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Architecture and construction stone in Jordan

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Abstract: This essay addresses the uses of building stone in architectural design and links them with the time line of civilizations. It involves the findings of physical experiments on the building stone taken from various regions in Jordan. It stresses the beauty of building stone and estimates the ability to use it on a large scale along with the ancient architectural arts which need to be improved in order to comply with the theories of modern architectural schools and obtain the desired physical characteristics of walls such as insulation (percentage of absorption) in the prevalent climatic conditions of Jordan.

Keywords: Construction stone, Rupture modulus, Shelly bars, specific weight, Modern architecture

INTRODUCTION

Construction materials are important for architecture. It can be said that the history of architecture can be re-chronicled from the construction point of view. Architectural designs, i.e. trestle walls, stone thresholds, roofs, vaults and domes are determined by the available construction materials in a particular age. Modern architecture has radically changed to the extent that you can hardly connect it with ancient architecture. This can be attributed to the development of engineering sciences, construction and industrial techniques. Modern architecture has innovated construction materials and architectural designs. In addition, it increased the height of multi-storey buildings such as housing and office buildings as well as sky scrapers. Scientific and industrial potentials may bring us unprecedented inventions whose effects on the architecture of future can not be predicted.

Architectural developments since the second half of the 18th century can be investigated by referring to designing theories and approaches of architects because architectural patterns vary according to time and place. However, all patterns reflect the relation of architecture with the community and environment.

During that period, a noticeable change in architecture took place and different architectural schools appeared. For example, the Baroque school was followed by the New Classical School, New Gothic School and the Eclecticism School. Economic and social factors played a significant role in changing the community. Also, the new construction materials contributed to the appearance of an architectural intellect representing the modern trend which makes use of the cultural heritage of ancient civilizations. William Morris' (1843 -1896) definition of modernism and architecture stresses that (architecture aims at developing human needs by perceiving the external factors which can not be ignored because they represent the civilization. The art which we seek should be tasted by all community members.)

Laboratory Tests of Construction Stone in Jordan:
According to the Geographical Regions:

The necessary laboratory tests were carried out on the lime stone after making sure that it has none of the following defects by checking its shape:

- vents
- shelly barsshakeschert
- color & fossil

The following tests were made:

- relative absorption rate
- specific weight Compressive stress
- Rupture modulus

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Table 1: Construction stone classification

characteristic	Grade A	Grade B	Grade C
Specific weight (min)	2.56	2.45	2.16
Obsorption%(max)	3.00	4.20	7.50
Rupture modulus N/Mm2 (min)	6.90	5.20	3.40
Compressive stress N/Mm2 (min)	55	28	12

Table 2: Laboratory tests of construction stone in Jordan

Region	Specific weight	Obsorption %	Rupture modulus	Compressive stress
North	2.39 - 2.67	2.24 – 0.34	6.3 – 19.6	25.2 – 187.1
South	2.58 – 2.67	1.18 – 0.41	11.6 – 13.2	38.4 – 119.3
Eastern regions	2.39 – 2.60	2.7 – 0.19	9.1 – 16.6	42.5 – 99.3

Construction stone is classified according to the Jordanian general technical standards of buildings for the year 1992 as shown in table (1).

The results of tests are shown in table (2) based on the regions of Jordan.

Discussion:

Modern architectural patterns produced integral construction skeletons which are distinguished by their two directional grids. Unlike carrying pillars which are made of stone, iron or concrete, walls are considered screen elements. However, walls serve as trestles in ancient constructions. Screen walls are either fastened by the trestles or used to wrap up the skeleton. Thus, the building consists of screen and carrying elements for protection purposes.

Historical architecture in the Middle East including Jordan tells the cumulative history of the Mediterranean societies whose architecture have been developed in the light of modern life styles, city planning and construction materials. For instance, it was believed that ancient forts were built of stone and mud that existed in the national environment.

Construction or lime stone is a type of sedimentary rocks that is composed of dual Calcium and Magnesium Carbons. Lime stone is the most commonly used raw material in the construction industry especially for designing the external walls of buildings due to its physical and chemical characteristics. Recently, it has become the most efficient construction material used for decoration. Therefore, it gives final touches to buildings and makes Jordan known for its distinctive architecture particularly in the wealthy societies where raw lime stone is not affordable.

Jordanian architects like those in other parts of the world could expand the use of lime stone in architectural designs of walls and decorations because they took national environment into their account. They could also link the past with present because this stone was widely used in the ancient civilizations i.e. the Roman, Islamic and Nabatean for which Jordan was home. Furthermore, lime stone was one of the most precious natural resources for the Jordanian economy. It can be found in the North (Ajlun, Irbid and Dyer Alla), in the south (M'an and Kerak) and in the East (AZraq and Mafraq). This means that it is distributed all over the kingdom.

Due to the high prices of manufactured or imported construction materials such as cement and iron, middle and low class people began using construction stone of low quality to build their houses because the good one is monopolized for the wealthy people to build their palaces and enormous villas.

Conclusions:

Having compared the standards of grouping construction stone, it is noticed that the stone taken from the Northern region (Ajlun) and Southern region (M'an) are of better quality. In fact, the two cities are considered the first producers of construction stones in addition to Azraq in the Eastern region.

Stone is regarded as a cheap national construction material that complies with environmental and climatic changes due to its physical characteristics. It is not only beautiful but also resistant to humidity, insular to sound and cheap despite the high prices of artificial construction materials nowadays. What is more, it has a relatively long age and matches the architectural heritage of the region. This enables us to preserve the architectural designs of the Middle East in general and Jordan in particular. It also enables us to make use of the construction stone and architectural designs of ancient civilizations which settled in Jordan such as Jerash, desert forts and the rose city (Petra).

That calls for establishing a modern national construction school which takes the past into account in the light of what the architectural revolution achieved today.

REFERENCES

Jordanian general technical standers of buildings 1992.
Evaluation of Jordanian limestone as building stones, Ph.D. thesis, University of London. Moh'd,B.K, 1996.
Techo stone, SPA. Study for the exploitation of deposits of lithic materials in Jordan, Carrara-Italy.1984.
Modern Architecture a critical history, Frampton, Keneth, Thames and Handson, 1982.
Modern architecture, Shireen Zada, 1999.