

Indigenous Architecture of Havelis in Rajasthan

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Abstract - Winston Churchill right away says the grasp of architecture & surroundings with the phrase that "We shape our buildings & later they shape us. Architecture is a civic profession that feels all human beings at all levels of their reality everywhere & every day. The space induced a previous old historical descendant to suggest that spaces grip our mind to think about the past events & incidents in it. The world should move towards sustainability through the vernacular aspects. In this Rapid growing modern world, the built form is majorly mechanized with the active technologies which in turn increases the cost of living. Vernacular principles provide a comfortable living environment through sustainable principles & energy-efficient techniques. Indigenous architecture is the only solution to the problem the world is facing. This paper's result represents, what does haveli mean? Through spaces & function in architecture. we also form the valid highlighting points with supporting case study. We found valid passive design ideas, intrinsic construction details of Havelis of Rajasthan. Also, endorse the vernacular aspects in the modern building through Indigenous architecture of Haveli & its responsiveness to location & climate through the case study of Nathmal ki haveli which promotes more sustainability with high energy-efficient techniques.

Key Words: Sustainable, Vernacular design, Passive design, Energy efficient ideas, Indigenous intrinsic details.

1. INTRODUCTION

Today, the building zone causes up to 30-40% of the world's whole energy consumption (I.E.A-2008). In developing countries (World Energy Outlook 2007) it takes for a lot over percentage. A big part of energy utilized in buildings is used to earn thermal comfort for the resider/inmate through cooling, heating & lighting. Vernacular architecture connects a universal way to draft the buildings so that many contradictory problems & demands of ecology, economy & Human wellbeing are combined. Current buildings are more inept to fit a warming climate & are naturally energy fast/deep into it. In adverse vernacular architecture also flexible to environment allow to ethic/value by varied generation.

2. METHODOLOGY

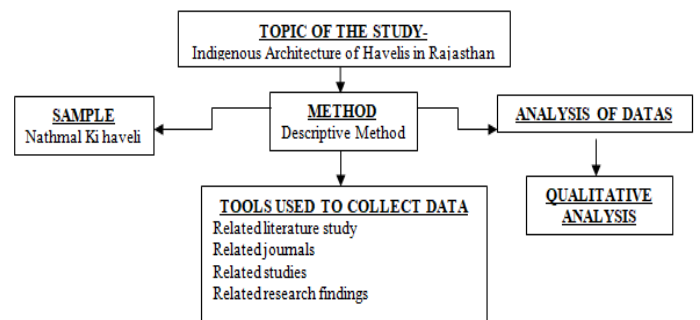


Chart -1: Methodology of studied

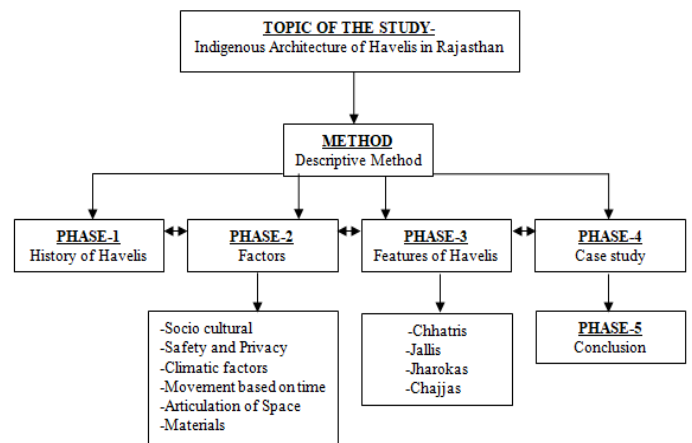


Chart -2: Detailed stages of framework

3. HISTORY OF HAVELIS

HAVELI-Mansion, Residence, Dwelling, Estate, Habitation, Manor, Villa.,Etc.

- The term Haveli arises from Arabic, Ancient havelis dressed Muslim emperor of Indian Subcontinent & evolve into an essential architectural part of urban environments below the Mughals. Although havelis rise from Indo-Islamic architecture the life of multistory homes in area is claimed ad early a 3300 BCE.

- It have exact contrasting architectural approach from traditional havelis that exist refined below Muslim rule. Conventional hurt in Indian Subcontinent are made over a courtyard, and all family action roll around this chowk or courtyard. Also, the courtyard aid as a light wells & serve ventilate the house in hot & dry climates of region.
- While the medieval period, the name haveli was along utilized in Rajputana by the Vaishnava to mention to their holy place in Gujarat covered by the Mughal Empire & Rajputana kingdoms. The Ancestral caption haveli finally near to be label by townhouses & Mansions of merchant class.

4. TYPICAL FEATURES

i) Sociocultural condition:

- 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

ii) Safety & privacy:

-The chowk, at span, divided spaces for men & women keep them by privacy.

iii) Climate:

-Utilizing open area in building form to react to regional climate, air flow induce by temperature changes comfort in the Natural ventilation of the dwelling unit. [1]

iv) Movement based on time:

-In morning, the courtyard was utilized regularly by women to perform their work & communicate with more women in private open space.

-Palace of the Vendor caste usually had over than one courtyard.

v) Articulation of space:

-Chowk, piece of the city mansion group in Udaipur, there is the theory of the courtyard as a Dancing room. Likewise, in havelis a courtyard has many functions, generally used for weddings & festive shows.

vi) Materials:

-Bricks, sandstone, marble, wood, plaster, granite are frequently used materials

-Decorative look are determined by various local skills & heritage.

All those factor tie to build an place & contribute the chowk collected assure feel. The shape of havelis has expand in reaction to climate, lifestyle & availability of material. In hot climates where cooling is essential buildings with internal courtyards for breeze & cooling were express the utmost suitable fitting of form. In rainy site the houses were made to be stored.

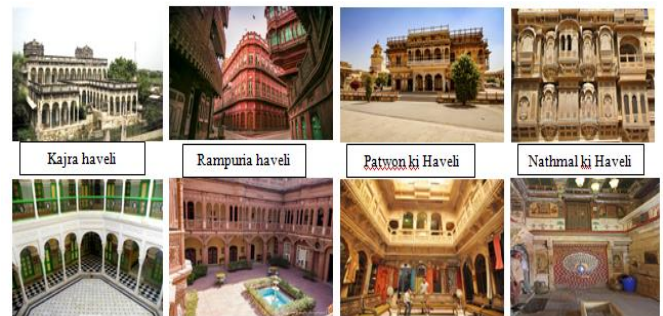


Fig -1: Different havelis which exists

5. FEATURES

CHHATRIS:

-Grant arch form canopy used & an detail in Indo-Islamic architecture & Indian architecture. Beginning as a shade over tombs; it reacts a enhancing element. The enhancing case of chhatris existence utilize in Indian Sub-continent exist fix in Mausoleum of Ibrahim in Bhradeswar.

-Still used in Rajasthan & More unit of Indian Sub-continent by the pair Muslim & Hindu emperor its roots are Indo-Islamic.

ABOUT IT:

-One of the rich of all Memorials, the Chhatri nonce perfectly crafted cenotaphs expose it as a great visitor interest in it. The Commemorative badge is made in the mind of Sage Vyas who had recorded the tale Mahabharata is a ritual Pyre land for the Brahmins placed in Jaisalmer.

- The Shrine devoted to the sage is placed north of the whole structure. These shrine were built as a motif of tribute to the crew of the regal group later it's dying. The glory & goods of chhatris & pillars show the Evergreen Rajasthani architecture. Intrinsic layout, figures & the material used must have been elite. The chhatri is still widely noted as the Sun- set mark ceding a exclusive view of the beautiful city of Jaisalmer. Expressing back the form the tricky slash of arcades structure are numb in their debut. A Stay here will give you an enduring peace & calm in particularly mid dusk. It able hint of the stout life who trek on this tar & is a glad hint of India's Civilization & Haves craftlife who trek on this tar & is a glad hint of India's Civilization & Haves craft. The Obelisk order was made for the fond regard of Rajput emperor & its families from the

civic patch sandstone. The area's usual Bhatri Rajput king made these tomb to respect the grant of their precursor. The Mild cleft on these.Chhatris are the top case of real latent of Rajasthan buildings.



Fig -2: chattris

JALLIS:

- A Jali or Jaali is a meaning "Net". The style for a permeate stone or net screen mostly with a decorative mold build over the avail of Calligraphy, Geometry or Natural patterns. This style of architectural frill is typical in Indo-Islamic architecture & also usually in Islamic architecture. It admit light & air while underrate the sun & rain.
- Also when the air cross over these openings, its velocity rise offering deep scattering. The Gap are much about the equal width or less than the density of the stone, thus given structural stability. It has been descried that moist space like Kerala & Konkan have best dent with total fort quantity than correlated with the dry climate regions of Gujarat & Rajasthan. With the extensive use of glass in the move recent 19th century, Density of the residential space in Contemporary India, Jallis develop into less usually for Secrecy &Armor thing



Fig -3: Jallis

JHAROKHAS:

-Shape of extend cover porch about verified in temples, havelis & palaces fixed in Rajasthan. The Jharokha balcony I primarily stone window. It active for Spare structural style to the building for any more definite limits. While prior days, women with shawl use to see outermost by concealing themselves internal this attire.

-The Project balcony is a key form of Rajasthani architecture make it need as tool embellishment & too as a vision noticing platform. There are lot of Jharokhas fetch chhajjas with them. It worn to start back separating the façade face. It keep be used the pair to raise the aesthetics of the building alone for a limited design. One of the best corping part that could be erect in past, the casement keep add secrecy that admit women to notice the fact in exterior left out the presence seen by others in mansion these Jalousie could also be worn to area curves & scout.

- Jharokha is utilizing to

- Aesthetic representation
- Climate condition
- Elevation treatment

-Not purely an aesthetic aspect; in fact, it also help the act of secrecy& had a thermic gain by one more set of windows. The previous structure of the home were worn to afford typical heating & cooling by cross-ventilation. The Jaalis &Jharokhas are not onliest for secrecy & ornamental idea still more for purifying & freshning.Feat as atmospheric mitigator admit ventilation & tie direct sun into the interior.

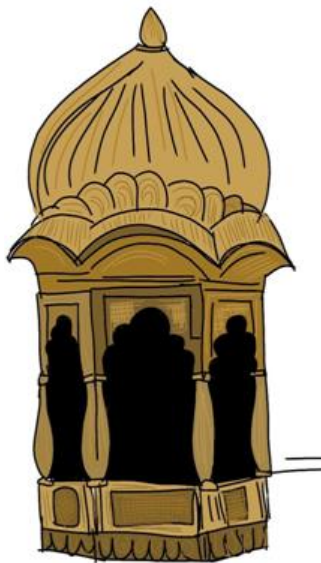


Fig -4:Jharokhas

CHARACTERISTICS:

- Project from the wall
- Does not stretch to ground
- Promoted by brackets or carbels regularly truly ornate, symbolic & ornamental in medieval times.
- Normally on upper floors

Sense for utilize Jharokha appear to be climatic as it cover the network from direct sunlight & admit air to crawl the main space. This Window used in hot & dry climate belt. The Façade clear to sun reduce repeatedly applying this detail. The Exterior look of construction worn to be a coat with this kind of protruding extend hang, jaali & small vent in it works for ventilation purpose. Passive system used to control thermal relieve. More a feasible architectural part like Jalis (Screens), Verandas, Fountain, Plants, Chajjas, Courtyard, Basements that admit ventilation but obviated Direct glare

CHAJJAS:

-It is an extend Soffit or Ceiling cover in Indian architecture. It is typify with huge hold support with distant artistic model or pattern. Mutation is also note in area built upon the concern of building on which it face or best of designer. It part is same to that of other project or soffit in that it save & decorate entrances, arches & windows from external part. Some tone of dome can be examined large chhajja a whole

Even there is no clear accord on when the chajjas develop as an architectural part, it can be imitated end to ere the growth of Mughal realm in India

The type idea of the Chhajja's a lot of the new Indian Architectural drop with it regularly outlined end to building design from older years



Fig -5 :Chajjas

6. CASE STUDY

Region: Jaisalmer, Rajasthan

Climatic condition: Hot & dry climate

Air temperature: Max 49.2deg Celsius, Min 1 deg Celsius

Rainfall: 16.4 cm

Design Strategy: Resist heat gain, Promote heat loss

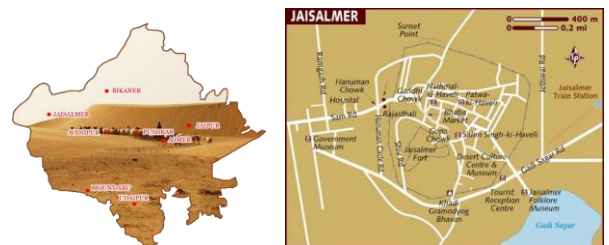


Fig -6 : Location of haveli

History: Two twin named Hathi & Lulu were approved to form the Haveli for Diwan Mohota Nathmal, with the authority of the plan of this glorious haveli [2]

They initiated brother focus on one side of Haveli [3]. The remain of building it concurrently exhibit up with distinct left & right edge through work was finished. Still it didn't glimpse more overt and one concern it only detect it concern firmly.

About it: One more captivation is the elephants in Yellow sandstone, which are fixed at the attractive incised entrance door. Same if these are not comprised, Nathmal Ki haveli is quiet examined the leading in Jaisalmer in rate of dazzle. There are added art in the haveli that value recognition. These are too elephants finished of Yellow stone that are marvelous at itself. [2] These soul extent clone have been put in façade of the main port so that it case as if they are protect the haveli & convenient the inmate else than these, there

pictures incised on pillars & walls. Those images of Horses, Cattle & illustration of flora with view chattels. But the best appealing aspect of this haveli is the etching of current ease such as cars, fans, etc...,

The walls & ceilings of the lavish marker are adorn with rare paintings & fine cleft that cast to the charm of historical structure. The Monied architectural invention of the two brothers is mirrored in the different paintings of modernized ceilings fan & cars on the curb of Nathmal Ki haveli. A structural whiz of ancient age, Nathmal Ki haveli nonce a congenial mix of endemic architectural trait of Rajput's & Muslims. Between the quaint scenery of Jaisalmer the ogre architectural marker of Nathmal Ki haveli angle great with it by grand architectural structure

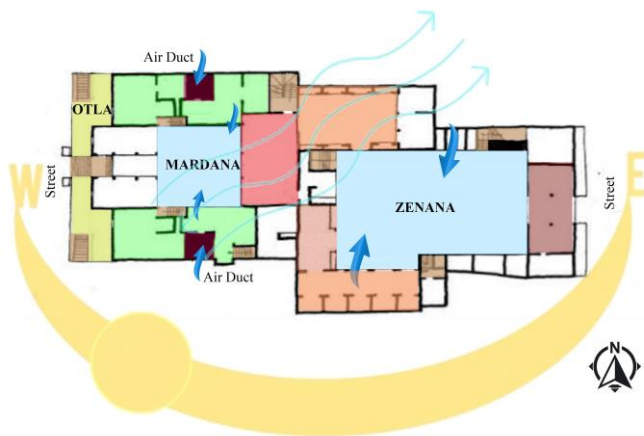


Fig -7 : Ground floor plan of Nathmal ki haveli

About Plan: The building is outlined over two patio, the one in the façade is a lot lower than the true one. The first element of the building is three storeys tall & has the central living cottage. The back part is two storey tall & include the additional adaptation.

Building Form:

The whole building is of uneven ceilings with wind canopy great parapet walls, sire an irregular sky& earth line overshadow in the concot. At the forward lay they keep a include of Eaves like sunshades & balconies. At the base levels, the flush unit of the building exterior are acutely carved devise finned flare up. Spotty building plan also clart irradiated heat loss from walls. Along raised wall area of the bumpy building mass scatter a better extent of heat to the sky as consequence stays cooler than a more covenant mass.

Spaces:

The study area of the family is placed on the first floor over the doorway. This amply gild room is two storeys tall. There are timber shuttered window openings against the street & large digit of small ventilation pocket in the uppermost part

of the room. Compose these openings clinch heat exile by ventilation. The place in the lower floor were devise as strong sway for asset. The coldness of some degree rest stable around the year owed to the hooky of any heat heft due to prompt ruin of the ambience heat curl in soil.

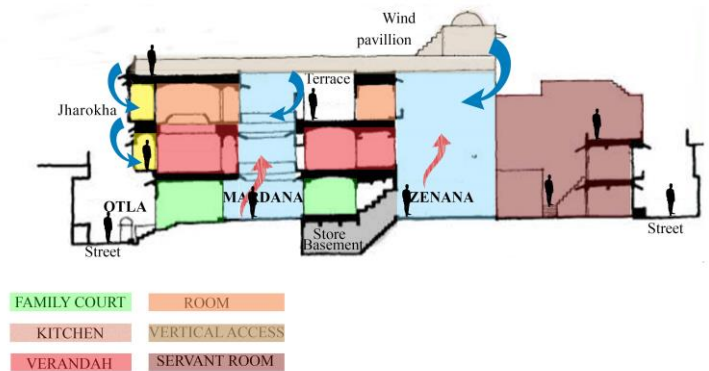


Fig -8 : Section of Nathmal ki haveli

Building Materials: The carnal worn for curb in this haveli is usually Light sandstone as limestone abide used for the top storeys & front it can be well carven. The stone joints are built without mortar and are gripped stable proving iron twinge. Rate to wide solid walls and clay cement, it trim the thermal load on the building.

Windows: Windows & balconies are typically proper fit with jallis or lattice windows. Curtain like windows for secrecy as well to reduce dust but at the alike time allow in wind to interior. Doors are made with stone flounce and suited with timber doors.



Fig -9 : Detail of window

Roofing: The ceiling is finished in conjunction with separated timber beams & next is capped by a coat of reed or grass covering lastly fix by a band of earth on tip. These are then polished with stone floor or mud plaster. The Course of earth & grass covering control the inside refreshing air conditioned. Stone joints are made without Detail of carved mortar and held together with panel: iron cramps.

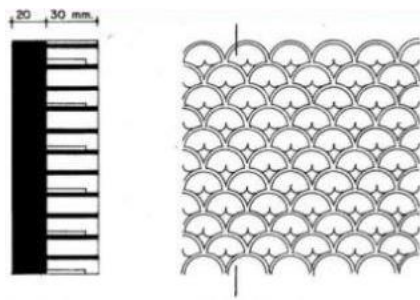


Fig -10 :Detail of Roof

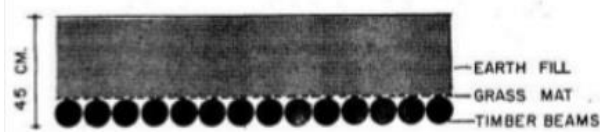


Fig -11: Section of Roof

Air Ducts: Perpendicular ducts & stair shafts blunt the wind order into the house & drive the ventilation over the courtyards. The Yards supports the basic light & ventilation for all the background places. Interim the façade gain few sunlight amid the summer, the back courtyard is entirely bared to sun. The trail and slender shafts are entirely shielded from the sun. The differential heating of the vertical channel assures constant movement over the house

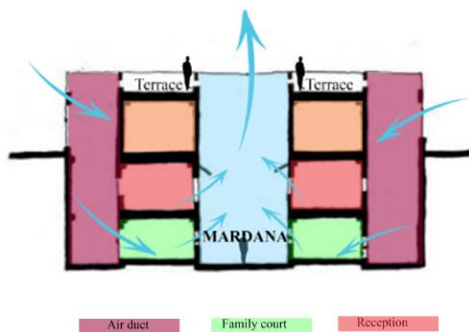
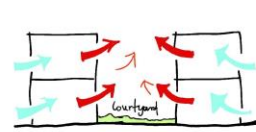


Fig -12: Section of front portion

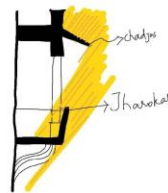


INDIGENEOUS DESIGN SOLUTION IN MODERN BUILDINGS.

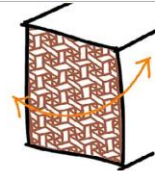
1) Insertion of courtyard – for achieving stack effect



2) Providing jharokhas – nowadas as an overhanging balcony which gives shade as well as aesthetical element



3) Providing chajjias- nowadays as extending the eaves – shade purpose
Large projection provide shade to façade



4) Providing Jallis- nowadays for ventilation without dust and as well as façade treatment
Deep carved patterns – minimize the heat gain



5) Uneven building forms- radiative heat loss from walls.



6) Increased wall surface – greater amount of heat loss as a result cooling effect

Fig -13: Indegenous design Solution in Modern building

7. CONCLUSIONS

After studying the Havelis in detail, following conclusion can be made by our self as:

-The Havelis react best aptly to the weather of region and culture of the community in rate of material excerpt, spatial alignment, construction style and benefit of passive design feature

-With the mixed result of all features, the interior of the building ever bring a cozy habitat when the surroundings appearance was annoying

-The identical space could not equip the covet refresh in all seasons. Thus there were a array of spaces (open, semi open and enclosed), which were worn, in various period and times of day.

-The inclusion of static study mien use an inclusive path to form precise from the rise of building. This intend that the construction method to be endorse, the plan at cluster level and building level, the materials to be used and all other

point required to be route together to clear up the issue in an eco-friendly, philosophically, climatically and cost-effective & efficient manner.

Thus the time and money spend in modern buildings to achieve energy efficiency can be achieved by endorsing our vernacular architecture which has many hidden profits in it. Vernacular architecture beauty lies in responding to the context. Giving truth to the existing one without altering the truth. Entire process has been borne in our contemporary buildings it excogitate as a "PARADISE

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