

# Study of House-Form and Settlement Pattern of Vadnagar, Gujarat

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**Abstract**— Architecture is generated by various layers like physical as well as cultural. It is an integrated outcome of living and cultural pattern of people, social structure, history, climate, materials, economy, technology prevalent at that place, and the aspirations of the people. Each layer contributes varyingly, weaving complex yet a united whole. Each layer is the character of a context, which is very specific to a place. Architecture causes in form and space concerning attributes of a place. Architecture, unlike other art forms, is distinct from music, sculpture, literature, fine arts, or motion picture since its expression and physical forms are inseparable from the location.

The first part of this paper illustrates/ photographs the study of Vadnagar, Mehsana, Gujarat while the second part is the Documentation of Bhatia Sheri and its traditional House forms with the Street formation. The work is focused on the architectural characteristics of the place. The description of Vadnagar is not complete but an attempt to explain the essence of this marvelous region of North Gujarat.

This paper is an attempt to capture, Documentation and explore the dynamic lifestyle and the essence of a place with such distinctive characteristics between House level, Neighborhood level & town level private/public open spaces along with its architectural beauty.

**Keywords**— *Vernacular Architecture, House form of North-Gujarat, Construction Techniques, Street formation. Open spaces.*

## I. INTRODUCTION

Vadnagar (23° 47' N; 72° 39' E) located in the northeastern part of Gujarat is one of the ancient towns of the State. Known by various names such as Anartapura, Anandapur, Chamatkarpur, Skandpur, Nagaraka, etc. during different periods of its history, it is one of the important sites for Buddhist studies and understanding historical and cultural development of the State as literary references and archaeological evidence revealed. Xuanzang of Hiuen Tsiang, visited Vadnagar (on-an-to- pu-lo = Anandapur) around 641 CE. He records that there are more than 1000 monks of the Sammatiya School or Little Vehicle in 10 monasteries. This suggests that Vadnagar was one of the important centers of Buddhist learning in western India during that period. He also records Vadnagar as a capital city that has no king.



Figure 1: A map of India showing locations of Gujarat State.



Figure 2: A map showing locations of Vadnagar Town.

Geographically, as the topographical map of the area reveals, the initial settlement of Vadnagar was established on the left bank of a wide shallow depression, possibly a remnant of the palaeochannel of River Sabarmati. At present Sabarmati flows at about 15km southeast of the town and another river named Rupen lies about 4 km northwest of it. The local tradition carries that the town was located on the right bank of a small river named Kapila which was transformed as a feeder canal to Sarmistha Lake in the medieval period. *Ain-e- Akbari*, a 17th century CE biography of the Mughal ruler Akbar, records that during his time there were about 360 water bodies around the town, each having a temple. The sandy loam soil around the town provides good agricultural yields. The Aravalli hill range, which could have

been a source of a variety of natural products, is not far away from it.

Vadnagar was ancient, situated at a strategic location where two major ancient trade routes crossed each other. One of them was from central India to Sindh and further northwest while the other was from the port towns on the Gujarat coast to Rajasthan and north India. Therefore, it could have been a city of ample opportunities until these routes remained vibrant. Traditionally, Vadnagar was also known as one of the important land ports (*SthalPattan*) of Gujarat.



Figure 3: Geographical map with Six Gate of Vadnagar.

The main town of Vadnagar is still situated within the ancient fortified area. The present settlement is perched on the high mound that has been formed due to the gradual deposition of cultural debris during the last 2300 to 2500 years of its uninterrupted occupation. The Ancient fort wall is still visible on all sides of the town, although, its complete height with the latest battlemented parapet is available only at a few places. The fortified area measures approximately 995 m east to west and 660 m north to south. The six entrance gates two each through the western and southern wall and one each through the northern and eastern wall appear to have been originally constructed during 12th century CE, possibly, at the location of earlier gates. At present only two of them, Amthol Mata Darwajo (gate) in the east and Pithori Darwajo in the south are more or less in their original condition and are built in the Hindu style of gate architecture whereas the other three gates show later renovation that was carried out at the time to time till 17th century CE. The Ghaskol gate through the southern wall is at present only in the form of a wide opening, without any architectural features. The highest area of the present settlement appears to be near the ruins of the ancient citadel known as Darbargadh. These gates. The present layout plan of the town is datable to the mid 19th area is about 25 m high from the surrounding ground level. The present houses or groups of houses following the contour of different streets and lanes are located at different altitudes of the ancient mound. The existing major streets of the town show a gradual ascending towards the Darbargadh from all the entrance century CE.

## II. HISTORY OF THE TOWN

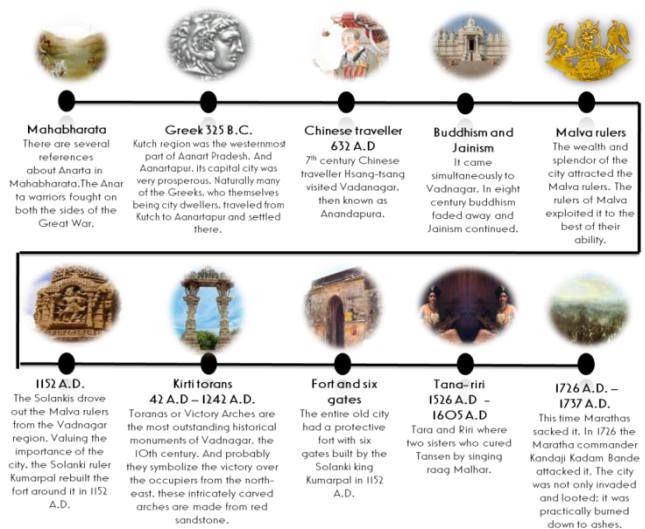


Figure 4: Flow chart of the history of Vadnagar

## III. ARCHITECTURE & STREET FORMATION OF VADNAGAR

Habitat in a semi-arid climatic region is a composition of open, semi-open, and enclosed space is interwoven together forming the public and private realm- collectively called 'Built form' or 'Built environment'. The beliefs, religion, climate, materials, social structure, and economy of the people of that place shape the living pattern and the habitat of the Place. Conversely, the habitat and lifestyle reflect the behavior, social setup, economy as also the deep-rooted traditions and aspirations of the people.

Vadnagar (23° 47' N; 72° 39' E) located in the northeastern part of Gujarat is one of the ancient towns of the State. Geographically, as the topographical map of the area reveals, the initial settlement of Vadnagar was established on the left bank of a wide shallow depression, possibly a remnant of the paleochannel of River Sabarmati. At present Sabarmati flows at about 15km southeast of the town and another river named Rupen lies about 4 km northwest of it. The local tradition carries that the town was located on the right bank of a small river named Kapila which was transformed as a feeder canal to Sarmistha Lake in the medieval period. *Ain-e- Akbari*, a 17th century CE biography of the Mughal ruler Akbar, records that during his time there were about 360 water bodies around the town, each having a temple. The sandy loam soil around the town provides good agricultural yields. The Aravali hill range, which could have been a source of a variety of natural products, is not far away from it.

The town has a 27,790 population and people are of various castes and communities. There are 92.19% Hindu, 7.09% Muslim, 0.5% Christian, 0.17% Sikh, and 0.41% Jain etc. The zoning of public and private activities in the town gives the reference and shows a resemblance to a typical old Indian town. The whole settlement is based near the water sources (Sarmistha Lake). The major population is Hindu, Jain and Muslims with a firm hold of the caste system. People of the same community stay together forming major zones of

the town. Today many houses of Vadnagar are unoccupied as people have migrated to cities for employment.

The Six gates (Nadiol, Amtol, Ghascol, Pithori, Amarthol, & Arjunbari) are the formal entry points of the town as well as the main and large chowks of the town. Some streets radiate from here in different directions. While walking across the town Inner Street becomes quite narrow and finely carved entrances of houses with repetitive main entrance door with small niches and long windows on both the side are seen. Streets take angular turns at intervals and almost all houses have a sloping roof.

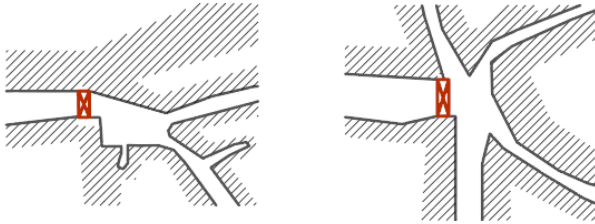


Figure 5: Nadiol Gate nu Rabariwas.

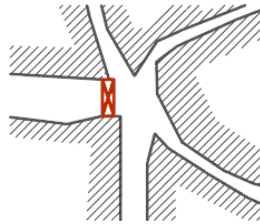


Figure 6: Amtol Gate nu Chaklu.

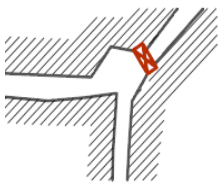


Figure 7: Ghascol Gate (Bhuneshwari Mata no Chowk).

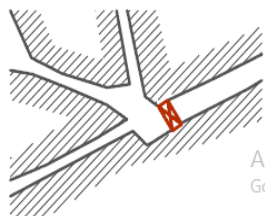


Figure 8: Pithori Gate (Amba Mata no Chowk).

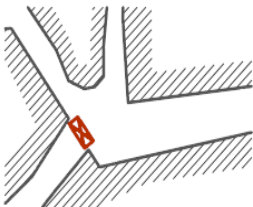


Figure 9: Amarthol Gate (Shebharvad no Chowk).

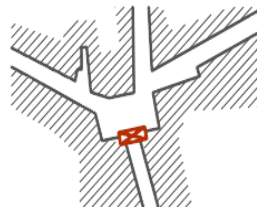


Figure 10: Arjunbari Gate (baroti no Chowk).



Figure 11: Overlooking from the Nadiol Gate to Rabarivad town square.



Figure 12: Overlooking from the Ghascol Gate to Bhuneshwari Mata town square.



Figure 13: Compact organization of Vadnagar from the tower.

Houses of the town are row houses on both sides of the street. Many features like doors and windows, color, textures, carving on lintels distinguish a particular house and the group. Row housing pattern reduces the exposure of external wall surfaces to the sun as the houses share a common wall. The movement of warm air inside the house is minimized and helps to keep the interiors cool and comfortable.

The streets of Vadnagar have a unique pattern. They are constantly turning in T or Y shape, in a particular direction through small chowks of T or Y shape. The entire town is a mesh of these curvilinear streets which connect the chowks. It is like water lines flowing smoothly in various directions and as they go ahead the width goes on decreasing, forming alleys. At a large scale, the entire street network has a distinct advantage in that the curvilinear streets behave like channels of winds throughout the town. Breeze can be discreetly felt on any street in the town justifying the curved street pattern.



Figure 14: Y and T-shaped branching of streets forming small intersections (Chowks) at regular intervals.





Figure 15: Human scale of shades streets, the changing heights, and ever-extending views of the street.

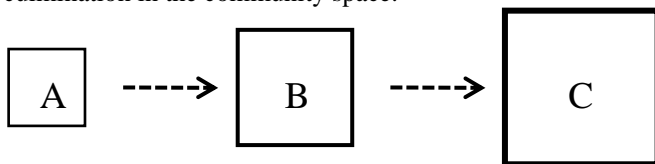


Figure 16: Platform as an integral part of houses and streets.

#### IV. SYSTEM OF OPEN SPACES

The entire town is a network of curvilinear streets connected by chowks of varying proportions and scale. The visual and physical lengths of streets go on decreasing in the town. The main community space or chowk (C) is the largest from which the main streets radiate, and it is the hub of commercial (economic) activities of the town. It functions both as a maidan for congregations and as Bazaar. After the square, at the junction of major arterial streets (primary streets)- main street intersection chowks are formed. They are in Y or T (trident shape) to serve as neighborhood spaces like Temple, Shebharvad no Chowk, Amtol Gate nu Chaklu (Secondary Street). Narrow streets and lanes continue (Tertiary streets) to terminate the space around 10-12 houses which are in most shared door fronts or Delly.

It is a sequence as a whole, and intertwined hierarchy of public spaces- beginning from the doorstep where the private domain of household ends and the public domain begins, further continuing into the neighborhood spaces to culmination in the community space.



A= Entry of the House(Delly)

B= Neighborhood space

C= Main street chowk as community space

At the intersection of B or C streets form neighborhood chowk open space. The street pattern apart from the house facades and activities is characterized by these open spaces. The narrowness of the street is reduced by occurrences of such intermediate chowks. The whole town has 6m to 8m wide neighborhood interaction spaces. A typical feature of these neighborhood spaces in the street shines with chabutaru. The narrow lanes terminate ahead in a small Platform with an Otlā of 10 to 12 houses of about 3m to 6m in size. In these small Platforms at the entrance steps of

houses people sit and interact with each other, kids play around- makes it an active space. Open spaces around the houses are formed considering the use and the scale, distances; several uses perfectly blend in a sequence of domains. The public spaces are gradually enlarged as social interaction is increased between the houses to the neighborhood to the community and finally as the whole town.

There is a visual order in the overall architectural composition of built form evolved with response to the climate and social aspects which seem to be planned and is not random growth. The evaluation of the organic form of the town needs to be understood: how the street catches breeze by staggering houses with varying proportions of width and height, the texture, color, opening pattern, and carvings of the façade causing play of shade and shadows, etc.

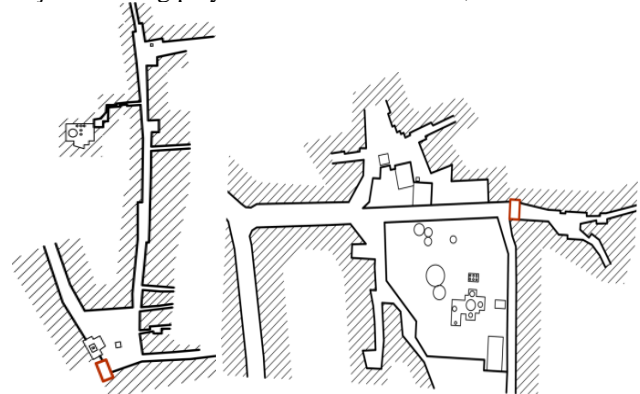


Figure 17: Ghascol gate (Bhuneshwari Mata no chowk).

Figure 18: Hatleshwar Temple chowk.

#### Legend

A- Entry of the House (Delly)

B- Neighborhood space (Modhvada nu Chachru)

C- Community space (looking from Ghascol Gate – Bhuneshwari Mata)



Figure 19: Neighborhood open space with chabutaru.

#### A. Elements of Street

The pair of doors and windows with Gokhala and decorated lintel has a symmetrical arrangement to mark the entrance. It shows a varying order of ornamentation- from the simple to the exclusive. The carving depicts birds, flowers, and auspicious symbols. The scale of the house, the intricacy of carving. Sizes of the opening, colors, the entry steps

indicate the status of the family. These elements give a distinct visual character to the streets and form the streetscape..

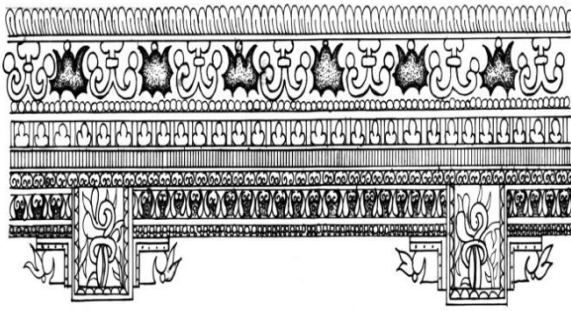


Figure 20: Wooden Carving.

All along the curvilinear narrow streets, the streetscape is continuously changing with a visual tension and curiosity at every point- offering new views and vistas. The curved streets, the changing light intensity with shades and shadows on walls and streets, the varying stone, brick, mud color and textures, the carving and composition of doors and windows, the proportions and heights of the houses, the occurrence of wide spaces in the form of chowk in the narrow street network forms a pleasurable walking experience.



Figure 21: Neighborhood space continuously changing with visual tension.

Figure 22: Ornamentation of the streets.



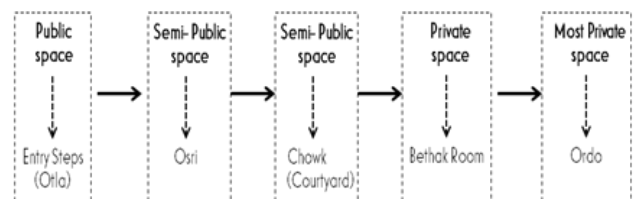
Figure 23: Ornamentation of the streets.

The movement through the streets in bright sunlight with the continuous cool breeze makes walking on the street visually and climatically a pleasurable experience. The space is enlivened by the people and their activities, the combination of shifting narrow street patterns with the embellished elements of streets, entrance, and open public space as chowks form a visual character of the town. It is an experience of movement through one complex.

Vadnagar town is a beautiful example of vernacular architecture where each Mahad is part of the large composition. The climate, social structure, and cultural patterns are an initiate of the town form. It has an organic structure form that evolved time by time and is an excellent architectural model for Habitat.

## V. HOUSE FORM

This house is located at Bhatia Sheri of Jain deraser road. It belongs to a Jain family of two persons Hasmukhbhai and his wife Renukaben choksi and is entered from the street by small steps with the platform (Otlā). The guests or the visitors are entertained at the steps and as per the familiarity is welcomed inside the Osri. The house is 120 years old.



The basic form of the house is an elongated space with two courtyards and two-story rooms on the front and rear sides. Both the rooms have sloping roofs supported with wooden members. All the spaces and activities are concentrated around the courtyard and organized in a system from public to the most private spaces. The elaborate entrance door decorations, fine woodwork of furniture, stair, and large storage also indicate the affluence of the family. The sequence of spaces is as follows.



Figure 24: Street elevation of Bhatia Sheri of Vadnagar.

Figure 25: Street elevation of Bhatia Sheri of Vadnagar.





Figure 26: Street Plan of Bhatia sheri.



Figure 31: Court spaces of the houses.

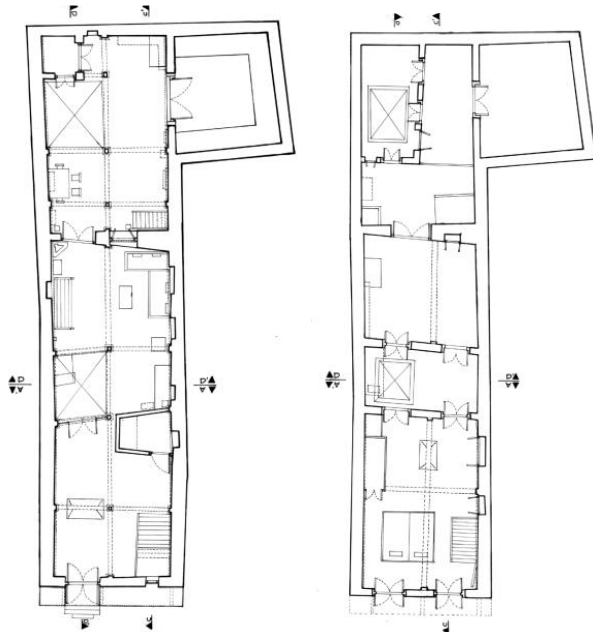


Figure 27: Ground Floor Plan

Figure 28: First Floor Plan.



Figure 32: Section AA'

Figure 33: Section DD'



Figure 29: Section BB''

Figure 30: Section CC'

The courtyard lights help in ventilation for all the rooms of the house and by their proportions, it is in shade for most of the day. The open to sky court brings nature inside the house and creates an inner microcosm of the family- a space for every family member. So the court forms an ideal place for their working in an open area with privacy. All the household activities by the lady are done in the courtyard from drying of food articles to cleaning of utensils, washing the clothes as well as marriage purposes.

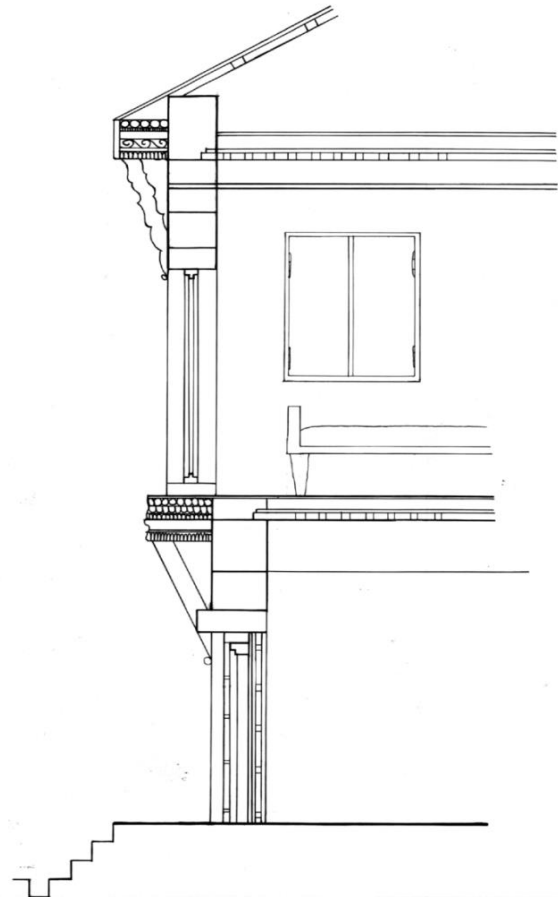


Figure 34: Front Wall Section of the House.

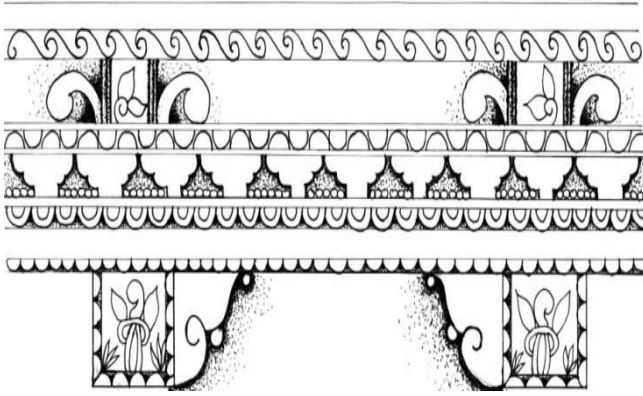


Figure 35: Wooden Carving



Figure 37: Inner Photograph of the house.

Figure 38: Inner Photograph of the house.

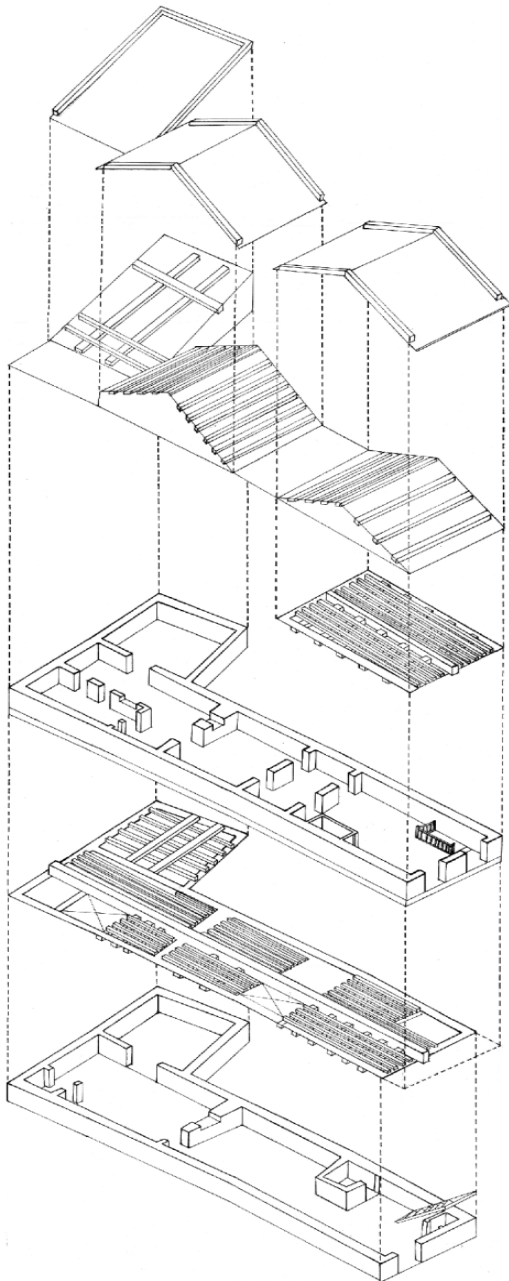


Figure 36: Isometric view of the house.

#### A. Analysis of Built form & Spatial Organization

The Vadnagar town planning and its house forms, the spatial organization, and its system of private and public spaces illustrate the climate and social setup as the basis of the evolution of the town form in the north area of Gujarat. The houses have a sequence of spaces with social status and living patterns. The spatial hierarchy of a house, the community spaces, and the street show transition and a clear order from the most public, semi-private, and most private spaces. Cultural patterns and climates have influenced the planning and design at every stage from the chowks to the smallest details in the house. The natural elements of sun, wind, and water are responded to in architecture for community, family and individual needs. A distinct genesis is observed in the planning houses, the curvilinear streetscape, the varying scale of public spaces, and the plan of houses. It gives a definite character to the entire town and specific vocabulary to the built form (Built Environment).

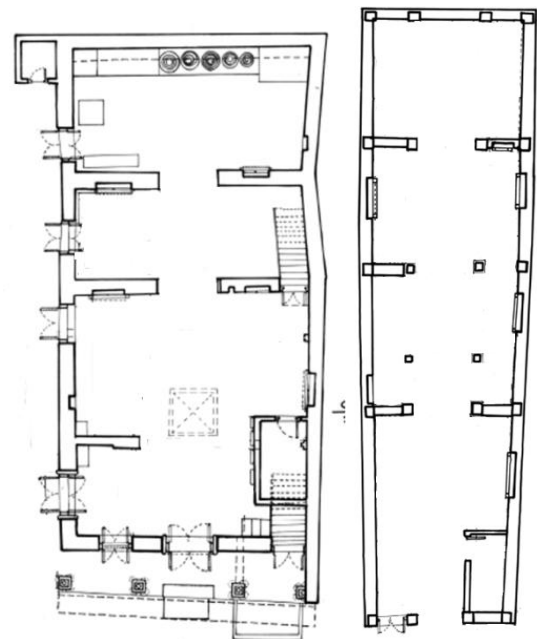


Figure 39: floor plan of two various houses.

## VI. CONCLUSION

The houses of Vadnagar and various parts of the north Gujarat region are diverse, beautiful, and interesting as built forms and spatial arrangement. The plan varies as per family structure, particular beliefs and is enriched by each community's elements of decoration. The construction techniques are simple using available local materials like stone, bricks, and wood. The overall architectural vocabulary and language are uniform and rigorous. The houses illustrate the sequence of activities and interrelation of both public and private space and explain the character and lifestyle in the Vadnagar town.

In the other area of the region like the Kheralu, visnagar, shipour, Umta, Kasa, etc similar types of house and settlement patterns, its evolution and development are observed as Vadnagar. However, the scale, the streets, the size of houses, and the character of towns/ villages change according to their regional importance and population.

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