

Analysis of Vernacular Architecture-Jaisalmer

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Abstract- This research paper aims to explore the vernacular architectural style found in Jaisalmer, a city situated within the Thar desert of Rajasthan, India. Jaisalmer is renowned for its distinctive architecture, characterized by the utilization of sandstone and intricate decorative carvings. The paper delves into an examination of the historical, societal, cultural, and environmental influences that have shaped the development of architecture in Jaisalmer. Additionally, it scrutinizes the diverse aspects of vernacular architecture, including the utilization of indigenous materials and the adaptation to the local climate conditions. The findings of the study suggest that the vernacular architecture of Jaisalmer serves as a remarkable illustration of how age-old construction techniques and locally sourced materials can be harnessed to create sustainable and visually appealing edifices that mirror the indigenous culture and identity.

Index Terms- vernacular architecture, jharokhas, chajja, opla, khamba, chowk-courtyard, aedicules.

I. INTRODUCTION

Jaisalmer is a city in the Indian state of Rajasthan also known as “Golden City”. It is located in the Thar desert and is known for its magnificent fort, havelis, houses, and temples. The architecture of Jaisalmer is unique and has evolved over centuries due to various factors such as climate, culture, and local materials. The use of sandstone and intricate carvings is the most striking feature of the vernacular architecture of Jaisalmer.

II. HISTORICAL BACKGROUND

Jaisalmer was founded in 1156 AD by Rawal Jaisal. In its overall shape, Jaisalmer is an Irregular Polygon with a Double Line of Fortification. It is a city within a city. The inner city is more protected with a Stronger Wall and is set on top of a hill about 100 meters higher than the surrounding area. The city is Triangular in Shape due to the shape of the hill on which it is built. The Royal Palace with The Royal Square Forms the nucleus of Jaisalmer. The city structuring manifests itself in two strong ways: The location of the Royal Quarters on top of the hill with the strong fortification. Secondly the Dispersal of Communities is affected by caste groupings making distinct residential zones of different communities. The market square with its bazaar structures in the lower city and the Royal Square with the temples holds the upper city together. Streets act as linkages, activity and interaction spaces.

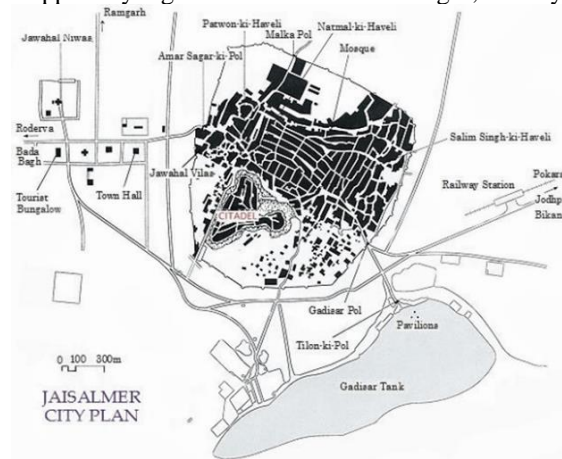


Fig -1: Jaisalmer city plan

III. CLIMATE

- The month with the highest relative humidity is August (61.52 %). The month with the lowest relative humidity is April (20.44 %).
- The month with the highest number of rainy days is August (6.20 days). The month with the lowest number of rainy days is December (0.37 days).
- Summer starts here at the end of June and ends in September. There are the months of summer: June, July, August, September.

IV. SOCIAL AND CULTURAL FACTORS

Jaisalmer district is full of art, architecture, culture and traditions dance and music and it attracting hordes of Domestic and foreign tourists. The folk music of desert is an outstanding culmination of long traditions mixed with varied social customs and inherent concept of classical music revealing the life of desert. The Chowk or courtyard provided as the Centre for differing ceremonials & customs. The Holy Tulsi plant act situate here & glorify daily to heel growth to house.



Fig -2: Jhanki of Jaisalmer Fest



Fig -2: Jaisalmer dessert Festival

V. CRITICAL ANALYSIS

Streets of Jaisalmer

The general street orientation is south-east to north-west axis. The majority of haveli structures are positioned along the east and west axis, with their longer walls facing north and south to minimize exposure to direct solar radiation. Meanwhile, the shorter walls are aligned along the east and west directions.



Fig -3: Plan of Street

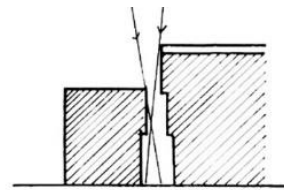


Fig -4: Conceptual street section

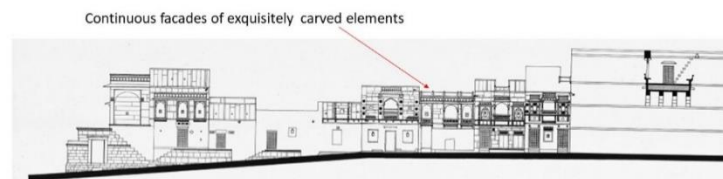


Fig -5: Section of Street

Characteristics of Vernacular Architecture

The vernacular architecture of Jaisalmer is characterized by the use of local materials, the adaptation to the climate. The buildings are made of sandstone, which is abundant in the region. The sandstone is durable, and its color blends with the natural surroundings. The buildings are also designed with the use of terraces and balconies that provide views of the surrounding area.



Fig -6: Openings with details



Fig -7: Courtyard of haveli

Havelis of Jaisalmer

Haveli is one most unique architectural features of Jaisalmer. The most detailed part of the Havelis in the facade which is defined by Jharokhas, Balconies, Canopies, and Eaves, all carved in every detail. The real openings might be tiny since the greater part of the spaces opens inwards. However, the elaborate treatment of the exteriors recommends more accessibility and openness than exists. Strangely, Havelis and more modest houses are many times viewed as close to each other, sharing a common wall, demonstrating that community grouping is a higher priority than economic status. Havelis in Jaisalmer have categorized are as follows:

1. HAVELIS OF RAJPUROHITS
2. HAVELIS OF RAJPUTS
3. HAVELIS OF MERCHANTS OR MARWARIS
4. HAVELIS OF HINDU SUB-CASTE

Principles of Design

The haveli's overall formal and spatial composition, including the design of the elevations, is one of the design elements (including external facades and internal rooms). Using a variety of architectural components and Aedicules, a detailed architectural expression demonstrates the importance of form at the micro level. The haveli's structural arrangement serves as the primary framework for the entire formal and spatial organisation from a planning perspective. It provides a framework for all design choices controlling the construction of spaces employing a range of architectural components. The structure plays a crucial part in how the elevations are designed.

Formal and Spatial Organisation

The basic form of a Haveli

- In each individual house, a central courtyard referred to as the "Chowk" takes center stage, open to the sky, and characteristic of the inherently introspective nature of the structure. The aspect of the house most exposed to public view consists of an elevated platform, a few feet in width, accessible via steps from the street.
- On this "Ota" platform, individuals engage in casual social interactions and carry out various household tasks such as laundering clothes, bathing children, and sun-drying homemade spices. The "Pidhakiyas" comprise the staircase leading from the street to the entry door.
- Interestingly, the front entrance of the residence remains intentionally concealed from direct sight within the chowk, ensuring a lack of visual connection. This distinct arrangement safeguards the privacy of the occupants by preventing a direct street-level view into the chowk.
- Functionally and aesthetically, the chowk stands as the heart of the house. Its dimensions range from narrow proportions in modest structures to expansive areas in more sizable havelis. In some larger havelis, the presence of multiple chowks is not uncommon. This central space serves as the primary gathering spot for significant formal social gatherings, as well as the hub for culinary activities. The chowk effectively fulfills the roles of an open area within the home while adding the unique advantage of complete seclusion and security due to its inward-facing orientation.

Planning of Haveli

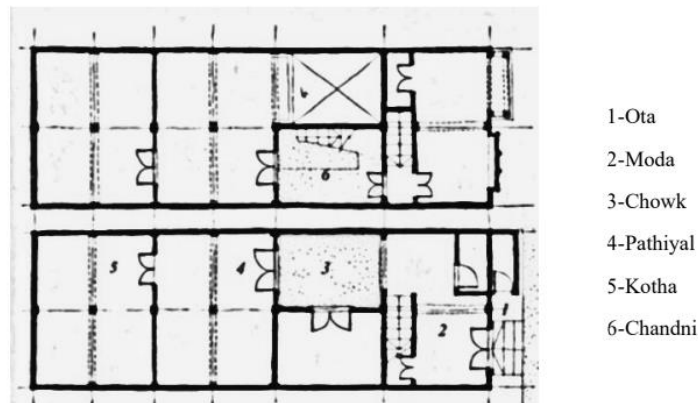


Fig -8: Plan

The general street orientation is south-east to north-west axis. Most of the havelis buildings are oriented towards east and west axis longer walls are facing towards north and south direction and shorter walls facing towards east and west direct to avoid the direct solar radiation. • The idea of “The Centre” has been a crucial one in form-making throughout the long course of this tradition.

• The open central courtyard, which is frequently surrounded by Jharokhas facing the four cardinal directions, and the representation of the house’s center on the outside elevations through jharokhas are more obvious representations of the idea. When applied to the creation of the smallest individual building components, the same idea results in complex, frequently interesting architectural compositions.

• The structural bay is the unitary component. In composition, it serves as the cellular unit. All levels, whether inside and outside, have similar markings indicating the structural bay’s center.

• From the lowest level to the parapet, it is viewed optically as a single symmetrical object that spans its whole height. Although the architectural expression of the building varies from level to floor, each piece is symmetrically placed with relation to the bay's centre line.

Elevations of haveli

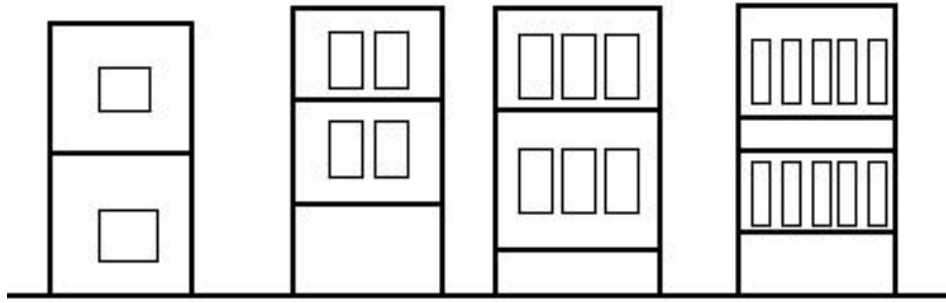


Fig -9: Conceptual Elevation with different proportions of openings

- The most basic structure consists of a foundation or plinth called a "Dasa," on which load-bearing columns, or Khambhas, are positioned.
- "Khambhas" have brackets at their top ends called margol that serve as support. These fixed brackets resemble arches but do not really function structurally as arches. They are part of the architectural style and have an aesthetic function. The load above the margol is supported by and transmitted to the load-bearing columns by a deep horizontal beam, or "Chabna", that is located directly above the margol.
- The name of this structural component—Chabna or Bharwar—depends on its orientation. A Chajja is a horizontal stone fin that is cantilevered from a wall and used to shade the wall surface, primarily from the vertical sun.
- The chajja is supported from below by a horizontal moulding with a curved profile, which is placed above the chabna.
- The "Galar" is the name of this moulding. A continuous cornice-like stone protrusion called the kane is seen on the wall surface above the chajja. The kane is topped by the "Kangra", a flat horizontal strip of stone that is typically adorned with relief designs, and the ensemble is completed by the chaap, a projecting course of stone.
- In multi-story structures, this elemental syntax is repeated on every floor. Formal variations are sought by combining different elements from the palette of forms and looking for novel arrangements. The centers of structural bays are the primary places for adicule placement.

Aedicular Composition

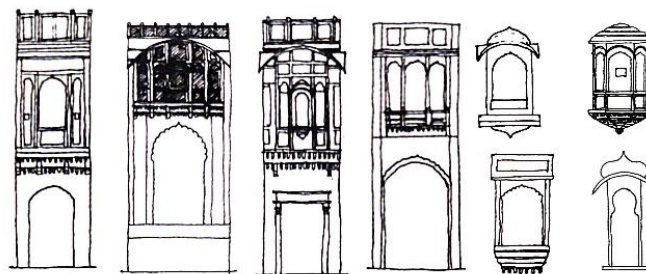


Fig -10: Types of Aedicules

- The notion of imagery and structural logic are linked in the architecture of havelis. When a shape is not actually required for practical reasons, imagery is the visual depiction of that form. The portrayal may include Aedicules like jharokha and baris as well as structural elements like khambhas, todis, and margol.
- Playing with size is a common theme in imagery. The aedicules, which are scaled-down versions of the greater structure, can provide the wrong sense of scale, especially when compared to actual items. a selection of important aedicular kinds (and variants within each type) that have been utilised historically.

Materials and Construction Techniques

Two types of construction are used for roofs and floors:-

- There is traditional method used in the roof by laying closely spaced timber beams and covering them with a layer of reed or grass matting and a thick layer (0.45 to 0.60m) of earth on top and this is used in most havelis.



Fig -11: Roof detail section

- Due of the difficulty in finding timber in the desert, in some later houses the timber stone slabs have replaced by beams.
- In above cases the all the roof and floor are finished only with mud plaster. This also shows no problem of water seepage, as if there is little rainfall.

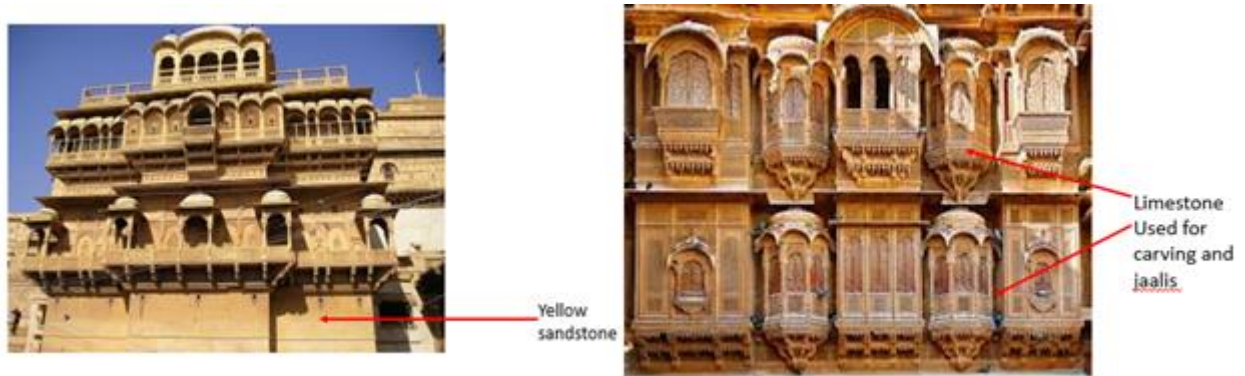


Fig -12: Materials used in elevation

VI. PARAMETERS FOR STUDY

The literature study assisted with the list down the parameters based on which the case study analysis should be possible and the suggestions for the exploration can be outlined. The parameters include:

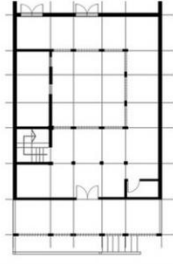
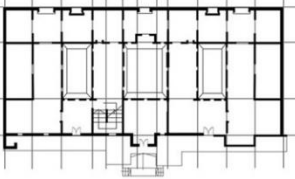
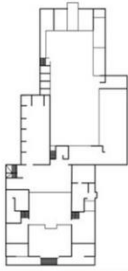
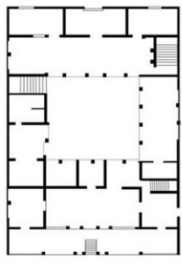




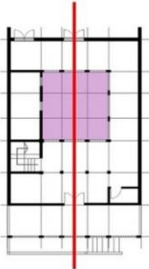
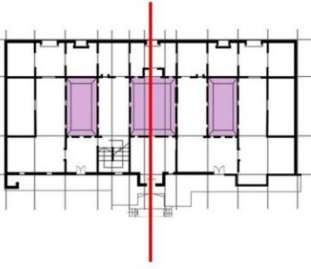
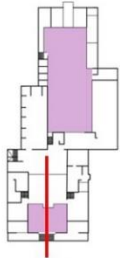
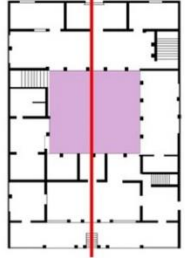

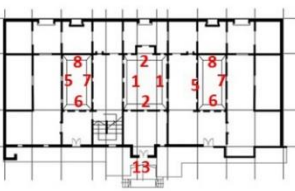

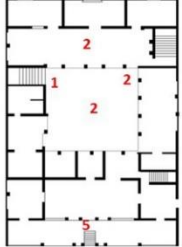
Typology, Orientation, Entrance, Courtyard, Space divisions, Elevation, Openings (Jharokha/ Jalis/ Chattris / Chajjas), Materials and Construction Techniques








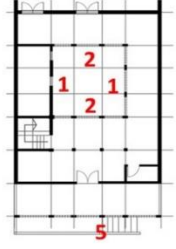
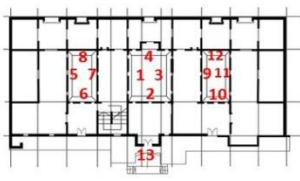




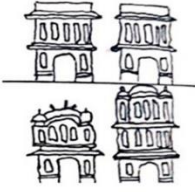
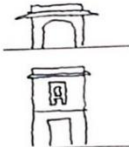

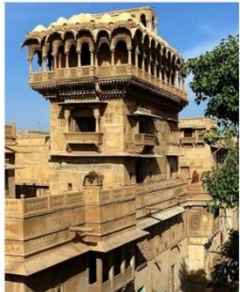


The analysis would be done on these parameters and the combination of these elements helps to create an architecture or building.

VII. CASE STUDY

This chapter aims at finding the different design strategies from the vernacular of Jaisalmer. The case studies took up for this purpose are taken from different typologies.

Four case studies are analyzed which include Suraj Kanha Haveli, Salim Singh's Haveli, Nathmalji ki Haveli, and Patwon ki Haveli. All these Havelis are belongs to different communities (Typologies)

| | HAVELIS OF RAJPUROHITS(BRAHMINS) | HAVELIS OF RAJPUTS(KSHATRIYA OR WARRIOR CLASS) | HAVELIS OF HINDU MERCHANTS OR MARWARIS(VAISHYA OR TRADERSCLASS) NATHMAL JI KI HAVELI | HAVELIS OF HINDU SUB CASTE(KOTHARIS, BHANDARIS OR DHABHAIS) PATWON KI HAVELI |
|---|--|---|---|--|
| | SURAJ KANHA HAVELI | SALIM SINGH'S HAVELI | | |
| ENTRANCE |  |  |  |  |
| ENTRANCE |  Direct Entrance |  Otta at the entrance |  Otta at the entrance |  Otta at the entrance |
| The movements and openings along the same axis and direction. |  |  |  |  |
| COURTYARD | Extrovert planning of courtyard as they usually used courtyard for interaction like bhajans. And at centre, they plant tulsi for pooja | Central courtyard for the men's interaction and other two for womens. Both introvert and extrovert planning Direct entrance to the first courtyard for interaction as it belongs to prime minister. | The first courtyard for the men as they are traders so they used this for interactions or meetings. Second courtyard for the women it's private | This is common space for them to work . Fraternal cluster planning are there. |
| ELEVATION |  Around the courtyard, they have jharokha and jalisa and the opposite side of the courtyard has the same details. |  First Courtyard has walls around with jalisa to maintain the privacy. And opposite direction has same details or openings |  Courtyard has balcony with jalisa. |  Chajjas are around the courtyard |

| | | | | |
|--|---|---|---|--|
| <p>Chowk have different openings with different proportions and ratio.</p> |  <p>Chowk view Shows jharokhas</p> |  <p>Chowk 2 view</p>  <p>Chowk 1 view</p> |  <p>Chowk 1 view</p>  <p>Chowk 2 view</p> |  <p>Chowk views</p>  |
| <p>ELEVATION</p> |  |  |  |  |
| <p>OPENINGS</p> |  <p>Upper Level Projected Chatri roof</p> |  <p>All levels Projected Flat roof</p> |  |  |
| <p>SYMMETRY IN ELEVATION</p> |  <p>There is no line of axis in the elevation of haveli.</p> |  <p>There is no line of axis in the elevation of haveli.</p> |  <p>There is line of axis in the elevation of haveli.</p> |  <p>There is line of axis in the elevation of haveli.</p> |

VIII. CONCLUSION

Vernacular architecture of Jaisalmer is an outstanding example of how traditional building techniques and materials can be used to create sustainable and aesthetically pleasing structures that reflect the local culture and identity. Ensuring the protection and advancement of Jaisalmer's indigenous architecture is vital to safeguarding the city's cultural heritage and maintaining its distinctive identity.

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