors.
  - Boring to seal steel reinforcements and connectors into the masonry and wooden structure.
  - Laying of the steel reinforcement : connectors, linking metalwork for the walls, peripheral metalwork of the floor and on beams, steel fabric…
  - Tainting, according to the case, of a basic formwork.
  - Sealing in the masonry with non-shrinking mortars or screwing in wooden elements, or using chemical sealing. The connectors can be screwed in or sealed chemically - see data sheet : A.3 Filling and mounting a crack.
  - Casting the concrete, use vibration and surfacing for the slab - see data sheet : A.8 Surfacing mixed floors, wood/concrete.

  The order of operations can vary for the installation of the slab formwork, boring and sealing, according to the magnitude of the pathologies and the extent of the renovation work.

  **CAUTION !**
  - Implement boring and sealing with care : this is one of the keys to a well connected floor. Well adapted tools, particular skills and equipment, are essential. Quality tools will guarantee performance and effectiveness, and will help save time and materials.

A.8 Surfacing Mixed Floors - Wood/Concrete

**DESCRIPTION OF THE CONSTRUCTION ELEMENT**

The horizontal structures of all the floors above ground level in Al Balad are constituted of a framework made with main beams supporting a joisting (plaster work).

This framework is covered with wooden boards, and more often with bit. The floor is then covered with an earth and lime slab, smoothed with a tool.

The light gray surface was traditionally covered with carpets or kilims.

**DESCRIPTION AND CAUSES OF POSSIBLE PROBLEMS AND PATHOLOGIES**

The floors of all the old buildings in Al Balad have weakened because of ageing and of the strain of modern standards, sometimes because of a change of use in these buildings. Moreover, the masonry often needs restructuring and supplementary blind beams or wall ties.

Mixed floors, with wood and concrete, often referred to as connected, are the best technical solution to both repair floors and simultaneously improve the binding of the floors of a building. This operation replaces traditional earth and lime slabs with a thinner slab of reinforced concrete. When the slab is poured, a reasonably flat surface is satisfactory. Traditionally, earth floor slabs were covered with kilims. Today, finishing a reinforced concrete floor slab requires another covering which will not have the traditional look or aspect.

Using a power float or vibrating slab with special ready-made powders can create a trowel type finished surface, a waxed concrete very similar in both implementation and aspect to the traditional of Al Balad floors.

Using cement type binders considerably increases the resistance and endurance of the floor compared to traditional lime techniques.

Adding waterproofing products on the surface makes maintenance easier.

Using mineral oxides to pigment the surface offers a good chromatic range.

Adding waterproofing products on the surface makes maintenance easier.

**LEVEL OF COMPETENCE FROM 1 TO 4 : 3 FOR IMPLEMENTION (SPECIALIZED TRADES)**
A.9 WATERPROOFING TERRACE ROOFING

DESCRIPTION OF THE CONSTRUCTION ELEMENT

The roofings of Al Balad actually make up a network of terraces. These various terraces are actually the outcrops of the roofs below. Each level is therefore different, according to the height of each building and each top floor. The terraces are delimited from one another by low walls. The structure of these terraces is identical to that of the floors below.

The terraces are flat and sloped downwards, towards the lowest edge:

- Outwards, away from the walls through hollow wooden waterspouts.
- Towards the inside of the building, for water to go down glazed terracotta pipes into cisterns. The terraces sometimes have round or octagonal chimneys, and wooden kiosks. The surfaces, laid tight with metal trays and tools, waterproof the roofing in successive slopes.

The outside rim of the walls is often a little higher, surmounted with decorative crenellation work (built with masonry work or moulded), or with wooden palisades.

DESCRIPTION AND CAUSES OF POSSIBLE PROBLEMS AND PATHOLOGIES

A very common pathology in the roofing of Al Balad is a loss or weakening of the waterproofing. There can be one or several causes for this pathology:

- on a building scale, structural movements reverse the slopes of the roof (settlement of the ground or the masonry) leading to stagnant water and infiltration,
- on a terrace scale, sagging floor beams lead to stagnant water and infiltration,
- on a smaller scale, cracking and deterioration of the coating or layers of the slab, likewise : leaking or infiltration.

LEVEL OF COMPETENCE FROM 1 TO 4 : 3

CAUTION !

Waterproofing is very common on the floors of large buildings : industrial structures, department stores or shopping malls… Small surfaces and areas are not adapted to large models of power floats. Similar smoothing machines obtain good results; without quite matching the shine or brilliance of power floats. They are generally used on small surfaces, or areas inaccessible to the power float, like room angles.
DESCRIPTION OF THE MAINTENANCE AND/OR RESTORATION

A thorough survey or diagnosis of the building is necessary before any works of rehabilitation: treating waterproofing issues will be useless if the causes for the damage are not dealt with beforehand.

The minimal maintenance of a terrace requires maintaining the tight coating or rendering. Repairing can consist in fixing the slab, which must remain identical to the original, made of earth or other materials, as well as the waterproofing material. Stagnating water and subsequent infiltrations are most common. The key maintenance on Al Balad terraces consist in restoring the slopes and waterproofing.

Heavier works can be more advantageous, in terms of means and cost, when structural works are also necessary, such as implementing new wall ties, upgrading floor resistance, laying waterproofing materials that can be warranted by manufacturers and contractors.

The principles of a full scale building repair include the following stages:

1. Implementing a connected floor – see data sheet A.7: Mixed floors, wood and concrete / connected floors.
   The slab must have an appropriate enough slope to drain water through the sheer force of gravity. Using light aggregates is best, both for loads and heat insulation.

2. Laying a flexible, easily extensible, tight membrane on top of the reinforced concrete covering. There are several types of waterproofing materials: traditional layers of tarred roofing, double-layered bitumen elastomer, single layer PVC. According to the product, consult the manuals, recommendations and technical instructions.

3. Laying heavy protection on the membrane. It is important to protect the watertight facing against impact and UV. Several solutions can be carried out: aggregates, blocks on supports or studs... the simplest, most adapted in Al Balad remains a tightened slab.

Here again, light aggregates are best to limit loading and maximize heat insulation – see data sheet B.5 Stucco rendering or A.8 Surfacing mixed floors, wood/concrete.

The slab must be properly sloped and follow the various levels and thresholds: follow the height of the steps in the staircases between floors and between terraces. The concrete or mortar must be reinforced with steel mesh or fibers and can be improved with additives, resins, water retentive agents, damp-proof or surfacing products.

4. protection of the acroters by laying mechanical surface clinging aggregates and resins, and a fiber reinforced rendering on the low walls and crenellations. This will be satisfactory as it will confer a traditional aspect and be efficient from a technical point of view.

Metal head guards shouldn’t be used as sealing joints as they are not appropriate on old heritage. They aren’t efficient on non-rectilinear surfaces and are most unattractive.

The waterproofing of terraces should be finished in the same manner as the floors of the dwelling storeys in the building – see data sheets: B.2 Preparatory Layers, B.3 Smoothed rendering finishing, B.5 Stucco rendering and A.8 Surfacing mixed floors, wood/concrete.

CAUTION!

The roofings of Al Balad actually make up a network of terraces: the finished network of levels must be sloped towards one or more drains.

The leveling survey must be accurate and flawless; it should be drawn out and carried out by skilled technicians (geometrician, surveyor...). The finished roofing surface should be the smoothed slab (asphalt, waxed concrete...), not the membrane.

Each type of membrane can be laid differently, depending on the type of product – read and follow instructions and user’s manuals carefully.

The waterproofing must be raised at least 15 cm above the sides of the finished floor. Gluing the watertight membrane is possible, it will be much lighter, but the visual aspect would differ from traditional models: the finished layer, here again, should be the rendering and not the bare membrane.

REPAIRING A ROOF TERRACE follows the same principles as a connected floor:

1. REINFORCED CONCRETE SLAB CONNECTED TO THE WOODEN BEAMS, SLOPED AT LEAST 1% FOR DRAINAGE.
2. VAPOUR BARRIER.
3. INSULATION.
4. WATERPROOFING, EITHER WITH A TRADITIONAL MULTI-LAYER, OR ASPHALT, OR DOUBLE-LAYERED ELASTOMER BITUMEN, OR STANDARD PVC MEMBRANE.
5. HEAVY PROTECTION (LIME CONCRETE, SEALED FLOORING, SLABS ON STUDS... ETC).
6. MESH WITH RENDERING, LAID ON THE WATERPROOFING, WITH GOOD MECHANICAL CLING.
7. ELASTOMER JOINT BETWEEN THE HEAVY PROTECTION AND RENDERING.
The practical rehabilitation of the buildings in Al Balad consists in assembling elements, in using mortars, filling voids and holes with liquid or paste materials, creating connections with concrete and steel, coating and painting surfaces.

Choosing the materials

The consistency of mortars and pastes is plastic during implementation: they are used to assemble elements and cover surfaces; they contain mineral binders (like lime or cement), water for plasticity, and aggregates to give body to the materials.

**WATER**

Water is what makes mineral binders cure and harden. Whether used in the composition of hydraulic materials or in the carbonation process, water is essential for binders to be efficient. Too much, too little, or a loss of water will affect the resistance of both lime and cement.

The following guiding principles help prevent water-related issues:

- dampening the support before applying mortars, grout, rendering, lime wash paint,
- choosing the best season and time of day, when temperatures are as low as possible, specifically for outside works,
- protecting the works under way from sun-light, wind and any factor that would hasten drying.

**BINDERS**

The characteristic of lime, after setting, is a relatively low level resistance – giving it a certain degree of flexibility – and porosity generated by the carbonation process. The characteristic of cement, after setting, is a high level of resistance – giving it rigidity – and little porosity, short of carbonation.

All mineral binders, clay, lime and cement, reduce in volume (shrinkage) while curing and settling. Mineral binders have no adherence power, they do not stick, contrarily to organic binders.

Binders set more or less quickly.

Consequently, the characteristics of binders have an impact on:

- The choice of binders: Mangabi stone masonries are supple and can contain water vapor; the binders used for repairing should be hydrated lime. Structural reinforcement, where compression and tensile strength are sought, should be carried out with cement. Air lime is best for limewash paint, stucco and sgraffito techniques, due to slower setting.

The ratio of binding material

The binding material fills the voids between the aggregates. The more binding material there is, the better the grains of the aggregates will hold. Therefore, the greater the shrinkage, the higher the cost price.

Mechanical clinging:

The first layer on the support holds the wall and guarantees mechanical clinging: the dose ratio in binding material is necessarily high.
■ AGGREGATES
The aggregates give body, volume and resistance. The grading can vary according to use.
The size of the aggregate makes it more or less inert or reactive.
The finest elements have a high specific surface, increasing shrinkage and brittleness.
The choices made by the builders and restorers are based on these characteristics.
Inert aggregates should be preferred. Mixed aggregates should be washed when they contain too much filler.
Payments are very fine elements and should be limited in mortar (3% maximum of the weight of binding material) to avoid excessive shrinkage and brittleness, as well as in limewash paint to limit chalking.
For lime renderings and stucco, the grading of the aggregate should be chosen according to the function of the layer and to the type of finishing sought.

Methodology
To manage a rehabilitation project and site in best conditions, one should know the characteristics of materials and implementation, as well as understand the pathologies linked to materials and implementation.
Methodology limits mistakes, saves material and time, and improves on-site working conditions.
An operational rehabilitation should list and check the following:

- Accessibility and safety
  Good scaffolding and protections ensure accessibility to the whole construction site.

- Climatic conditions
  Seek the lowest temperatures possible; protect works from wind and sun light; work in the shade, according to the position of the sun.

- Supplies
  Organizing and localizing a storage place saves time and handling.
  Storage feet from a need for deliveries.
  Materials are protected against pollution.

- Supports
  Support should be free of dust for good mechanical clinging; dampened before each layer for the binders to harden.

- Preparation
  Formulas take into account weight/volume ratios.
  Formulas are adapted to the building site and of conditions of implementation.
  Binders and aggregates should be chosen according to use, function, mass, finishing...
  Formulation using weight and even more often volume measurements.

- Man power
  Make up teams with the right number of people, according to difficulty, volume of work and workability.

- Implementation
  According to conditions and type of work, always adapt means to fulfill objectives, ease work and optimize results.
  Adapt teams to the type of implementation.
  Wait for the right amount of time between layers of renderings.

 Chronology

■ SHORING AND DEMOLITION
  See data sheet AD : Methodology for floor shoring and demolition.

■ IMPLEMENTATION
  See data sheet « Surfacing »
  All the sheets were organized the same way: see sections on implementation and follow instructions.
B.1 Making lime paste

DESCRIPTION OF THE CONSTRUCTION ELEMENT

White lime is the binding material for the mortars used in traditional masonry; and lime paste is the binding material for the lime washes of the old buildings of Al Balad, in Jeddah.

White lime binds the particles of the aggregates and the pigments; without the binding material, the aggregates would be a thick mass of non-cohesive material.

It is used to stabilize earthen materials, to render and coat stone and earth masonry, to paint or wash earthen constructions, stones and renderings, inside and outside.

White lime is manufactured from quick lime, which is obtained by firing lime stones at 800-900°C. The quick lime obtained, once hydrated, becomes (according to the nature of the fired limestone):
- air lime, air hardening lime (fat lime). It is found in powder or paste, made from pure lime stones. Air lime is used for the limewash paints of the masonry in Jeddah. It is a fresco technique. It’s recommended for the realization of the sgraffito façades of Al Balad,
- lime hardening in water and air (natural hydraulic lime), in powder or paste form, which must be used quickly. Used for the floorings and joints of the masonry of Al Balad.

DESCRIPTION AND CAUSES OF POSSIBLE PROBLEMS AND PATHOLOGIES

The conservation of old constructions requires regular maintenance. Buildings undergo thermal shocks, salt aggression through ground water, deterioration due to plants, water, etc.

White lime is necessary for the maintenance and repairing of:
- stone masonry (wall courses, hewn stone, rough stone), terracotta brick,
- certain types of terrace morting and copulas, rendered and painted with lime,
- facing rendering, outside and inside,
- limewash paint on stone and earth masonry, on renderings,
- paved floors, slabs.

Lime paste is essential for fresco techniques, as well as to disinfect dwellings and cisterns. Traditional lime paste vanished with the widespread use of cement and artificial lime, in the past century. Lime paste, however, offers many advantages: on the one hand, this binding material has better qualities than air lime powder – it is plastic, simple to use, gives mortars and paint good clinging; in addition, it keeps well in water, makes no dust and cannot be inhaled, which makes it healthier for the worker.

LEVEL OF SKILL AND PROFICIENCY 1 TO 4 : 1-2
B.1 Surfacing

Special comments:

- Lime paste has a very basic pH: it is harmful for both eyes and skin. In the event of splashing in the eyes, rinse eyes thoroughly with clean water and consult an eye doctor.
- The water covering the lime paste contains dissolved lime that can cause skin burns. Always pour lime into water, never pour water onto lime (product must always be covered with water and keeps indefinitely (likewise lime can cause skin burns.
- Quicklime stones look like the lime stones used, but are whiter and lighter. It is preferable to use quicklime stones that do not disaggregate.
- Quicklime expands quickly when in contact with water and becomes very hot (water can boil), it transforms into paste. Never pour water onto lime, pour lime into water.
- Lime paste soaks in water, the longer and better it becomes. Soak at least 4 days, blend the paste with a rake or a shovel. It takes two months to eliminate all the lumps in the mixture.
- After cooling, it is necessary to sieve the paste and remove impurities (unfired or burnt pieces of limestone, elements other than limestone). This operation can be carried out in a hole in the ground, a stone basin, a cistern, metal barrels, etc.
- Quicklime expands quickly when in contact with water and becomes very hot (water can boil). It transforms into paste. Approximate dose ratio: 3 liters of water for 1 kg of quicklime.
- Lime paste is very basic and improves the quality of powder air lime by soaking it several weeks before use.
- When painting with lime, improve the quality of the lime paste by adding linseed oil and alum salt into the hydrated lime. (Dose ratio for 50 kg of quicklime: 3 liters of linseed oil and 5 kg of Alum salt).
- Rough surface to guarantee a mechanical cling of the layer of finishing.
- Use a trowel or a wooden tool for the surfacing.

B.2 Preparatory Layers

Presentation

- DESCRIPTION OF THE CONSTRUCTION ELEMENT
  - Under-layer of the finishing: Two coats: the base coat and the rendering layer
  - The oldest, most common technique, carried out on the masonry of every building
  - Mortar of lime and sand, as well as other aggregates such as gravel, rubble, fibers.
  - Apply in one or two successive layers: the first roughmaking makes the rendering cling, the second is the pre-finishing layer: it makes the rendering flat and compatible with the layer of finishing.
  - Rough surface to guarantee a mechanical cling of the layer of finishing.
  - Use a trowel or a wooden tool for the surfacing.

The strong dose ratio of the binding material of the preparatory layer makes the rendering cling; the thickness of the layer of mortar varies according to the stone support. The resulting rendering must be relatively flat.

- GENERAL ASPECT, COMMENTS
  - The one or two layers of mortar are applied on the inside and outside walls of all buildings.
  - Essential for a traditional finishing, they tend to disappear with the use of industrial ready-made mortars, which are used on present-day masonry. The latter are double-layers, applied fresh one on the other, making up a mono mass layer.

- ENVIRONMENT AND USE
  - The preparatory layers constitute the support for the renderings, finishing and decorative layers: they are found everywhere in Al Balad, semi-detached houses (duplex houses) or standalone buildings.

Type of building and use

Preparatory layers exist on all buildings, whether religious (mosques), military, or civilian (palaces). They are made to protect and decorate. They are therefore used in all the houses of the vernacular architectural heritage of Al Balad.

These layers are covered with finishing on the main facades, as well as on the secondary facades and on the interior facings of the buildings.

Type of facing

The preparatory layers are applied on all the facings of every masonry: bonded stone walls, made with Mangabi stone.

There are two exceptions:
  - Wooden tie elements were rendered or limewashed until the 20th century. This has been given up since.
  - The surfaces of fine stones, used for the framings of porches and other carved elements. They are too smooth to hold mortar: their surfaces are protected and decorated with limewash paint, which resemble the smooth surfaces of finished renderings.

- PERIOD OF EMERGENCE, PERIOD OF USE
  - It is difficult to date the emergence of preparatory layers exactly: they were probably introduced at the same time as the layers of protection in Al Balad. Trowel-smoothed rendering has existed for centuries, even thousands of years in some areas; preparatory layers were probably developed simultaneously. They will be used as a long as masons want to make smooth and flat renderings on the whole masonry of a building.
B.2 SURFACING

ASPECT - TEXTURE, COLOURING, DAMPING

Because of their role, preparatory layers must be roughly flat, even if it isn't vertical and even. This surface must be of a rough texture for a good mechanical link between the following layer. It can be smoothed up and vary in texture without any consequence on the overall flatness, as it will be covered with the layer of finishing. You can obtain texture through various surfacing techniques and different sand grading.

The colour of these layers can vary according to the sand used. When the mortar is hard and dry after application, the colour of the surface corresponds to the colour of the mixture of sand and lime used. The colour of preparatory layers is of no importance because they will be covered with finishing - and moreover white limewash or pigment coloured wash.

Although the texture in finishing and colouring are irrelevant, damping these preparations is essential for a good aspect of the facings.

Two cases:
- If the finished rendering covers the whole surface or when it is applied on embossed mouldings and profiles (rendering or stone), damping is irrelevant.
- When the finished rendering must trash frames or openings (entrance door), the preparatory layers mustn't outcrop on the masonry.

The preparatory surface must have 4 to 5 mm less outcrop than the finished surface.

Note : There is no associated finishing in Air drafted, the preparatory layers are entirely covered.

Construction principle

MATERIALS

Binders

Originally, the binders used were quicklime, produced locally and hydrated by moisture. Thin air lime and hydraulic lime, from which to greywash, for mortars, and fat air lime pastes for limewash and paint.

Natural hydraulic limes are found in powder or paste form and must be used quickly (approximately one day).

Natural hydraulic limes are found in powder or paste form and must be used quickly (approximately one day).

Today, the recommended binders for preparatory layers are natural hydraulic lime powders (NHL or NHL-Z).

Air hardening lime powders (European denomination CL or CI) are the worst binding materials. When using air lime powder (CL or CI), improve the binding material by hydrating before use. Lime pastes produce better results than air lime pastes, but is not adapted for this use. It is little known, little used and poorly distributed. Hybrid NHL and powder air lime mortars are possible.

Aggregates

Nature and availability:

Original, all kinds of aggregates were used in the mortar of these preparatory layers: local sands of all kinds, not sifted, residues of all kinds (minerals, charcoal, ashes and rubble). Dusty sands, close to the nature of earth, produced poor quality renderings (thiggle and crackled).

Today, the aggregates used for the preparatory layers are graded sands, found on the market, sold by manufacturers. These sands are often round fossil or alluvial aggregates. Crushed sands are also more and more common. Whatever the kind of aggregate used, it does not have a real impact on the result of the preparatory layers.

Grading:

Traditionally, masons had to manage with local sands and do with their characteristics. They used un-sieved sand because the larger grading improved the solidity of the mortar and sieving was an extra chore. Earthy sands, however, contained a lot of fine materials, making the rendering fragile and brittle.

Today, the grading of aggregates varies from 0-3 to 0-5 mm. Sands are graded : mixing is therefore useless.

Dose ratio of the preparatory layers

Originally, to make the rendering cling onto the wall, the mortar was rich in aggregates. Generally, the reported dose ratio was 2 volumes of aggregates for 1 volume of lime.

Today, the dose ratio are:
- For roughcasting : 5 volumes of natural hydraulic lime (NHL or NHL-Z) for 10 volumes of dry aggregates or 7 volumes of powder air lime (CN or DL) for 10 volumes of dry aggregates or 3 to 3,5 volumes of air lime paste for 10 volumes of dry aggregates,
- For the second preparatory layer : 4 volumes of natural hydraulic lime (NHL or NHL-Z) for 10 volumes of dry aggregates or 5 volumes of air lime paste (CN or DL) for 10 volumes of dry aggregates, or approximately 2,5 volumes of air lime paste for 10 volumes of dry aggregates.

TOOLs

Initially, mortars were mixed : with a shovel for lime powder ; with a kind of rakes for this kind of mixture sand and lime paste.

A wooden float and a trowel were used to apply and project the mortar. The surface was scraped with a wooden hawk.

Today, mortars are mixed with a concrete-mixer, sometimes with a horizontal mixer for lime paste.

For a single preparatory layer:

The dose ratio of the mortar can vary from a roughcasting type to a finishing. A high roughcasting dose ratio improves clinging but causes significant cracking ; conversely, a finishing type dose ratio limits cracking but does not cling very well. From 4 to 5 volumes of natural hydraulic lime for 10 volumes of aggregates, from 0-3 to 0-5 mm. For the roughcasting, the water dose ratio is key. The mortar must be fluid enough for good adherence and project into a thin layer over a large area.

For the finishing layer, however, the mortar should not be too fluid on a thick layer can be applied. The finishing layer is applied according to the flatness of the support layer. The mason will adjust the fluidity of the mortar according to the thickness of the layer he seeks.

The workability time span of the mortar is related to the kind of binding material used : 12 hours maximum for natural hydraulic lime, several days, protected against air and wind, for lime air.

Application:

Roughcasting - the mortar is projected with a trowel, in broad strokes, to cover the wall surface with thin layers (approximately 5 mm). After projection and when drying starts, you should surface the facing rendering with a wooden hawk to remove lumps. This operation helps reduce the thickness of the following layer. Projection can be carried out using an air powered compressor or a mechanical rendograph (hydraulic).

Finishing - the mortar is projected with a trowel or powered plastering machine (rendograph), first on the hollowest parts, then on the whole surface, to obtain a relative flat result. Thickness can vary. Though regulations often recommend 10 mm maximum, this can be insufficient on certain old buildings - the rendering might outcrop from framing stones.Promoting elements can have aesthetical shortcomings. The surface of the finishing must be corrected after projection. The best solution consists in leveling the surface with a wooden hawk when the rendering begins to harden - this guarantees a good mechanical cling (with a scraped apron). It is however not recommended to flatten the rendering and scrape with the edge of a trowel afterwards (too late when dry), the apron may turn too smooth and prevent layer of rendering from clinging properly. The mortar scraped off with a hawk can generally be mixed into fresh mortar - correct the flatness of the mortar with water.

Roughcast and finish in a single layer : the mortar is projected manually or with a powered plastering machine, smoothed with a hawk, leaning against protruding stones.

Between moughcast and finishing layer, wait until shrinkage has started:
- 2 days with NHL or NHL-Z.
- 1 week with air lime (powder or paste).

After applying the preparatory rendering (sometimes in a single coat), wait before applying the finishing layer, for the same reasons:
- 7 days with NHL or NHL-Z.
- 1 to several weeks for lime (according to the thickness, level of moisture of the support).

Checking:

After hardening, the mortar must be solid and neither flake nor crumble. The surface must be homogeneous and gray.

For single coat applications, cracking is invariable. For large surfaces and when climatic conditions are poor, touch up the rendering where necessary.

Pathologies

IMPLEMENTATION PATHOLOGIES

Cracking:

The surface of the rendering is cracked in a + (onweb + pattern) : thread-like cracks which increase the penetration of water in

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Evolution

**TECHNICAL ASPECTS**

The main evolution is using ready-made industrial mortars, almost always projected with a plastering machine or rendergun. The mortars are fine and must be scraped with a wooden hawk to be grainy enough. They can also be scraped with a notched aluminum hawk, similar to tiling paddles. The notches in the rendering improve the mechanical cling.

The evolution keeps projection techniques, though more mechanized with the plastering machine and rendergun.

Another extremely harmful evolution is that masons have forgotten or lost the concept of mechanical cling (read paragraph on ageing pathology linked to technique). In the same spirit, scraping and rejointing have replaced rendering techniques, due to a disastrous fashion of bare and visible materials.

The preparatory layers can crumble off the masonry. A partial correction is then necessary. After pruning and cleaning the damaged rendering, fill the missing parts or purge with mortar, in the same conditions as the existing surface. Use a mortar strongly dosed in binding material with heavily graded sand to improve the mechanical cling of the finishing layer.

Professionals can also inject grout to reconnect the rendering to the support. Ready-made industrial grout is easier to carry out than home-made grout.

The new mortar will be clearer than the old rendering, but this doesn’t matter, as the mortar will be covered with the layer of finishing and painted with lime.

**Maintenance**

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**Causes:**
- too much binding material
- too much filler in the mortar
- mortar too liquid at the time of application
- desiccation too quick
- support not damp enough, too much sun, or wind
- areas where layer is too thick

**Preparatory layers crackle because of a wrong dose ratio in binding material.**

**Shadowing, ghost marks:**
- Joints of stones or bricks appear in the rendering.

**Crumbling, screening, chalking:**
- Disintegration of the rendering.

**Surface connection:**
- Irrelevant: the preparatory layers are covered with a layer of finishing.

**Unsuitable surfacing of the preparatory layers and delamination of the layer of finishing**

A bad surfacing of fresh mortar can cause a delamination of the layer of finishing: this unfortunately often happens nowadays when flowing the preparatory layers and scraping them with the edge of the trowel. The surface of the rendering is too smooth and cannot hold the layer of finishing. This mortar implementation pathology is worsened when using cement or artificial hydraulic lime (NL).

**Solutions:**
- Scrape off the preparatory layers and redo.

**Surface connection:**
- Irrelevant: the preparatory layers are covered with a layer of finishing.

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**Solutions:**
- Scrape off the preparatory layers and redo.

**Surface connection:**
- Irrelevant: the preparatory layers are covered with a layer of finishing.
B.3 Smoothed rendering finishing

Presentation

DEFINITION
- Layer of protection and insulation, but also finishing layer.
- The most common process, certainly the oldest for all categories of buildings.
- Mixture of lime and fine sand, but also of other aggregates such as gravel, broken tile, ashes, animal fibers.
- Application: one layer on the preparatory layer.
- Trowel used for smoothing and finishing.
- Variable aspect of the surface according to process of finishing: smooth according to the movements of the masonry.

PRESENTATION, COMMENTS
Smoothed rendering is used inside and outside buildings. Limewash paint is easily carried out with hydrated white lime. This technique disappeared with the emergence of cement. (see: evolution of technologies - characteristic elements of the old buildings of Al Balad)

ENVIRONMENT AND USE
Trowel smoothed finishing is found everywhere: in urban and rural environments, on grouped or isolated housing. Used on all types of architecture (civilian, military and religious), on dwellings, mainly on primary and secondary facades.
However, renovating campaigns, maintenance, and the negative trend of bare/visible materials and striping have altered the characteristics and clearness of this technique.

Trowel smoothed renderings cover the whole surface of the facing. They are often non-projecting, continuous with the stones of the framings and openings: they never outcrop. They can also come against mouldings and profiles.
These renderings used to be maintained regularly with whitewash. This technique of maintenance, according to the type of facing and period in time, made it possible to apply colours and make decorations, which is a more recent trend.

On the main facades of Al Balad, the finishing is richer: smoothed renderings are often engraved with geometrical patterns, using the sgraffito technique.
B.3 SURFACING

**HISTORICAL EMERGENCE, PERIOD OF USE**

Smoothed rendering is linked to the technique of rendering mortar made with hydrated white lime, producing flexible and fat paste, slow hardening, best adapted to this type of surfacing.

Trowel smoothed finishing has existed for as far back as antiquity; it has been used until the 20th century, then was gradually replaced with • sprayed • sand and • floated finishing. The latter is based on faster hardening and thinner mortars, using cements and derivates.

**ASPECT – TEXTURE, COLOURING**

The surface of trowel smoothed renderings is in harmony with the masonry they cover. Walls are more or less flat according to the stone surface: it can be vertical or not, surfaced or not. The surface is patterned by the strokes of the trowel; undulation marking varies according to the skill and style of the mason; and direction of the smoothing can differ from one facing to another.

The texture of the surface is smooth, without bumps; it can bear slight defects: tool marks, lack of material in certain cases. The texture of the surface is also related to the grading of the sand used: the finer the sand, the smoother the texture. Fat pastes make implementation easier than raw sands.

On old facings, the thickness of the layers can vary: some are very thick, in multiple layers, other times very thin.

**Profiles, made with rendering or ashlar, which can be painted**

In Al Balad, some engraved geometrical ornamentation is based on faster hardening and thinner mortars, using cements and derivatives.

**Lime paste gives mortars the best plasticity for this type of finishing.**

**Note: do not use artificial hydraulic lime and cement on the old construction. They lack porosity and are too hard.**

**Aggregates**

**Nature and availability:**

Originally, the aggregates used were the sands found locally. The sand was rolled, not crushed. Builders recovered every available mineral residue. The geological nature of local sands corresponds to the geological nature of the rocks of the upraised basins of stratum. The colour of these sands are those of rocks. But colour is irrelevant as the renderings were always maintained and whitewashed.

**Today, the aggregates used for smoothed lime renderings are ready-calibrated fine sands found on the market.**

Rolled sands are more regular in shape and are harder to carry out. They are more appropriate than crushed angular sand which is more difficult and longer to carry out.

**Grading:**

Originally, the aggregates extracted by the masons had to be graded as sieved before use for thin smoothed finishing.

For smoothed renderings, the grading of the aggregates vary from 0-2 mm.

**Industrial sand is already sieved. For this type of rendering, it is recommended to sieve them again down to a grading of 0-2 mm.**

Lime paste is the best tool to mix lime renderings. Concrete-mixers are generally used to mix mortars.

**Construction principle**

**MATERIALS**

**Binders**

Originally, the binder used for trowel smoothed mortars was hydrated lime, made by the mason with quick lime fixed by local lime-burners. According to the limestone, and when it was pure, one obtained air lime paste; when it contained a lot of clay, one obtained this lime paste, which had to be used to avoid cracking. The lime dose ratio must be lower than the base rendering layers.

**Today, the reported dose ratios for smooth renderings with lime is 200 to 250 kg of binding material for 1 m³ of dry sand, preferentially:**

- approximately 2.5 volumes of air lime paste for 10 volumes of dry aggregates
- 3 volumes of natural hydraulic lime for 10 volumes of dry aggregates
- 4 volumes of air lime powder (CII or CIII) for 10 volumes of dry aggregates

**TOOLS**

Originally, tools were used to apply or project mortars, as well as to smooth rendering. Shovels and various kinds of trowels were used to mix mortars.

Today, lime rendering is applied and smoothed with a trowel, preferably flexible. The use of larger stainless tools improves the quality of the rendering, without tool marks - smoothing machine, Swiss float (stainless). The other tools are mixing boxes, floats and mixing tools for mortars. The horizontal mixer is the best tool to mix lime pastes. Concrete-mixers are generally used to mix mortars.

**DESCRIPTION OF IMPLEMENTATION**

**Conditions and preparation**

**Climatic conditions**

Most recommendations, between 50 and 30°C (70° to 93°F) is ideal. Protection against dehydration - wind, sun - weak in the shady. Protection against rain for three days when using air lime (very rare run).

**Implementation process**

Smoothed rendering is applied to preparatory coats: base rendering and rendering - see data sheet 02 Preparatory layers:

- The first coat consists in covering the support carefully. It must be free of dust and any trace of organic materials or other materials (soot, salt, lime, plaster...). Before carrying out the rendering, soak and saturate the support. The purpose is to prevent the support from absorbing the water contained in the mortar, as this would prevent or reduce the hardening or carbonization of the rendering.

**One day before implementation, soak the support (masons) must obviously take into account the nature of the support and climatic conditions.**

It is often necessary to dampen the support again in the morning, before carrying out the work.

**Formulation**

The rendering should not contain too much binding material to avoid cracking. The lime dose ratio must be lower than the base rendering layers.

The dose ratio is 200/250 kg of lime powder for 1 m³ of dry lime paste, grading 0-2 mm.

- Air lime paste is the binding material for trowel smoothed finishing.

Sand must be fine and un-sieved.

Mortars is carried out manually or with a concrete-mixer. When using lime paste, a horizontal mixer is more effective. The water dose ratio is determined by the mason; the fluidity of the mortar must make application easy, particularly to regulate the thickness of the layers.

**Application**

The mortar must be liquid enough for a good application, and it must cling onto the support. The finishing should not be too thick, to avoid cracking - 4 to 5 mm.

If the mortar is made with hydraulic lime, project it using the trowel on the dampened base rendering.

The workability of natural hydraulic lime mortar is limited to approximately 24 hours.

**The plasticity of air lime mortar, does not cause projection problems.** Apply with a trowel, in two successive coats, applied fresh. The first coat is thin, tool-tightened; it prepares the wet surface for the second coating, which will have the right thickness. The workability of air lime mortar is unlimited, as long as the mortar is protected from air, under a film of water.

No matter which mortar is used, finishing is obtained in successive smoothing strokes, using a trowel or other tool (smoothing machine or Swiss float – stainless steel float). Smoothing is carried out more or less horizontally.

According to the care of the masons, the surface can bear more or less tool marks; carry out tests. When a team of workers is used, check the homogeneity of the result.

A surface must be carried out and finished without stopping; if not, rendering irregularity will be visible. For seamless surfaces, choose a large enough number of masons. Mortar must be applied from top to bottom.

**Extra Finishing**

The smooth white surfaces of the noble buildings of Al Balad used to always be painted with lime.

In certain rare cases, they were also engraved with a tool and then painted a fresco (masons of red ochre). This type of ornamentation was found outside and inside the buildings of Al Balad.

**Checking**

After hardening, the mortar must be solid and net flake. There should be no cracking (too fine cracks of any sort). Surfaces should be homogeneous.
Pathologies

IMPLEMENTATION PATHOLOGIES

Crackling:
The surface of the rendering is cracked in a “cobweb” pattern: thread-like cracks which increase the penetration of water in walls, accelerating deterioration.

Causes:
- too much binding material - too much filler in the mortar - mortar too liquid at the time of application - desiccation too quick - support not steep enough - too much sun, or wind - excess water.

Solution: if the whole support holds well, apply a layer of whitewash on the surface.

Shadowing, ghost marks:
Joints of stones or bricks appear in the rendering.

Causes:
- rendering is too thin, insufficient thickness of the layer - mortar too thin, too permeable - masonry too recent (mason too fresh and wet).

Solution: thicken the layer of rendering.

Crumbling, screening, chalking:
Disintegration of the rendering.

Causes:
- under-dosed ratio - sand too thin / too much filler / too much pigment - outdated (bad) binding material - evaporation of the water in the mixing too quick - bad hardening of the binding material.

Solution: scrape off the preparatory layers and redo.

Gray marks:
Defects showing on the surface of the rendering.

Causes:
- smoothing was delayed too long and mortar was too dry. Trowel ears off on the aggregates and leaves scrap of metal.

Solution: smoothed renderings are painted with lime.

AGEING PATHOLOGIES

Linked to the material and climatic conditions

The ageing pathologies are the same as for other renderings using the same ingredients.

They are mainly:
- chemical, with a dissolution of the binding material under the effect of water: gradual disintegration of the rendering. Lime washing is the best way to fight against this. It also helps fight against biological attacks (micro-organisms).
- physical, with a delamination of the rendering following swelling and shrinking cycles due to thermal shocks on the facing.

Linked to the technique

There is no ageing pathology linked to the technique. On the contrary, applying the rendering with a trowel creates a finer porosity of the surface of the rendering. This characteristic of smoothed rendering improves the evaporation of moisture and limits water penetration water inside the rendering. The tighter the rendering, the better its characteristics: a typical example is lime stucco.

Maintenance

The maintenance of smoothed rendering consists in limewash painting: dry technique with an application of lime paint or limewash.

Filling the rendering: fill hollowing with fresh mortar, on all or part of the rendering, after having cleared out powdery or delaminated elements.

You can also apply a thin layer of barbotine, or slurry [mixture of pure binding material and water, thick cream-consistency]. The slurry can be replaced with a mixture of binders and fine aggregates (better resistance and lower cost). For this technique, the mason often uses a smoothing machine. Dusting and soaking the wall are essential before applying this layer.

In the rehabilitation of historic buildings, grout can fix delaminated rendering or repair cracks. This technique is often used by restorers.

Evolution

TECHNICAL ASPECTS

In the 20th century, the use of artificial binders for the maintenance of old constructions proved inefficient and ill-adapted. For technical and aesthetical reasons, those in charge of the maintenance of architectural heritage have been trying to improve practices and to recover the right traditional techniques.

However, the current evolution of recommendations and practices show that thin lines are still poorly considered and lime paste almost totally ignored.

Industrial ready-made renderings are sometimes used for the finishing of old constructions. If they are smoothed with a trowel, additives make them glossier. They are tinted and no longer painted with lime.

For smoothed lime renderings, manual mixing is replaced with mechanical mixing, using a concrete-mixer and horizontal mixer. The mortar is still applied by hand but the mortar is spread and not projected. Moreover, for reasons of productivity, large smoothing machines are often used.
B.4 Limewash paint

Presentation

DEFINITION
Limewash paint is the most common finishing for the facings of architectural heritage. The paint is a homogeneous mixture of water and lime which can be coloured with mineral pigments and improved with complementary additives or binders. Applied in one or more layers, using round or flat brushes, it is carried out on mineral surfaces of the earthen or stone masonries, and most frequently on renderings. It protects supports and decorates buildings.

GENERAL PRESENTATION, COMMENTS
Limewashing has been used outside and inside buildings since antiquity, and up till the 20th century. Lime paints play several roles: surface maintenance, a disinfectant and sanitary role, due to a strong basic pH for whitewash (pH=12). The whiteness of the washes reflects light; it regulates the temperature of external facings and has provided lighting for dwellings, when lighting used to be limited.

On exterior walls, when cement became common, lime was no longer considered necessary. On inside walls, in the 20th century, lime rendered and lime painted walls were gradually replaced with plaster work, organic paints and wallpapers.

ENVIRONMENT AND USE

Geographical area
Al Balad is a district where limewash has always been very widespread on the external and interior facings of old buildings. Traces of limewash can be found on every Margibi stone masonry laid with hydrated lime mortar. The aesthetical and visual power of this technique has however been diminished by the wearing of painted decorations, applications of organic paints, and the modern trend for bare / visible materials, leading to scraping and pointing the masonry.

Type of building and use
Limewash paint is applied on all types of buildings: civilian, religious and military architecture, whether the architecture is commissioned, monumental or vernacular. Limewashing is found in mosques, palaces, and all the dwellings of the city.
For a long time, the façades of Al Bālād were pure white: maintenance was carried out with a mineral binding material which was always more or less white. Though natural or oxides mineral pigments, natural or burnt, have been used for centuries, even thousands of years. Few colours have been used on the vernacular housing of Al Bālād. In addition to white, traces of red ochre and black have been found. The black used with lime came from crushed charcoal, bone black and very black. In the 19th century, in Europe, the advent of artificial colours containing metal oxides in yellow, red and green colours stronger: ultramarine blue was invented by Guimet, allowing to paint large surfaces in blue. From that time onwards, limewash could be coloured with pigments, mainly yellow ochre, in addition to whitewash.

Limewash painting has existed since Antiquity. It has only vanished recently, with the massive use of cements which need not be protected. In Jeddah, limewash was abandoned, on new buildings, in the early 20th century, whereas the technique survived on older buildings till the 1950s-60s.

The technique is strongly recommended for the old construction of Al Bālād, for its qualities: both technical (great porosity, durability) and aesthetic (traditional aspect of architectural heritage).

**ASPECT - TEXTURE, COLOURING**

**Surface**

The main characteristic of lime wash is that it is very matt. According to the type of paint applied, the surface can show traces of brush hair: it can be thick or thin and liquid like a wash. Lime can preserve the texture of the support, in the case of a fresco application, be of an aqueous type of whitewash, or even just pigment applied with water (lime Al Bālād).

The quality of the sieving, for limewash after hydration, has even just pigment applied with water (rare in Al Bālād). It is applied indifferently onto stone, rendering, wooden tiles (from the moment they were scraped and visible). The paint stops at wooden doors and mouchachates, on the façades.

**Extra Finishing**

Limewash paint is used on main façades as decoration: the monochromatic facades sometimes bear ornaments, painted at a fresco, with sculpted strips of rendering.

**Support**

The supports of all limewash paints are mineral supports, except for plaster. The plaster, lime and sand renderings are appropriate for this technique.

A good mechanical cling and a significant porosity improve the hardening of the whitewash. Though the outside wooden faces may have been painted with lime, no trace remain: lime can easily wash away or crumble off this type of support.

**Construction principle**

**MATERIALS**

**Binders**

Originally, all lime pasta (Ca(OH)₂) was used when it was possible to paint the constructions of the city: it was obtained from quicklime (CaO), manufactured near Medina and hydrated (CaO + H₂O) in Jeddah. Fused in water, it can keep indefinitely: it is the most plastic of all binders: this makes application easy and remarkably effective.

The inside of farm buildings (stables...) was sometimes dispersed in a little water before use in a whitewash. The former masons of Jeddah worked with thick whitewash. The whitewash techniques and paints are highly recommended for the rehabilitation of Al Bālād because this is the only compatible solution, technically and aesthetically, respecting the physical characteristics and aspect of the old city. The fresco stone, the freshest possible: hydrated quickly in water will produce the best results. (see data sheet B/1 Making lime paste).

Choosing hydrated lime is important. The material is widely available today.

In Western Europe, when hydrated lime was rediscovered in the second half of the 20th century, normalized air lime powder (CEM then C1 or C2) was used due to an ignorance of traditional binders and industrial production standardization, and a poor distribution of pastes. Air lime powder is the weakest of all binders and is absolutely not adapted to the climatic conditions in the Gulf. They should not be used. This mistake must be avoided in Jeddah and throughout Saudi Arabia.

Natural hydraulic lime powder (NHL or NHL-Z) can be used.

Quicklime today is seldom hydrated locally. (It is always burnt in large quantity in Jeddah, Al Bālād.) Quicklime powder was used to make hydrated lime paste, but may be already partially carbonated before hydration. Lime paste offers the best plasticity for liming.

Improve the quality of air lime powder (CL or DL) by soaking in water before use. The longer, the better. However you cannot obtain the quality of manufactured lime paste or quick lime.

Lime NHL or NHL-Z: density approximately 0,9 litre weights 0,9 kg.

Air lime powder: density 0,5 litre weights 0,5 kg.

Air lime paste: vary in density according to fluidity, according to the water content. One litre of lime thick application paste (consistency of butter) is equivalent to 1,5 litres of air lime powder: 0,75 kg of lime, without the weight of water.

Note: artificial hydraulic lime and cements are not recommended on old constructions (lack of porosity and whitewash too hard).

The additives often used nowadays are Alum salt, to improve the carbonation of air hardening lime, artificial minerals from organic chemistry, water retainers: methyl cellulose and various thinners to be used when application conditions are poor: bad weather and to obtain strong colours.

**Aggregates**

**Nature and availability**

In theory, milk of lime does not contain aggregates, except for grime paste elements: unhydrated lime or burnt lime, non-lime biogenic salts, non-hydrated particle (Ca(OH)₂) when quicklime is too fresh.

However, bad sifting for hard sifting can make it look like there are aggregates because small lime grains show on the surface of the whitewash.

When whitewash paint degrades the construction, it is recommended to paint using the fresco technique on non-carbonated rendering or using a dry technique on the other supports (stone, hard rendering, old lime paste) while adding pigments to the whitewash.

Percentages are the equivalent of aggregates in this technique. Always use mineral pigment that can resist the alkalinity of lime. They are natural when extracted from sands and earths. They are artificial when they are manufactured industrially.

Yellow and red ochre come from sands, as well as umber and umbra, which can be for darkening tones.

Bone black or umber is especially used for very fine craftsmanship.

In the 19th century, the first artificial pigments were used metal oxides: yellow and red iron oxide, chromium green, manganese Black, mixed brown and ultramarine blue (Guimet). Until the 20th century, the pigments used in whitewash were seldom combined, although they are compatible.

**Grinding**

Originally, the pigments were crushed on a marble slab for aggregate application. This is the case for fresco techniques.

In the 20th century, the fineness of the pigments was obtained through mechanical crushing: the finer the pigment, the stronger the colouring. On the other hand, smoothness makes dispersion more difficult: this is the case for metal oxides which must be dispersed in a little water before use in a whitewash. Generally found in powder form, sometimes available in suspension form.

**Whitewash dosage**

The former masons of Jeddah worked with thick whitewash. The thinnest of the whitewash, the more resistant the layers. The aspect of surface was matt: rely with brush hairs.

In old European furnaces, Alum salt was added to 10% of the weight of lime, to help carbonise the lime paste. Some local additives may have been used also. Local resources did not identify any.

For the most sophisticated decoration observed, pigments were applied in fresco, mixed only with water, fixed by the lime in the rendering.

**Contemporary practise**

The dose ratio of lime is volume lime [any type of lime] for 1 volume of water.

The dose ratio of a wash is a volume of lime for 2 to 3 volumes of water.

The dose ratio of half-time or tempo is 1 volume of lime for approximately 5 volumes of water.

The dose ratio of lime pastin is 10 to 20 volumes of water. Colour saturation, in the liming technique, corresponds to 10%, of the weight of lime, of artificial pigments, up to 10% of the
**Pathologies**

### IMPLEMENTATION PATHOLOGIES

**Chalking – poor reaction of the whitewash : leaves marks when touched**

- bad conditions of hardening : temperature too high, exposure to sun, too much wind, desiccation too fast.
- support not or insufficiently moistened.
- pigments too concentrated.
- bad additives (lack of resin when high concentration of pigments).
- lime powder stored too long, unusable.
- cold whitewash (very rare risk in Jeddah).
- support incompatible with limewash paint (plaster, not mineral support).

**Dilamination**

- risk of dilamination is increased with thick consistency of whitewash fillings.
- support incompatible with limewash paint (plaster, support not mineral).
- synthetic paint under layer of limewash paint.
- water repellent in the rendering support.
- dilamination from moisture (lime paint is waterproof because of too much resin additives).

**Micro cracking**

- application too thick (nucleation of binding material when hardening).

**Efflorescence**

- rendering and masonry grieved with water before the application of lime wash, followed by a salt migration ; and salt deposit after drying (curing).
- limewash paint in: fresco on thick lime rendering / layer of circular thickness (shewal of humid weather after painting with lime, on masonry and renderings that have been painted).

**Traces of brushes or brush strokes**

- lack of method to the application.
- support too absorbent (not wet enough).
- insufficient number of layers (2 layer minimum).

**Colour nuances**

- support already has nuances (apply a first white layer) ; number of layers insufficient. Fresh whitewash : wet aspect contours transparency.
- bad disposition of pigments when preparing the whitewashing.
- whitewash not mixed enough during application (dose). 

### Bad chromatic reaction

- organic pigments incompatible with lime (lime is a basic liquid that destroys organic matter).

All the solutions are found in data sheets : B2 Preparatory layers & B3 Smoothed rendering finishing.

### AGEING PATHOLOGIES

**Linked to materials and the climatic conditions**

The climatic conditions considerably influence the quality of a whitewash : the better the weather, the more solid the whitewash. Porous supports can be dampened well and offer good mechanical cling, creating good factors for slow ageing. Applied on rendering, stone or earth, limewash paint tends to wear off with a dissolution of the lime, with the acidity of rainwater, and crystallization of soluble salts. Concentrated resins (naphs...) make limewash paint tight, hampering the transfer of water vapor (absence of porosity and permeability can cause delamination or peeling). Excessive dose rates of organic binders are likely to cause this pathology. Casein gets yellow and doesn’t resist ultraviolet rays.

**Linked to the technique**

When applied in thick layers, liming can crackle (shrinkage of the mineral binder during hardening) and tend to delaminate. In the fresco technique, pigments applied on the late side do not hold onto the support ; this generates chalking. The fresco technique offers the best conditions for whitewash hardening. Overground pigment generates chalking and a fast wearing of the whitewash.

### Maintenance

Limewash paint isn’t maintained : it must be carried out using a dry technique. Carry out as described above. When there are too many layers, the main risk is delamination. Scrape off all layers using a paddle, dust, dampen support and paint.

### Evolution

**Technical aspects**

Lime is no longer known or used in Jeddah today. In Europe, lime paste is little known, contrary to air lime powder. Limewash paint is often replaced with industrial products containing air lime, but with a lot of additives : that creates problems of porosity, the color is less neat, color is too uniform. These solutions must be avoided.
When conditions are bad (cement support, wall frequently exposed to bad weather, support is not porous... all seldom the case for the old buildings of Al Balad) use NHL. However, the basic color cannot be white. Workability is limited to 12 hours.

Synthetic resins replace traditional organic binders (gum, resins, fat hydration body, animal glue, etc...) though casein is more common today, in spite of its disadvantages.

The main positive evolution could be powered projection (rendering machines, renderguns). It is possible to save time while only slightly decreasing the quality. But the sedimentation of whitewash and the mineral load of lime make mechanized projection impossible for the time being.

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**B.5 Stucco rendering**

**Presentation**

- **DEFINITION**
  - From the Italian word « Stucco », which defines the many recipes for smooth rendering, using mineral binders and different types of white lime, plaster, and organic binders (animal glue, egg...) and fine aggregates.
  - Very smooth and resistant finishing.
  - Surface is often white, very smooth, obtained by compacting the material, on a very flat rendered facing.

- **GENERAL PRESENTATION, COMMENTS**
  - This technique replaces limewash paint. The mechanical quality of stucco resists pollution, the surface is easier to maintain and to clean.

- **ENVIRONMENT AND USE**
  - In Al Balad, stucco is found:
    - on lime renderings,
    - on trowel smoothed lime slabs, floors, inside buildings.
  - Its complexity and time of implementation make it expensive, it is usually reserved for decorative purposes or for particular technical uses like waterproofing (lining of cisterns) or when seeking solidity and resistance (floors and slabs).

- **PERIOD OF EMERGENCE, USE**
  - Stucco renderings are found on all the floors above ground level in the buildings of Al Balad ; it has probably been developed alongside other traditional stone masonry techniques.
  - Use was interrupted in 20th century, when lime and traditional techniques were abandoned.

- **ASPECT - TEXTURE - COLOUR**
  - **Surface**
    - Stucco rendering removes any relief or texture from the support. It is completely smooth, according to the flatness of the support (trowel smoothed rendering). This surface of stucco can remain bare.
  - **Texture - Colouring**
    - The surface is very smooth and soft when touched : it displays few imperfections. Aggregates are invisible because they are coated with the binding material. Surfaces are mostly white, colored by the lime.
  - **Type of masonry**
    - Stucco renderings are applied on many types of support. Vertical supports : stone masonry rendering ; horizontal supports : floor slab of hard-packed earth, protected with tight lime mortar.
  - **Damping**
    - Surface covers the whole vertical facing, up to door frames or stopping at a horizontal line (lining). Surface covers the whole floor, stopping at the connection of horizontal and vertical facings. The layer is thin : 1 mm.
  - **Associated finishing**
    - Stucco rendering can be engraved with metal to create geometrical patterns. Engravings are fine (2 to 3 mm).
MATERIALS

Binders

Traditionally, and till the emergence of cement, this technique was always implemented with hydrated lime paste. Today, for stucco renderings, according to use and to the support, it is recommended to use air lime paste to finish walls and natural hydraulic limes, or an equivalent, for floors and slabs.

Industrial air lime paste, sold or hydrated by local craftsmen containing quick lime stones, is the best binding material: it is plastic when applied and resistant after carbonation, for vertical walls. It improves the quality of air lime powder (CL), when soaked in water (as long as possible). However, it isn’t resistant enough for floors, for today’s standards.

It’s possible to use natural hydraulic limes (NHL or NHL-2) on vertical walls, but application is complicated. Conversely, for floors, natural hydraulic lime offers better stability.

Aggregates

Natural or artificial pigments are essential for the quality of stucco mortars: it eases implementation and increases resistance. Additives are particularly interesting for floors (slabs) where mechanical characteristics are essential for use and durability.

Today, the grading of the aggregates used for stucco rendering is under than 1 mm. The size of the aggregate used will impact the thickness of the stucco.

Grading approximately 0-0,35 mm to D-0,7 mm are perfect for thin layer rendering. Adding fine or very fine aggregates, like talcum powder, is possible, more modern, technique.

Dose ratio

Previously, traditional stucco was carried out with lime paste, very often without aggregates. Applied in relatively thick layers (approximately 1 mm), micro cracking was inevitable. But there was also stucco with aggregates.

The dose ratio varies: 1 volume of aggregates for 4 to 5 volumes of lime. The range of the dose ratio varies: it is related to the thickness of the layer, the grading of the aggregates, the tools and the time of application.

Adding aggregates and/or fibers improves the resistance of stucco. Moreover, adding aggregates decreases the shrinkage, the micro cracking. The thicker the layer of stucco, the stronger the dose ratio and the higher the grading of the aggregates.

When mass colouring, the maximum dose ratio in pigments are:

- for earths and earths: 20% of the weight of the binding material, in pigments;
- for cinder: 10% of the weight of the binding material.

Density: 1 liter of well settled lime paste is equivalent to approximately 0,79 kg of dry mortar, without water. 1 liter of lime NHL is equivalent to 0,6 kg. 1 liter of lime CL is equivalent to 0,5 kg.

TOOLS

We do not have specific information on which tools were used originally, for the application of stucco in Jeddah: probably timbers or the like, as well as hard polished stones, as was practiced in other regions, in equivalent techniques.

Today, stucco mortar is mixed with a mixer. A trowel is useful to put the mortar onto the float or the rendering trowel.

Tools are used to apply stucco: smoothing machines, or PVC, iron or stainless steel floats. Metal produces smoother surfaces than PVC, but it can leave grey marks when applied on dry mortar.

The most smoothing machine is the most typical tool: it must be well maintained, smooth and lubricated against corrosion and rust, to avoid leaving marks on the rendering.

The larger the smoothing machine, the better the « surfacing ».

The smaller the smoothing machine, the smoother the stucco.

DESCRIPTION OF IMPLEMENTATION

Conditions and preparation

Climatic conditions

ILD temperature, ranging from 5 to 30°C (10 to 20°C is ideal) for the whole period of implementation and hardening of the layers.

Protection against dehydration: wind, sunlight.

Constructions Principle

Micro cracking:

The surface of the rendering is cracked in a « cobweb » pattern: thread-like cracks that accelerate the ageing.

Causes: layer too thick, due to an overabundant binding material: aggregates too fine (clay, talcum powder), air voids cracking.

Quick dehydration accelerates micro cracking.

Solutions: reduce.

Crumbling, chalking:

Causes: Quick evaporation of mixing water, support not wet enough, unsuitable climatic conditions, too many fillers for pigment, mix of dry powder. Solutions: to tighten the rendering and limit cracking; this also makes it possible to rub the surface to a shine.

Crumbling, chalking: these techniques are difficult and demand training and experience: understanding the technique is not enough to master application.

Checking

The surface must be uniformly smooth, both to the eye and hand.

It should be homogeneous, without gaps, nor traces of patched rendering. There should be no cracking or micro cracking. The rendering should not flake nor crumble. It must stick onto the support. Mixing the paste too fast is likely to make air bubbles in the mortar, generating delamination. Mix properly and slowly.

Pathologies

IMPLEMENTATION PATHOLOGIES

Micro cracking:

The surface of the rendering is cracked in a « cobweb » pattern: thread-like cracks that accelerate the ageing.

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Crumbling, chalking: these techniques are difficult and demand training and experience: understanding the technique is not enough to master application.

Blistering: delamination of the stucco layer

Causes: Support too smooth and too damp, air bubbles in the paste can lead to blistering the stucco.

Solutions: to remove material, dust and dampness, redo the stucco.

Blistering: delamination of the stucco layer

Causes: Support too smooth and too damp, air bubbles in the paste can lead to blistering the stucco.

Solutions: to remove material, dust and dampness, redo the stucco.
Delamination:
Causes: The application of fine mortars on hard surfaces is very chancy: strong risk of delamination.
Solutions: Mortars for mineral surfaces must contain organic binders. Use industrial products.

AGEING PATHOLOGIES
Linked to the materials and climatic conditions
Stucco is extremely resistant. Inside buildings, they are little affected by problems linked to moisture.
Moisture and leakage is generated by a lack of maintenance of the terraces, gutters and downpipes, or by air-conditioning systems. Water damage destroys stucco and lime rendering.

Linked to the technique
It is an excellent technique, superior to other lime techniques, like renderings and limewash paint.

Maintenance
Maintenance is difficult but seldom necessary.
The poor level mechanical cling of traditional stucco makes it impossible to maintain traditionally. Only organic paints adhere onto stucco.
Repairing is possible, but difficult to implement and always remains visible.

Evolution

TECHNICAL ASPECTS
The construction industry offers all sorts of ready-made renderings: thin layered, mass coloured, with additives. Additives make these renderings tight like organic paints. Traditionally, stucco was white. Today, stucco can be coloured.

The recent rediscovery of stucco in countries of the Mediterranean area (Spain, Greece, Italy, Morocco) lead to sophisticated stuccoes: marmorini, paddled stucco and even tadelakt stucco in Marrakech, glossed with a pebble.

These finishings are carried out inside houses: they are fine and silky. The polish is obtained using small smoothing machines, hot irons or a rag wrapped with plastic film. These operations are carried out on fresh mortar. They demand advanced training.

The emergence of these techniques encouraged industrial production: organic binders with a lot of additives which can be applied on other surfaces than lime renderings (plaster, plasterboard, organic paints...), and are not porous.

Stucco can evolve in the future rehabilitation of Al Balad: it can be used to process the concrete slabs of connected floors, when the latter replace earth floors.

The concrete slabs of connected floors are floated mechanically with metal floats and industrial powder additives: the finishing is close to stucco rendering.
This technique is extremely interesting when redoing the connected floors of rehabilitated buildings in Al Balad: it would constitute a good alternative to modern solutions, like tiling.
There are many advantages, both aesthetic and economic. This contemporary type of flooring is close to the traditional floors in the homes of Al Balad, though floors are usually covered with kilims and carpets.

B.6 Sgraffito

Presentation
DEFINITION
Sgraffito is a decorative finishing rendering found on the main façades of the noblest buildings in Al Balad. It is mostly found on outside walls, sometimes in inside reception halls. Sgraffito is a form of drawing, a curved ornament, engraved in lime rendering.

GENERAL PRESENTATION, COMMENTS
The sgraffito on the façades of Al Balad are typically geometrical shapes, in panels, positioned on the main façade.
They are carried out in white lime mortar: sgraffito is engraved in fresh mortar, before the mortar carbonates.
For a maximum workability, air lime paste is usually preferred.
The most difficult task is tracing the pattern, in new sgraffito or when restoring sgraffito. The actual realization of the sgraffito is not complicated for a skilled workman if the tracing of the drawing is good.

ENVIRONMENT AND USE
The sgraffito decorations of Jeddah are on the main façades of the residential buildings of Al Balad, generally on the busiest street. But they can also decorate two façades when houses are at street angles.
Sgraffito is implemented on ground floors, at eye level, to be admired by passers by; but never all the way down to the bottom of the wall, and seldom on higher floors. Buildings with sgraffito on several floors are usually on squares or places, in the open, for all to see.
The decorations are often located in the needling and the piers of the building, or at floor level.
The patterns are always geometrical, usually in rectangular or square panels, seldom in the frieze (Beit Nassif).
They are fitted on Mangabi stone masonry, which is rendered and painted with lime. Ancient wooden ties are always decorated with sgraffito.
Some plaster carving has appeared, certainly under the influence of Maghreb craftsmanship, mostly ornamentation on front doors.
B.6 SURFACING

Period of Emergence, Period of Use

The sgraffito is found on the oldest buildings of Al Balad. The technique disappeared on more recent buildings, built in stone masonry, with Mangali stones laid in lime or cement mortar. It was abandoned in the 20th century.

Aspect — Texture and Colour

Surface

The area of the sgraffito of Al Balad can range from 1 to several m². They are parallel/looking.

Texture — colour

The texture is smooth and generally scraped, with hollow drawings in the scraped part.

The support of sgraffito, in Al Balad, is a preparatory layer: the mortar seems mass tinted with red pigment (artificial red iron oxide) or with broken tile friezes of Beit Nassif, where the mortar seems mass tinted with red pigment (artificial red iron oxide) or with broken tile aggregates (brushed terracotta).

The sgraffito of Al Balad is never covered with coloured whitewash, because this is a more recent trend and the sgraffito technique had already been abandoned when coloured whitewash began to be used in Jeddah.

Extra finishing

There is no extra finishing for sgraffito. It constitutes the actual finishing. For the engraving technique, the tools are those used for the first phase.

Support

The support of sgraffito, in Al Balad, is a preparatory layer: the preparatory layer of rendering, for a good mechanical clamping and the finishing, for a flat smoothed "trowel" finishing. For the engraving technique, the tools are those used for the first phase.

These two layers can be brought down to one, in a single, highly closed, layer.

Construction principle

Materials

Binding material

The binding material is always hydrated white lime. Air lime is preferred for slow curing, leaving more time and workability for the carving.

Lime paste is made with air lime, for best implementation conditions, for solidity. Lime paste ages well.

Aggregates

Nature and availability

The aggregate is hard, silico-calcareous, rolled, natural, of a fossil nature and not crushed. Aggregates can be used to create another lime: one for the engravings and another for the surface of the white rendering: broken tile (brushed terracotta), for example, to make red.

Dose ratio

The dose ratio is the same as for fresh smoothed "trowel" finishing. The mixture of sgraffito, and the sand must be fine and sieved for a regular pattern in the mortar.

The grading should be no higher than 0-2 mm, no lower than 0-1 mm, unless the mortar is a very thin layer. This case has never been reported in Al Balad.

The sand for this grading must nevertheless be sieved before use, to remove larger aggregates that would hamper.

Dose ratio

The dose ratio is the same as for fresh smoothed "trowel" finishing: approximately 2.5 volumes of air lime paste for 10 volumes of dry aggregate — or, possibly: 4 volumes of air lime powder (CL or DL) for 10 volumes of dry aggregate.

The solidity and plasticity of air lime powder mortar is improved when prepared in advance.

Tools

The tools for the first phase are the same as for smoothed "trowel" finishing. For the engraving technique, the tools are those used for the first phase: various knives, scalpel. To scrape out panels: small trowels, roundup, random scraping tools, like the tips of stone cutter blades. Flexible brushes are used to clean out the grain of scraped surfaces.

Description of implementation

Conditions and preparation

Climate conditions

Mild temperatures for implementation and curing, 5° to 30° C (10° to 20° C ideal). The work should be protected against dampness, wind, sunlight and rain, for three days when using air lime (very rare risk).

Implementation process

The mortar is applied on the preparatory layers and renderings: for fresh air lime: trowel finishing.

The great plasticity of air lime mortar makes it inappropriate for projection (no splashing). Apply with a tool, in two successive coats, fresh coat on fresh coat: the first is a thin layer, tightened with a tool for good mechanical clamping. The first damp layer will make it easier to apply the second coat and control thickness. The workability of air lime mortar is unlimited, as long as the mortar is protected, and covered with water.

Then, whatever the mortar used, tighten in successive smoothing strokes, with a trowel or any other tool (float, smoothing machine or Swiss stainless steel float). More or less horizontal smoothing.

According to the quality of the work, the surface can bear more or less tool marks: test various possibilities. When a team carried out the work, check the result to make sure it is homogeneous. Finish a surface without stopping, any rendering painting will be noticeable. For large surfaces, make sure you have enough manpower.

Smoothed rendering is painted with lime, using a liming or wash technique: See data sheet B4: Limewash paint.

Sgraffito tracing

Sgraffito cannot be improvised, everything must be planned out; corrections are possible but would be long and tedious to implement, implying a repairing of the rendering and limewash. Tracing can be carried out on the spot, using common tools: measuring tools (rulers and compass), tracing tools, typing, rulers, pencils or dry-point.

One day before implementation, soak the support (one must obviously take into account the nature of the support and climatic conditions). It is often necessary to dampen the support again in the morning, before carrying out the work.

Formulation

Sgraffito mortar should not contain too much binding material to avoid cracking. The lime dose ratio should be lower than the rendering: 200/250 kg, for pozzolana lime, for 1/3 of fine dry sand, grading 0-2 mm, for a 5 mm layer.

Air lime paste is the best binding material for travel smooth finishing. Sand should be very fine and not rough.

Mixing can be carried out manually or with a concrete-mixer. The water dose ratio is determined by the mason, to adjust the fluidity of the mortar.

Application

The mortar must be fluid enough to be applied easily and cling onto the support. To avoid cracking, the layer of finishing should not be too thick: 4 to 5 mm.

The great plasticity of air lime mortar makes it inappropriate for projection (no splashing). Apply with a tool, in two successive coats, fresh coat on fresh coat: the first is a thin layer, tightened with a tool for good mechanical clamping. The first damp layer will make it easier to apply the second coat and control thickness. The workability of air lime mortar is unlimited, as long as the mortar is protected, and covered with water.

Then, whatever the mortar used, tighten in successive smoothing strokes, with a trowel or any other tool (float, smoothing machine or Swiss stainless steel float). More or less horizontal smoothing.

Engraving

The engraving is carried out from top to bottom, from left to right for right-handed persons from right to left, for left-handed persons.
The engraving must be carried out in fresh mortar, at a 135° angle; this angle gives stronger material resistance than a 90° angle.
The depth must be regular, roughly 3 to 5 mm.
The maximum depth is determined by the layer of finishing, 5 to 7 mm. Beyond, the rendering will be cracked.
The tracing points from the pattern will be invisible if the cutting line is inside scraped area.
Remove the mortar from the whole area that should be scraped careful.
Experience proves it is difficult to stay within the scraped area and maintain the same depth. In the event of a mistake, fill the gaps with the original mortar and whitewash. Keep the materials soaked under water.

Checking
The tracing can be checked with the stencil pattern, over the decorated area.
The colouring of the surface must be regular when dry, without any flat synthetic tint. It should not flake or flour when brushed with your hand, there should be no lime deposit.
The layer must stick onto the support (no delamination).
The lining may be slightly patterned (relief) due to the consistency of the whitewash.
The engraved elements must be regular in depth, colouring and texture.

Pathologies

 IMPLEMENTATION PATHOLOGIES

Delamination :
The implementation pathologies of sgraffito are the same as smoothed renderings and lime paints - see data sheets : B3 Smoothed rendering finishing and B4 Limewash paint.
Regarding the pathologies of lime paint : apply in fresco techniques for best conditions.

 AGING PATHOLOGIES

Linked to materials and climatic conditions
The ageing pathologies of sgraffito are the same as for smoothed renderings and lime paints - see data sheets : B3 Smoothed rendering finishing and B4 Limewash paint.

Linked to the technique
The ageing pathologies of sgraffito are the same as for smoothed renderings and lime paints - see data sheets : B3 Smoothed rendering finishing and B4 Limewash paint. There may be an accelerated deterioration of the finishing layer when mass colouring contains too much pigment, weakening the mortar. This pathology is specific to sgraffito - see data sheet : B6 Sgraffito.

Maintenance
The maintenance of sgraffito is carried out by fixing or patching the rendering and lime wash.
Rehabilitation techniques for mineral wall paint, with reinforcement and grouting.

Evolution

 TECHNICAL ASPECTS

We cannot speak of development or transformation in sgraffito techniques, as it is no longer used in Jeddah or Europe, where it was however widely used in the past. We can however speak of a potential transformation and evolution of the technique.

Industrial « lime » products (mortar, stucco, lime paint), with additives, produce silk-finished surfaces. They offer solutions as far as materials are concerned.
Layer on layer finishing and fine engraving cannot really evolve, from a technical point of view.

Patterns and stencils, on the other hand, can benefit from computer technology to trace, reproduce, and create patterns and supports. Pattern racing can be designed on computers like calligraphy, letter tracing, which has developed over the past few decades. These practices are already used in Jeddah for marble marquetry.
The progress would be substantial, as half of the work linked to the sgraffito technique is drawing and preparing patterns.
When it is used in the right conditions, wood can be a most durable material, as proved by the wooden elements discovered in buildings that are several centuries old.

However, wood has many enemies, destructive agents that can deteriorate or destroy it. Wood is composed of cellulose, lignin and other elements which attract and feed living organisms, whether they are plants or animals. Each degradation agent attacks with varying intensity and effects, according to the nature of the wood which is being attacked.

The main damages observed on certain parts of the wooden structure are rot, cracking and loss of solidity. They are due to the variations in temperature and moisture, to biological causes and structural problems.

Problems can also come from the physical contraction of the wood when drying, as well as from an irregular level of humidity. Using wooden parts which have not dried correctly or been controlled, or from trees that were cut at the wrong time of growth - containing a high level of sap - can have disastrous results.

Most wooden parts do not keep a permanent shape, even if they were cut and stored several years earlier. Indeed, a change in the humidity level and temperature either expands or contracts the wood - it can warp, sometimes even deform under continuous loading.

The biological causes of the deterioration of wood can also be damaging. Indeed, certain fungi and insects can develop inside the wood, making it rot. The rot generally occurs in parts affected by water, particularly when the wood is in a wall or masonry. In addition, longitudinal cracks reduce the solidity of wooden elements, while providing nesting places for insects.

A. Abiotic agents

Amongst non-biotic destroying agents, we find atmospheric agents: solar radiation, rain and, because of its great destructiveness, fire.

SOLAR RADIATION

Of the wide spectrum of solar radiation, a fraction of ultraviolet and infra-red radiations can heavily deteriorate wood, especially ultraviolet. Indeed, ultraviolet radiation mainly affects the surfaces and produces a series of chemical alterations which deteriorate the lignin, through decomposition. Ultraviolet radiation generates a grayish color of the wood, because of a greater concentration of cellulose. If nothing is done in time, a continuous degradation and rain will also eat up the cellulose, revealing the characteristic relief of wood on the surface. Springtime wood is less compact, thus more vulnerable than summer wood. If fungus spores settle on the surface, a slight surface deterioration can appear, together with a change in color: the wood will become dark gray and blacken. However, the degradation due to this radiation is very slow and doesn’t go in very deep.

Infra-red radiation does not deteriorate wood directly. The surface temperature rises, reducing the water
C. External structural constraints

Wood work is generally connected to the masonries. When masonries are submitted to heavy strains, they undergo structural damage that also affects the wooden elements, generating deformation and sometimes breaking.

D. Human deterioration

A last type of deterioration was reported in Al Balad, caused by drainage systems and equipments that were sometimes carried out by destroying or heavily altering the wooden work, like air-conditioners installed in openings or roofs.

SIMPLE PRECAUTIONARY MEASURES

- Use dry wood only, chopped down and cut at the right season. Use the wood while taking into account its characteristics.
- Suitable construction solutions can help preserve the wood. A good measure consists in protecting the structures from water and moisture.
- Good wood and building maintenance increases the life span of the structures.
- When the wood deteriorates : initially, analyze the causes of the deterioration to protect wood correctly. Take into account the characteristics of the wood used, its natural durability, its impregnability to protective products, the place of the wooden element...
- Select the most suitable process for repairs after studying the data collected.
C.1 Removal / disassembling

Removal / disassembling operations are a precondition to any joinery work.

DESCRIPTION

There are multiple causes for wood-related pathologies - see « wood-related pathologies » - every piece of joinery may need repairing, at some point in time, unless the level of deterioration is beyond repair. Damages are often limited to fractions or segments of the structure. Repairs may be partial but still require disassembling the element.

LEVEL OF COMPETENCE FROM 1 TO 4 : 2 TO 3 ACCORDING TO THE ELEMENT.
DESCRIPTION OF THE CONSTRUCTION ELEMENT

Joinery work is generally painted. In Al Balad, this is particularly true for inside wooden joinery work: communicating doors, moucharabiehs, wall cupboard doors and entrance doors.

Very often, wood is no longer painted simply for lack of maintenance.

DESCRIPTION AND CAUSE OF THE PATHOLOGY

The wooden façade elements, especially entrance doors, are often painted in several layers. In most cases, these layers are painted one on top of the other, without any pickling. Thus, ornaments and mouldings seem erased or smoothed out, and the wood can no longer breathe. The wood can rot, especially lower wooden parts, deteriorating the structure.

In addition, every wooden element that is grafted or replaced must be washed, which implies pickling or scouring operations, within the rules.

LEVEL OF COMPETENCE FROM 1 TO 4 : 1 TO 2

DESCRIPTION OF REMOVAL AND DISASSEMBLING OPERATIONS

For simple elements, doors, windows... opening frames, cover strips and battens must be removed, and door frames unscrewed from the masonry. If the damages only concern mobile elements, panels or the leaf, it is useless to dismantle the frame.

For suspended muntins, multilaminations are necessary. Disassemble the unit from the top level down; the top is often made up of a more or less elaborate layered cornice. Weak elements must be handled with care, especially where the wood is nailed and superimposed.

Then, for more hardness, unlock the side frames from the façade, as the side elements are fixed to the masonry. Once the façade is taken down, using ropes (or hoists, when heavy), dismantle the trim and dressing of the side walls.

When the structure is taken down (and made steady where necessary) the actual disassembling can begin.

Disassembling must be systematic.

Dismounting the whole structure calls for a prior scaled sketch, an accurate drawing listing and representing the position of the wooden elements, followed by a classification of these elements and careful storage in a clean area.

Photographs and sketches can help understand the structure and guide re-assembly.

Methodology

- First, remove all movable, swivelling and sliding parts.

- Then, the frames or frameworks can be dismantled.

Once disassembling is accomplished, the issues can be addressed:

- the whole woodwork may need to be pickled or scavenged - see data sheet C2: Washing, pickling and scouring.
- the restoration itself can be carried out: first a glossing with a soft metal brush and steel wool or a sanding of the whole surface,
- when material or wood is missing or highly damaged, it may be necessary to carry out a graft or some patching - see data sheet C3: Making a graft, a patch.
- Only dismantle elements to facilitate the graft. As it is a tricky operation, it should only be carried out where necessary.
- when remanufacturing or reproducing elements, make a 1/10 scale sketch of the element, then establish a 1/1 scale sketch that includes every characteristic: carving, profile, joinery systems and pegging should certainly be identified and visualized.
- straighten up warped elements where possible.
- metal elements should be also processed - see data sheet C7: Maintaining ironmongery and hardware.
- when Joint cover strips or battens are missing, replace them entirely.

- when all the repairs have been carried out, the elements must be re-assembled in the right order, as noted during the disassembling.

CAUTION!

Regardless of the condition of the elements that are to be dismounted, make a scale sketch of the elements and supports, taking into account any warping and sagging of the masonry. If the supporting structure (walls) are kept in their present state, it is necessary to make perfect copies, identical wooden structures, so they will fit and adapt to the bearing structure: for example, take into account faulty squaring: test moving parts to check they can open and close, like sliding shutters or « moucharabieh » panels.

C.2 WASHING, PICKLING AND SCOURING

The wooden façade elements, especially entrance doors, are often painted in several layers.

In most cases, these layers are painted one on top of the other, without any pickling. Thus, ornaments and mouldings seem erased or smoothed out, and the wood can no longer breathe. The wood can rot, especially lower wooden parts, deteriorating the structure.

In addition, every wooden element that is grafted or replaced must be washed, which implies pickling or scouring operations, within the rules.

LEVEL OF COMPETENCE FROM 1 TO 4 : 1 TO 2
DESCRIPTION OF THE MAINTENANCE AND/OR REPAIRING

For good pickling, it is necessary to dismount the joinery or the parts concerned.

The operation consists in several stages:

- **Wash** the element with hot water,
- **Picking** (chemical scouring) can be carried out in two ways:
  - soak the element in a potassium bath. Pickling requires great care; the pieces of wood are often quite thin and cannot remain immersed for long without undergoing irreversible damage.
  - pour gel onto the wooden element, laid flat; apply product with a brush. The instructions for the application of the gel should be on the product label. The gel softens the paint; scrape off the layers of paint one after the other,
- **Rinse** profusely, preferably with hot water - use a water hose; brush the whole surface with a hard metal brush,
- **Gloss** the surfaces with steel wool - use a wax base; brush the whole surface with a hard metal brush,
- **Gloss** the surfaces with steel wool - use a wax base; brush the whole surface with a hard metal brush,
- **Gloss** the surfaces with steel wool - use a wax base; brush the whole surface with a hard metal brush,

Once the piece is fully scored, the various elements of the unit can be dismounted. The pieces, mortises and tenon joints, can be cleaned with a chisel or a scraper, to remove any possible trace of glue, and to graft on patches in worn and deteriorated spots - see data sheet C3: Making a graft, a patch.

**CAUTION!**

Chemical products are harmful - work in a ventilated room. These products are not flammable but the fumes are harmful when inhaled. Wear protection at all times: mask, glasses, gloves and apron.

Rinsing operations can generate pollution: organize the workplace so as to recovery the scraped paint and the polluted water.

If safety conditions are not satisfactory, a more environment friendly washing system is possible: clean the element using soft brushes soaked in slightly ammoniated hot water. In addition to making cleaning easier, the water softens the wooden nature: after drying, glossing turns out more effective with steel wool.

C.3 MAKING A GRAFT, A PATCH

DESCRIPTION OF THE CONSTRUCTION ELEMENT

The joinery work of Al Balad remains traditional, conceived and assembled roughly the same way. The structures are made up of jambs, with cross-pieces, the structures are filled with panels.

Two cases are found:

- interior wood finishing with moving parts,
- external woodworks, very exposed to bad weather, with worsened damage when the woodwork is very thin.

DESCRIPTION AND CAUSE OF THE PATHOLOGY

Doors are subjected to constant action, the joinery pieces can play. The structure can warp, subside, causing friction. The wood is likely to get damaged, with chipping and missing parts: that’s when a graft is needed.

The same phenomenon occurs for sliding shutters. Structures easily warp and buckle, shutters can tilt, for example, causing the space of these shutters to narrow down, jamming the shutters. Constant friction ends up damaging the wood: here again, repairs involve patching the damaged elements by creating a graft, which consists in making a replica of the damaged or broken piece.

Another typical situation calling for grafting concerns is when the wood is attacked by insects. Otherwise, when the wood has too many gaps or is damaged beyond repair, it is best to replace the whole structure.

**LEVEL OF COMPETENCE FROM 1 TO 4 : 3 TO 4**
DESCRIPTION OF THE MAINTENANCE AND/OR REPAIRING

Each case is specific, but generally, for a graft to resist time, a good preliminary survey is important. For this purpose, photographs and sketches are necessary.

To make a graft:

- trace the part that must be removed on the worn part of the wooden structure, with power tools (band saw or circular saw) or manually, with a saw and a grooving chisel,
- knock out the part damaged using a power cutter, a portable tool, preferably equipped with carbide bits,
- clean the grooves,
- cut out and adjust the wooden replica (the graft must fit the gap as perfectly as possible). The wooden patch must be dry and flawless, in the same wood as the original piece,
- use vinyl glue, B3 type white glue, that resists moisture. In the event of a regular exposure to bad weather, particularly for exterior wood finishing, polyurethane glue is best. Polyurethane glue is more difficult to implement than regular glue: you must mix ingredients with a hardener and use quickly.
- The elements must be perfectly fitted and held tightly with clamps. To avoid denting the facings of the two elements with the clamp, use a wedge,
- scrape and smoothen the whole surface using a plane and a scraper, connections should be seamless,
- when the replica patch has specific characteristics:
  - to make a rabbet, for example, make new pieces using a rabbet plane or a groove plane,
  - to make a moulding, use a sculptor’s gouge.

CAUTION!
The gluing must follow the « sealing surface » for a really strong, efficient graft.

C.4 RESTORING A MOUCHARABIEH PANEL

DESCRIPTION OF THE CONSTRUCTION ELEMENT

Moucharabiehs come in many patterns: they are richly decorated with ornaments, and can sometimes even be quite spectacular in Al Balad. They decorate the transoms of a great majority of doors, inside and outside, and sometimes even windows. They are usually on the higher parts of roushan. They sometimes shut window wells.

Moucharabiehs combine aesthetical qualities with practicality, ventilating inside areas.

DESCRIPTION AND CAUSE OF THE PATHOLOGY

These sets are generally quite thin ~ approximately 30 mm wide 25 mm thick. Moreover, these elements are brittle due to thin grooves and notches crossing the center, over the whole length of the structure.

The panel is made rigid and solid through the intricate assembly of its many elements, firmly held at the edges.

Two cases have been reported:

- When the long elements loosen off the mortises on the inside edge, modules can fall off, weakening the whole panel that can break at the slightest bump or knock.
- The movements of the masonry, above doors for example, compress the panel. The whole module is quite flexible, due to an interlocked wooden system: like any piece of wood, it can tolerate sagging and warping, to some extent. However, the wood gradually adapts to this deformation and irreversibly takes on the new warped shape. It is extremely difficult to correct this kind of warping.

LEVEL OF COMPETENCE FROM 1 TO 4 : 3
DESCRIPTION OF THE MAINTENANCE AND/OR REPAIRING

According to one of the two above mentioned cases :

a. part of the moucharabieh has disappeared

When parts of the unit are missing, it is necessary to make and adjust a new part to replace it.

This type of system, which we can call « interlocked », or « overlapping » makes it possible to add pieces of wood.

For longer elements, we recommend changing the whole length of wood. In this case, the structure must be disassembled totally to take the wood off the mortises.

b. the unit is « swollen »

This is due to a deformation of the masonry. The surface is deformed by pressure or throttling. The size of the elements and the system mentioned above (overlapping wooden structure) gives the unit great flexibility. Thanks to this flexibility, the structure can deform without breaking. On the downside, it is almost impossible to correct the warping. The main reason is that the deformation developed over time, gradually growing irreversible.

In this case, either the deformation is acceptable or the whole panel has to be changed.

DESCRIPTION OF THE CONSTRUCTION ELEMENT

The door unit made of communicating double doors, surmounted by a moucharabieh openwork impost, is very common in the houses of Al Balad.

DESCRIPTION AND CAUSE OF THE PATHOLOGY

Interior doors suffer from the compressing and sagging of the masonry ; structural movement generates a gap between the door frames and a deformation of the impost.

The doors are usually only a little damaged. The jambs are thin and warped.

Battens and trims can be missing...

LEVEL OF COMPETENCE FROM 1 TO 4 : 3

C.5 RESTORING AN INSIDE DOOR

DESCRIPTION OF THE CONSTRUCTION ELEMENT

The door unit made of communicating double doors, surmounted by a moucharabieh openwork impost, is very common in the houses of Al Balad.

DESCRIPTION AND CAUSE OF THE PATHOLOGY

Interior doors suffer from the compressing and sagging of the masonry ; structural movement generates a gap between the door frames and a deformation of the impost.

The doors are usually only a little damaged. The jambs are thin and warped.

Battens and trims can be missing...

LEVEL OF COMPETENCE FROM 1 TO 4 : 3
DESCRIPTION OF THE REHABILITATION.

Like any restoration of joinery work, dismantle the unit.
If only the doors (leaf) are damaged, patching or grafts can be carried out without dismantling the structure.
Inside doors are generally fitted on reveals, on stop blocks, the jambs in a framework.

The restoration of a highly damaged inside door includes the following operations:

- remove the two doors,
- remove the cover strips,
- dismount the framework from the masonry. Scour or pickle the wood,
- after dismantling the door, identify and organize the various parts of the structure,
- pickle and sand the surfaces,
- then only, if need be, disassemble the panels to make grafts - see data sheet C.3 : Making a graft, a patch,
- if a piece needs to be entirely replicated, to the identical, make a 1/10 scale sketch followed by a 1/1 scale layout pattern including all the mouldings and profiles,
- once the grafts and corrections have been carried out, reassemble the structure ; slightly enlarge the holes and use larger pins for better strength,
- when cover strips are missing, make new ones.

DESCRIPTION OF THE CONSTRUCTION ELEMENT

Roshans are emblematic symbols of the architectural heritage of the city of Jeddah : they are found everywhere in Al Balad. Roshans shape light and shade on the façades, conferring vibrance and relief. They are found on ground floors, and the most majestic models are at storey level. These richly ornate paneled elements overhang on the street, alternating openings, shutters and moucharabiehs...

The Roshan unit is made up of a façade and side panels, of a floor and a ceiling. Made of wooden, it mixes fixed and moving elements.

The whole structure is firmly tied into the masonry by a series of wall brackets or consoles. These consoles are made in such a way as to integrate elaborate and sometimes polychrome ornamentation.

The design of the under-face includes a unit made up of small wooden surfaces, in « steps ». They are carved and painted.

This unit rests on console supports, within the masonry. The side panels are « stapled » over the opening, using metal cleats fixed into the wooden elements, tied into the wall thickness.

On the lower part, the panels are assembled in grooves, constituting a full plinth.
Above, sliding wooden shutters, full or louvered, are fitted at interior eye-level. These moving parts slide in the grooves thanks to a system called a guillotine system. They can be opened or closed onto the street, as one wishes.
On the higher level, moucharabieh elements are fitted for inside ventilation.

These structures are surmounted by a wide elegant cornice.
DESCRIPTION AND CAUSE OF THE PATHOLOGY

Though the composition of these sets is standard, the structure is actually quite complex: framework with panels, overhanging console, many moving elements and very elaborate wooden-lace work decorating the floor and the cornice.

- Floor consoles
  These big wooden elements, about 10cm/10cm squared at the base, sometimes suffered from the same pathologies as the wooden ties of the walls. In most cases, termites damaged the wood so much, they must be replaced entirely.

- Framework
  The framework is made up of jambs and cross-pieces. The jambs work as posts at the angles and are squared. On the façade, they are rectangular. These jambs or studs are slotted (mortaised) and are fitted with cross-pieces with tenons. The frameworks have grooves adapted for panels or elements. The roshan structures are completely interlocked with the masonry, deforming or sagging like the walls. In this case, the units can disunite, pieces tend to play, moving parts, such as sliding shutters, don’t work well. Jamming becomes inevitable and wearing appears at points of friction.

- Cornice
  The cornice is made of thin boards, from 10 to 25 m/m, jig-sawn like “lace”. This style of decoration is created by nailing boards one on the other: the effect conferred by the superposition is quite beautiful. Though these elements are rather thick, they tend to deteriorate badly, due to heavy exposure.

LEVEL OF COMPETENCE FROM 1 TO 4 : 3 EXPERIENCED CARPENTER

DESCRIPTION OF THE MAINTENANCE AND/OR REPAIRING

- Floor consoles
  The anchorage of Roshan units in the masonry is carried out with a mason. One must scrape out the sealed part completely and replace it with a wooden element, lined up with the other structures. As the edge of the wooden elements do not bear much load this operation is not too difficult. These wooden pieces are grooved to fit in small painted wooden elements, and rounded.
  It is also necessary to check the condition of the inside cross-piece in the wall, holding the consoles.

- Framework
  When the framework is very damaged, dismantle the whole unit - see data sheet C.1 : Removal/Disassembling.

- Panels : mobile pieces
  The damage concerns mobile panels: disassemble the wooden elements of the grooved system. Remove the sliding shutters and restore them (disassemble, patch or reinforce), in a workshop, or just fix them up (remove some material, using a plane or a scraper, when a shutter jams, for example).

- Panels : fixed pieces
  Moucharabiehs are easy to remove from the grooves. They can be mended or repaired, and, in the best cases, simply pickled - see data sheet C.4 : Restoring a moucharabieh panel.
  It is possible (but not recommended) to remove the bottom fixed panels without disassembling the whole unit. You would have to remove an inner side, replacing it with a panel. This type of work usually generates irreversible damage.

- Cornice
  The solution consists in replacing the missing parts: be sure to copy the wooden motives and work well. Usually, the most-damaged missing part is the piece that was nailed on top. Ideally, remove the successive layers of wood, disassembling them from one another.

  The main elements constructing a Roshan unit are jambs, cross-pieces and panels. Its main characteristics are related to the jig-saw profiles, the carving and the panels. Using larger sections, at properly calculated and targeted places, (loading and fitting), could slightly reduce deterioration. Don’t forget the units get their genuineness through an impression of suspension and lightness, conferred by the delicate thinness of its wooden elements.

CAUTION!
Special care should be given to the overall dimensions of the roshan, during removal and disassembling. Do not use glue when re-assembling the wooden elements. The goal is to preserve the structure and its flexibility with the building.
C.7 MAINTAINING IRONMONGERY AND HARDWARE

DESCRIPTION OF THE CONSTRUCTION ELEMENT

Ironmongery and hardware include all the systems that rotate, revolve or move: doorknobs, door mechanisms, and any opening or closing device.

DESCRIPTION AND CAUSE OF THE PATHOLOGY

Iron doesn’t wear out much, but it can oxidize. Thus, regular maintenance is important: it consists in an occasional brushing and well-dosed lubrication of the rotating mechanism.

LEVEL OF COMPETENCE FROM 1 TO 4 : 2

DESCRIPTION OF THE REHABILITATION WORK

Hardware needs to be maintained regularly. Very damaged elements must be replaced.

If the hardware is painted, the elements must be dismantled and pickled. Let the pieces soak till the paint peels off easily. Brush the parts with a soft metal brush and process the metal with rust-proof product like «Rustol».

If the pieces are painted again, apply with a paint gun, if possible, to avoid brush strokes. Reassemble and install the mechanisms with the right screws and nails. Try to use the same techniques and mechanisms as the original model.

C.7 MAINTAINING IRONMONGERY AND HARDWARE
Al Balad Historic District Survey
Jeddah, KSA
Introduction
A critical survey and a design proposal for Al Balad, the Historic District in Jeddah, KSA

1. Siteplan: surveying sections

2. Pictures

3. Survey documentation
   3.1 Section 1
      3.1.1 Point Clouds
      3.1.2 Orthophotos
      3.1.3 Elevations
      3.1.4 3D Model
   3.2 Section 2
      3.2.1 Point Clouds
      3.2.2 Orthophotos
      3.2.3 Elevations
   3.3 Section 3
      3.3.1 Point Clouds
      3.3.2 Orthophotos
      3.3.3 Elevations
   3.4 Section 4
      3.4.1 Point Clouds
      3.4.2 Orthophotos
      3.4.3 Elevations
   3.5 Section 5
      3.5.1 Point Clouds
      3.5.2 Orthophotos
      3.5.3 Elevations
   3.6 Section 6
      3.6.1 Point Clouds
      3.6.2 Orthophotos
      3.6.3 Elevations
   3.7 Section 7
      3.7.1 Point Clouds
      3.7.2 Orthophotos
      3.7.3 Elevations
   3.8 Section 8
      3.8.1 Point Clouds
      3.8.2 Orthophotos
      3.8.3 Elevations
   3.9 Section 9
      3.9.1 Point Clouds
      3.9.2 Orthophotos
      3.9.3 Elevations
   3.10 Section 10
      3.10.1 Point Clouds
      3.10.2 Orthophotos
      3.10.3 Elevations

4. Design proposals

5. Bill of quantities
A critical survey and a design proposal for Al Balad, the Historic District in Jeddah, KSA

Architectural History and Built Heritage

The architectural history of a Nation and its built heritage are among the irreplaceable assets of humanity as a whole. Since the adoption of the UNESCO Convention in 1972, the protection and conservation of cultural heritage constitute a significant contribution to a sustainable development. Currently experimenting an intervention methodology in diverse cultural conditions around the world, the task of our research group is the promotion of theoretical and scientific techniques, in order to protect, conserve and transmit to the future generations any valued built heritage.

Our recent work aims at the conservation of different examples, prolonging the life and integrity of its architectural characters, its built forms, its constituent materials, its original urban and natural landscape. In the main-frame of our general proposal, we shall distinguish diverse interventions such as preservation, rehabilitation and restoration. As all of you very well know, preservation emphasizes the retention of all historic fabric through conservation, maintenance and repair. It reflects a building’s continuum over time, through successive occupancies, and the respectful changes and alterations that were and are made. It is a very important stage: preserving is better (and cheaper) than restoring and accurate and competent maintenance is essential for the healthy survival of our built heritage. Rehabilitation emphasizes the retention of historic materials, with some latitude for replacement and reconstruction of the deteriorated or missing parts. The upgrading of historic standards to contemporary ones is a necessity: nobody wishes to live now as our ancestors lived in the past. This is true in terms of size of the rooms, in terms of natural light and ventilation, in terms of service areas such as bathrooms, kitchens etc. But properly upgraded historic buildings can often be more efficient and provide a more comfortable and healthier contemporary living than many recently built ones. Last, but not least, restoration focuses on the retention of materials from the most significant in the building’s history, while permitting the removal of materials from other periods. It is the most delicate part of the intervention and it has to be executed by highly skilled craftsmen under the supervision of experienced scholars and professionals.

The architectural history of a Nation and its built heritage are among the irreplaceable assets of humanity as a whole. As a whole, and considering the very interesting relationships that originally linked the harbor (natural) to the (man made) built environment on the hill overlooking the Red Sea to the west and the desert to all the other sides, this quite vast urban complex can be very well considered as a true cultural landscape, a combined work of nature and of men and its public space, the product of the creative genius of different generations. A cultural value which is so exceptional as to transcend local (the Hijaz region) or National (Saudi Arabia) boundaries and to be of common importance for the present and the future generations of humanity as a whole. Nowadays, the local Administration of Al Balad is demonstrating its full commitment - in the forms of appropriate cultural, political, legal, scientific, technical, administrative and financial measures adopted and proposed - to restore and protect this urban complex, we are willing to cooperate with our specific scientific culture, technical know-how and with our experience made in decades of field studies on similar Italian and foreign urban complexes.

The Historic District of Jeddah represents an interesting example of the Islamic urban and architectural creativity; it bears a significant testimony to a very specific cultural tradition and to a living civilization; it is also a very peculiar mix of different building types that contribute to an architectural ensemble which illustrates a significant stage in the city’s history. Quite a few areas of the Historic District meet the conditions of integrity and authenticity (authenticity is expressed through a variety of attributes including form, material, and substance, use and function, traditions and techniques, location and setting). It is also very important to note that the entire area is very lively and densely populated, if not as attractive, because of its present state, for tourists as well as for the inhabitants of “modern” Jeddah: the people that live and work in Al Balad form a very interesting anthropological mix of various immigrants coming from Africa, the Middle East and Asia.

The most outstanding built examples that have been accurately studied and surveyed date back to the 18th and 19th Centuries. The rediscovery of the identity of Al Balad is clearly linked to the rediscovery of this anonymously, but competently and also stylishly designed and built architectural heritage and of its original, as we said now unfortunately lost, visual relationship with the harbor. Our Saudi Arabian colleagues and ourselves share the opinion that the city of Al Balad has to look back at its memories if it wishes to come to a fresh start for a part of the historic district of Jeddah and for some outstanding buildings that will deserve a special attention. Though spoiled by recent buildings of debatable quality, this area is still nowadays - it is an extremely interesting mix of different building types, illustrating a very significant stage in the city’s history, when its merchants successfully conquered local and foreign markets and when Jeddah started to act as the main gateway for the Red Sea to the Holy Cities of Mecca and Medina. Our project aims at the revitalization of its rich and fascinating built heritage and at the rediscovery of its lost relationship with the once nearby harbor on its west side and with the modern city all around; in addition to this, we also wish that the renovation of Al Balad may constitute a significant step toward KSA’s green leap forward, demonstrating that properly upgraded historic districts can be not only more pleasant and appealing to visitors and pilgrims, but also smarter than recently built suburbs.

Al Balad is made of different parts and of quite different buildings; most of them, because of their history, their architectural qualities, their typology, their building materials, their decorative apparatus, their homogeneity and the social and relational qualities of the public spaces, can certainly be considered of outstanding value from the point of view of history as well as art. As a whole, and considering the very interesting relationships that originally linked the harbor to the built environment on the hill overlooking the Red Sea to the west and the desert to all the other sides, this quite vast urban complex can be very well considered as a true cultural landscape, a combined work of nature and of men and its public space, the product of the creative genius of different generations. A cultural value which is so exceptional as to transcend local (the Hijaz region) or National (Saudi Arabia) boundaries and to be of common importance for the present and the future generations of humanity as a whole. Nowadays, the local Administration of Al Balad is demonstrating its full commitment - in the forms of appropriate cultural, political, legal, scientific, technical, administrative and financial measures adopted and proposed - to restore and protect this urban complex, we are willing to cooperate with our specific scientific culture, technical know-how and with our experience made in decades of field studies on similar Italian and foreign urban complexes.

The Architectural History and Built Heritage

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and our Saudi Arabian colleagues share the opinion that the city has to look back at its memories if it wishes to come to a fresh start for a brilliant future. Al Balad is an outstanding example of an Arab Historic District on the Red Sea, unique in terms of size (the largest in Saudi Arabia), of architectural quality, of materials (stones coming from the local coral reef and beautifully carved wood from the trees), and of aesthetic and architectural features of its buildings and streets; everything gets unique and despite a general lack of attention and conservation, the visit of the Old City is considered one of the most intense and rewarding visitors' experiences of Saudi urban and architectural culture. The towering typology of the historic buildings is clearly defined; the wonderful Rawa sheens, beautifully carved traditional wooden oriel windows, with their protruding volumes, add a very specific flavor to the facades. The vastness of the district, the labyrinthine layout of streets and alleys, make it hard to find in order to the urban sprawl and increase the quality of its urban life: improving air and water quality, creating safe, vibrant and friendly neighborhoods and becoming a walkable city, at least in its central areas.

As we have anticipated, our project aims at the conservation of the entire Historic District, prolonging the life and the integrity of its architectural characters, its built forms, its constituent materials, its original colors. A subtle cultural sensibility and a deep critical know-how are evidently requested in order to correctly read and interpret the built architectural and urban heritage. As it is the case for Saudi Arabia and other different areas in the Middle East and in the Mediterranean basin, Italy has been continuously inhabited since very ancient times; its historic cities are universally recognized among the most valuable urban models of human kind; the quality of life that the historic, central districts of some of our cities can boast is rated at the highest ranks in the world urban competition. Italian experts, though sometimes overcome by the huge quantity and the great artistic quality of their extraordinary built heritage, have usually been quite successful in preserving and restoring historic towns as a whole. The reason for that, though post-war Italian cities are also post-war and as efficient, active service same problems (and ugliness) of many other contemporary cultures around the world, the Italian historic urban legacy is still nowadays very successful among its citizens and extremely appreciated and looked after by tourists coming from all over the world. It's understood that the built heritage is not and should not be considered a heavy burden on the municipal finances, but an exciting opportunity to exploit – not without a quite high degree of cultural sensitivity - for the future of the entire local community. As we anticipated, the Historic District in central Jeddah should also be a significant part of Saudi Arabia's green leap forward. Our current ways of life, in Saudi Arabia, as anywhere else, is clearly unsustainable, and that which is not sustainable does not continue. Our cities have to rely on renewable resources, they must be dramatically more ecologically sustainable and we have the challenging task to redesign them in order to achieve an entirely different kind of civilization. A green city can coexist perfectly well within a historic district. A well redesigned historic district won't just help become prosperous, it will also present all the functionality of inhabitants' most basic needs – from clean water and adequate housing to education, healthcare and other social services – way better than spread out, public policies, can serve as viable alternatives to reliance on the automobile. We have to discourage car ownership and invest in making public transportation safe, cheap and reliable. We have to protect key views of the many historic buildings that ambiguously dot the Landscape and introduce green roofs, rain gardens and green facades in order to create a significant percentage of their food using their small gardens, their terraces and green roofs and the little public.
trends and influxes, in a very similar way to what can be found in many successful and tourist oriented Italian and European historic towns. Hopefully, many Saudi Arabsians will start reconsidering their now quite scarce interest in Al Balad and will move back to Old Jeddah as their ancestors once did. But, most of all, we must not forget the importance of carefully keeping the precious, cultural identity of the place, of its architectural and functional characters, in a more general attitude aiming at showcasing the rich, traditional western Saudi Arabian culture of the Red Sea Coast. The chosen methodology will be the same that has been used in similar projects in Italy and elsewhere, aiming at the conservation of urban diversity (in terms of building types, materials and functions), an extremely difficult quality to achieve in new interventions; the strengthening of civic pride (people living there must feel that they are part of a deeply rooted community, that they are citizens of Al Balad and not city-users); the creation of a sustainable environment (the buildings should produce more energy than they request etc.); and - last, but not least - the transformation of Jeddah’s Historic District into a very attractive and deeply rewarding area not only for its inhabitants, but also for millions of pilgrims and foreign scholars and tourists flocking to Jeddah every year from all over the Islamic world: the transformation of Jeddah’s Historic District into a very attractive and deeply rewarding area not only for its inhabitants, but also for millions of Islamic pilgrims and foreign scholars and tourists from all over the world.

A critical survey

In the end, Al Balad should and will become a very interesting and lively area, highlighted by a variety of historic religious, commercial and residential buildings that form an extremely rich urban pattern, clearly different and easily recognizable from the modern parts of the city. A mix of religious, residential, educational and commercial buildings will also include showrooms, ateliers, galleries, exhibition halls, offices, boutiques, craftsmen shops, schools, little hotels etc.: the result will be an exciting and creative neighborhood, very attractive for the locals (especially for young people) and their different activities, but also open to the international trends and influxes, in a very similar way to what can be found in many successful and tourist oriented Italian and European historic towns. Hopefully, many Saudi Arabsians will start reconsidering their now quite scarce interest in Al Balad and will move back to Old Jeddah as their ancestors once did. But, most of all, we must not forget the importance of carefully keeping the precious, cultural identity of the place, of its architectural and functional characters, in a more general attitude aiming at showcasing the rich, traditional western Saudi Arabian culture of the Red Sea Coast. The chosen methodology will be the same that has been used in similar projects in Italy and elsewhere, aiming at the conservation of urban diversity (in terms of building types, materials and functions), an extremely difficult quality to achieve in new interventions; the strengthening of civic pride (people living there must feel that they are part of a deeply rooted community, that they are citizens of Al Balad and not city-users); the creation of a sustainable environment (the buildings should produce more energy than they request etc.); and - last, but not least - the transformation of Jeddah’s Historic District into a very attractive and deeply rewarding area not only for its inhabitants, but also for millions of pilgrims and foreign scholars and tourists flocking to Jeddah every year from all over the Islamic world: the transformation of Jeddah’s Historic District into a very attractive and deeply rewarding area not only for its inhabitants, but also for millions of Islamic pilgrims and foreign scholars and tourists from all over the world.

The silent witness of history

The Saudi Arabian built heritage is among the priceless and irreplaceable assets, not only for the Saudis, but for humanity as a whole. The loss, through deterioration or disappearance, of any of these most prized assets constitute an impoverishment of the heritage of all the peoples of Africa and of the world. Since the adoption of the UNESCO Convention in 1972, the protection and conservation of cultural heritage also constitute a significant contribution to a sustainable, future development. Based on the principles of the 1964 International Charter on Conservation and Restoration of Monuments and Sites (the Venice Charter), it is our specific duty to identify, study, protect, conserve, present and transmit to the future generations a built heritage of outstanding universal value, promoting the application of the most advanced theories, methodologies and scientific techniques. This valued architectural heritage is also of seminal importance for the collective psychological life of Saudi Arabia: a Nation needs deep and meaningful cultural roots. The built heritage works as the Nation’s soul, it physically represents its cultural spirit. No country is able to confidently look at the future without respecting the past. Our design proposal, which includes a scientific survey and a restoration project, aims at the most accurate conservation of this urban complex, prolonging the life and integrity of its architectural characters, its built forms, its constituent materials. It also includes the guidelines for the future life of this historic area, in the belief that architectural ensembles of the past request a contemporary role in order to fulfill new functions that respect the original design and, at the same time, guarantee their survival to the advantage of future generations. The transformation of Al Balad into the active focus of the religious, cultural, political and touristic life of the city of Jeddah, showing in the newly restored buildings’ interiors the lavish collections of the Saudi memorabilia, will provide the noblest future for this magnificent buildings, silent witnesses of the Saudi Arabian history.

Dr. Osama bin Mohammed al-Jawahri
Prof. Arch. Livio Sacchi
1. Site Plan: Surveying sections
2. Pictures
Al Balad Historic District - Jeddah, KSA

Survey documentation: Pictures

1. [Image of a building in the historic district]
2. [Image of a balcony in the historic district]
3. [Image of a street in the historic district]
4. [Image of a building facade in the historic district]
5. [Image of two people walking in the historic district]
6. [Image of a traditional architectural feature in the historic district]

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3. Survey documentation
Section 1
Section 2
Section 3
Section 5
Section 6
Section 8
Traditional Architecture recorded by means of building archaeology in Saudi Arabia

TRABASA workshop, 2012
7 Annex
7.1 Posters

SCOPE OF THE WORK
Task of the project are alternative branches and knowledge transfers between the King Abdul Aziz University in Jeddah and the Vienna University of Technology with the research on Traditional Architecture in South Arabia.

The research will attempt to cover all types and issues of traditional architecture in South Arabia. These types can be divided into three categories:

1. Living Heritage. This type is Saudi traditional architecture is found in all, southern and northern, and coastal and inland areas, with its traditional buildings and their daily life in traditional buildings. Examples of this category are traditional Jeddah, the historic market of AlBalad and the town of AlMakka. Documenting this style would cover a wide range of elements, such as dwelling types, traditional architecture and buildings, through a comparative and analytical center which is part of the project. If the work is to be done in the time of the project, it will be documented and described by the same scholars. In addition to the urban and architectural characteristics, it will be documented and described in terms of the work that has been written about it.

2. Traditional Heritage. This type is represented by the traditional architecture that has disappeared due to the various reasons such as the rise of modernization and Western. Therefore, the documentation of this category should be done through its intensive and systematic documentation of what has been written about it.

3. Scottish Heritage. This category includes buildings that are not centered on special features for various reasons but reflects a significant historical and cultural value. It is still located in the Highlands of AlJazir, the other location is in AlMakka.

7.2 TRABASA: Traditional Architectural Resource by Means of Building Archaeology in South Arabia

OBJECTIVES OF THE PROJECT
1. Establish the traditional architecture of South Arabia in the geographical and sociocultural aspects of the region.
2. Study the traditional architectural characteristics in order to better understand the work and its components.
3. Study the traditional architectural elements and their geographical and sociocultural characteristics.
4. Study the traditional architectural elements and their geographical and sociocultural characteristics.

FIELD WORK: Approaching the Building_Urban Scale
The city developed around a centered traditional karb of AlMakka, the historic market of AlBalad and the town of AlMakka. The city is characterized by its traditional architecture, which is reflected by its traditional architectural elements and their geographical and sociocultural characteristics. The city is characterized by its traditional architecture, which is reflected by its traditional architectural elements and their geographical and sociocultural characteristics. The city is characterized by its traditional architecture, which is reflected by its traditional architectural elements and their geographical and sociocultural characteristics.