AN ANALYSIS OF TRADITIONAL AND MODERN NEIGHBORHOOD UNITS IN INDIA - A CASE STUDY

by

AJAY SHAH

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A THESIS

submitted in partial fulfillment of the

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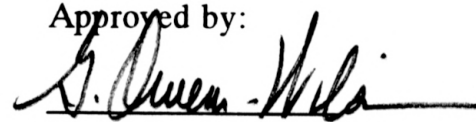## MASTER OF ARCHITECTURE

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College of Architecture and Design

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Approved by:

Major Professor

Abstract

The thesis looks at architectural controls and whether or not these controls on their own are capable of being a source of urbanism within a designed environment. The underlying socio-political hypotheses here is that "radical" ideas devoid of all consideration for tradition and vernacular values lead to sterile and lifeless environments. On the other hand, it is emphasized that one cannot survive with history alone as precedent.

The thesis used the guidelines advocated and administered by Le Corbusier for Chandigarh, and measured the physical exterior building facade features in the mohalla at Shahjahanabad and sector 22 of Chandigarh. This helps determine the difference between traditional and modern building facades and neighborhood organization and how modern design guidelines are violated if traditional architecture is measured with them. Through a study of literature review, texts and images, the author examined two different environments in India - the city of Shahjahanabad (1630 A.D.), which grew organically, and the new city of Chandigarh (1952 A.D.) designed and formally laid out.

The thesis examines the role of tradition in designing/building modern neighborhood units in India. It gives the readers insight into the issues and cultural ideas necessary in developing new neighborhood units in the 21st century.

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Acknowledgements

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I am thankful to Sheena, for her encouragement and patience and above all for believing in me.

Finally, I would like to thank my parents for their support.

List of Illustrations

GLOSSARY OF VERNACULAR TERMS:

(1)   <u>SHAHJAHANABAD</u>: The city built by Emperor Shahjahan in 1638 A.D., and is now know as Old Delhi.

(2)   <u>CHANDIGARH</u>: The city designed by Le Corbusier, construction started in 1962, now stands as the joint capitol of the states of Haryana and Punjab.

(3)   <u>JALLIS</u>: Latticework screens carved out of stone or marble, often used as visual filters by the women in the private quarters of the house.

(4)   <u>BAZAAR</u>: Market place, place of public convergence, area designated to trade, barter, and other commercial activity.

(5)   <u>DAIWARA</u>: Quarters for the mid wives.

(6)   <u>VAIDWARA</u>: Quarters for the doctors.

(7)   <u>MALIWARA</u>: Quarters for the gardners.

(8)   <u>HAVELI</u>: A house belonging to a better off nobleman. Often associated with bigger, more ornate spacious houses in a mohalla.

(9)   <u>MOHALLA</u>: Major street dedicated to a mixed usage of commercial and residential activity.

(10)   <u>KUCHA</u>: Linear street entity

(11)   <u>GALI</u>: Linear street entity

(12)   <u>KATRA</u>: Implies zone. Contains houses, mohalla, kuchas and galis.

(13)   <u>BASTI</u>: Small residential comples often comprised of less than 100 people.

(14)   <u>CHATTA</u>: The upper story of a residential structure when it crosses over a street.

(15)   <u>CHOWK</u>: Widening of a street to form a place of communial gathering.

(16)   CHAJJAS: Cantilevers over window openings often supported on brackets.

(17)   JHAROKHAS: Balcony like upper floor structures enclosed with lattice screens on all sides. Used by women to privately view the happenings on the street.

(18)   CHAKUTRA OR SAIWAAN: Pavillion like structure on terrace of house, used to sleep under in rainy weather, or to store fodder.

(19)   KOTHA: The roof terrace of a house. Used for sleeping, drying clothes or fodder.

(20)   JAMA MASJID: The holy mosque (place of religious congrgation for the muslims) in the center of Shahjahanabad city. Important physical landmark.

(21)   CHARPOY: Woven cot/bed used by Indians to sleep on. Often rope weave and bamboo combination.

(22)   PEEPUL TREE: A big shady tree species native to North India.

(23)   CHANDNI CHOWK: The main street of Shahjahanabad literal translation, "Moonlight Way".

(24)   MIR ASHEGH KUCHA Name of street in shahjahanabad. Named after mr. Mir Ashegh, nobleman in mid 1700's.

(25)   CHAUKATH: Threshold, entry to a house.

(26)   RAJA/MAHARAJA: King, ruler or emperor.

(27)   HOOKAH: Tobacco pipe with a water filter that makes gurgling sound when the hookah is smoked.

(28)   BRICK JAALIS: lattice framed screen built out of bricks, leaving voids to allow for sun and breeze to flow through.

(29)   LOO: Hot summer winds laden with dust, sweep the northern plains of India in the months of April to August.

(30)   <u>BARSATI</u>: A room built at the top of the house to contain a staircase which connects the house to the roof terrace. This was a small built structure containing a small landing and a veranda.

(31)   <u>INTROVERT DESIGN FORM</u>: <u>FIG. 1</u>. <u>Design layout with inward focus.</u> In the case of the traditional house, the design focused towards the internal courtyard, with all doors opening into it. An introvert design has a high degree of privacy and security.
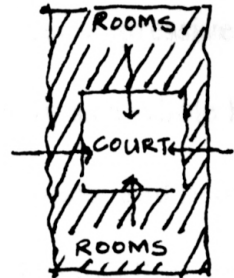
FIG. 1

(31)   <u>EXTROVERT DESIGN FORM</u>: <u>FIG 2</u>. <u>Design layout with outward focus.</u> Modern houses are often based on a design pattern where most communal activities are carried on in the front or back yard. This moves the focus of the house to the outside. Most houses today don't have boundary walls or fences and hence this set-up is an extrovert design form where there is less privacy and security as compared to a contained space in an introvert design.
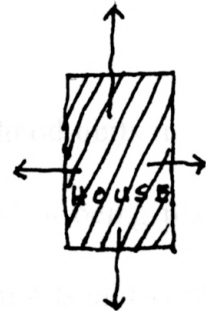
FIG. 2

Statement of the Problem and its Significance

Over the centuries, India has had design values intrinsically woven into the social fabric. This has made architecture livable, and has been expressive of its people, their culture and their traditional values. Indian society as a whole has functioned as one big family. Within it were various caste diversions; and people of similar castes often resided in close proximity of each other. The dwelling units are expressive of this social cohesiveness, as one can see old neighborhood units having a lot of outdoor interaction spaces amongst them.

The exterior physical features of traditional neighborhood units in India are expressive of the people's desire to create variety and boast of being playful and interesting. The building facades were often adorned with motifs and symbols which represented the culture of the people who lived in them. Upon analysis of facade features, one documents the variety of fenestration shapes and sizes, building heights, play in three dimensional facade fronts, and other features that made these neighborhood units alive. I have documented some of these exterior facade features that gave meaning to old neighborhood units in North India.

Studying the outcome of the architectural controls in Chandigarh and understanding the value of aesthetics in traditional architecture by analyzing the building facades of a neighborhood unit in Shahjahanabad is the objective of my thesis.

Chandigarh, the joint capital of Haryana and Punjab was the first planned

city of independent India. Today some argue that adherence to modernist design principles and rigid outlines have given the city a dull and monotonous appearance. For example, Chandigarh is accused of having repetitive facades and little or no freedom for creative expression. I have studied the exterior building facade features of Chandigarh, as designed with modernist principles.

Shahjahanabad, arising under quite different development circumstances, grew as people's needs changed, and also adapted accordingly. Complete freedom for personal expression gave rise to a semi-chaotic environment that looked alive and meaningful. Building facades had elements not conforming to strict regulations, which gave a sense of variety and generated visual interest. Physical features such as varying window shapes, fenestration, balconies, building heights, material usage and motifs shall be studied to see their importance in creating a neighborhood unit.

This thesis acts as a basis for developing principles for designing new townships in the future in India. Corbusier's ideas about design controls have been studied to better understand where they fail to incorporate traditional features and end up creating visually dull and monotonous building facades.

Methodology

The methodology used for this thesis is of a comparative critique type I have attempted to evaluate the effect of the application of Le Corbusier's bylaws To do so, the methodology consists of the following steps:

a. I have used as criteria, the bylaws established by Corbusier and the planners of Chandigarh for the city development and studied the external features of neighborhood unit facades in Chandigarh and Shahjahanabad.

b. I have identified a sector of Chandigarh and a mohalla in Shahjahanabad for analysis of physical features of the facades. In this thesis, the reasons for choosing Chandigarh and Shahjahanabad as areas for study for neighborhood units are:

    i. <u>Physical location</u>: Both cities belong to the same physical region, and are only 110 miles apart.

    ii. <u>Climatological equality</u>: Both cities being in the same physical region, are exposed to similar conditions of sun, wind, rain, and weather. This helped in comparing the ways in which climate has been dealt with in both cities, since the constraints are the same.

    iii. <u>Social habits</u>: Due to close proximity, within the same region

in North India, cultural traits, living requirements, habits, social norms, and customs in the two cities are the same. Knowing that living standards and values are similar, it is easy to analyze ways in which certain issues have been dealt with in both towns, for example privacy, social interaction, quality of neighborhood life, and scale.

c. I have compared the effect of bylaws on the results achieved by Corbusier in Chandigarh with the non-conforming elements as in Shahjahanabad. These will be identified by applying the guidelines Corbusier established, to the older mohalla. Through the comparative critique, this thesis portrays the strengths and drawbacks of physical features of both types of neighborhood units. The critique includes a comparative documentation of various topics such as fenestration shapes and types, building heights, material usage, facade ornamentation, street elevation study and street furniture.

Scope

This thesis aims to understand the importance of architectural variety in the physical facades of neighborhood units through a study of tradition and to see how compatibility can be achieved between the old and the new. The most important aspect of this thesis shall be to critically analyze the building facades as governed by the bylaws in a sector unit in Chandigarh, and compare them to those of the mohalla in Shahjahanabad.

Criticizing the idea of designing large scale environments at one stroke, the performance evaluation, shall focus itself on one sector in Chandigarh and be restricted to a mohalla in Shahjahanabad.

After identifying the existing bylaws in Chandigarh and having evaluated them in Shahjahanabad, the author aims to better understand the role of architectural variety both in the building facades of an urban environment and in the aesthetic elements which make neighborhood units alive and meaningful.

OPERATIONAL DEFINITIONS:

NEIGHBORHOOD   (dictionary meaning; Webster's New World, 1982)

      1)   A particular community, district, or area.

      2)   The people living near one another.

COMMUNITY   (dictionary meaning; Webster's New World, 1982)

      1)   Any group living in the same area or having interests, work, etc. in common.

      2)   A sharing in common.

NEIGHBORHOOD: As the dictionary meaning implies, a neighborhood is a conglomeration of people/houses in close proximity of each other having similar social/economic status. People in an ideal neighborhood share interests, feelings and space, creating our environment that makes the community feel like an extended family.

This is true of most traditional neighborhoods in India where high density neighborhood units are packed together to form sections of the city.

> "It is in their best interest for people in a community to look out for each other as it strengthens the neighborhood unit. A strong, united neighborhood unit is the basis for development of a city." (Mahmud Ahmed Rizvi (1976, "The Role of Social Units in Society", p. 87)

COMMUNITY: The word is derived from "COMMUNE", meaning group or a gathering of people with similar interests. The sociological implications of this word always refer to people performing activities as a group. A community

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encompasses within itself the people, their ideas, their habits, the built environment, their social/financial stature and their common needs. An ideal community is thus an agglomeration of people and their lifestyles united to share things on a regular basis. A community delivers security and support to its residents and represents one voice on the city front. Collective grouping of communities or "cells" (as referred to by B.V. Doshi, Architecture + Design magazine, Sept. 1990, pg 19) forms the social structure of society. A community thus represents a great majority of people, but is sustained by the efforts of every individual.

Chapter One
Evolution of the Concept of Neighborhoods

In this section I shall discuss the metamorphosis of the idea of neighborhood unit in society over the ages and its meaning as derived by various economists, designers, and developers. The "evolution of neighborhood units" section briefly explains design ideas of various planners to constantly better the environment they lived in. However even though I start building upon the "conscious" idea of neighborhood by giving examples from the late 1800's, neighborhood units have been present ever since man learned the need to dwell in groups.

Throughout history, there have always been great examples of settlements in countries/regions - Syria, Mesopotamia, Greece, Harrapa, Mohenjodaro, and places such as Machu-Pichu, and many more. The men whose examples I cite in this section have in one way or another contributed to the development to the idea of a perfect neighborhood and so I would like to portray their ideas on the topic of neighborhood units as an introduction to this section.

DEFINITION AND MEANING OF NEIGHBORHOOD UNIT DESIGN IN SOCIOLOGICAL TERMS:

- **From Egon Earnest Bergel:** ("Urban Sociology", 1955, pg 487)

    "The neighborhood is a term that may be characterized as a primary information group consisting of at least potentially all people who live in local proximity. The neighborhood area is usually, but not always, of a comparatively smaller size so that face to face relationships between residents can be established. Size, which is a defining criteria of a neighborhood is most difficult to define. It is function and communication that really determines the neighborhood domain."

- **From Al Bertrand:** ("Basic Sociology", 1973, pg 77)

    "A group of people experiencing social interaction in a localized area with one or two social institutions as the focal point or means by which the area can be identified physically as a neighborhood."

    Social interaction (i.e. communication) and Social institutions (which are the means) have been used as the basis of neighborhood formation. The size of the neighborhood is again not defined.

- **From C. H. Cooley:** ("Social Organiizations, A Study of the Larger Mind", 1909, pg 88)

"It may be said in general that from the time men formed permanent dwellings upon land, down at least to the size of modern industrial cities, the neighborhood group has played a major part in the primary heart to heart life of the people. It is a chief source of sympathy and mutual aid for the commons all though the dark and middle ages and for many purposes it remains so in rural districts at present."

Cooley has defined sympathy and mutual aid as the functions, but communication as the means of neighborhood formation and the size of the neighborhood that sustains communications has not been considered.

Thus, the fact that the size of the neighborhood has not been defined in sociological and physical terms is not an indication of the inappropriateness of this definition; instead, it is an indication that neighborhood formation and neighborhood relationship development is a continuous process.

The neighborhood is hence a fluid social organism with a hierarchy of competent social units. A physical unit would thus respond to the expansion and contraction of a neighborhood and its component units.

- **From Clarence S. Stein:** ("Toward New towns for America", 1957, pg 226)

"New town planning deals with the fundamental realities of living in a

contemporary community, and since we cannot foresee tomorrows needs, it must take the furture into account and allow for flexibility. The town plan must be moulded to the life people wish to lead, and to fit the special needs of this twentieth century with all its differences, mechanical and other - from the past. The form of the town, and its surroundings and the whole city must fulfil the requirements and aspirations of those who are to live in them."

Stein emphasizes the importance of understanding the lifestyle, culture and setting within which the new design shall evolve. This integrity between the design and the user helps create an amiable environment in the community.

Stein emphasizes the community as being the basis of development of new towns and refers to them as a "coordinated entity". ("Toward New Towns for America", 1957, pg 225)

• **From Sir Raymond Unwin:** ("Housing and Town Planning" 1936 - lectures - 1937; Released by sub-committee on research and statistics, Central Housing Committee, Washington D.C., CHC. 1062:2)

"The last ability of a man is one which an architect should thoroughly understand, for differing customs, habits, and conventions determine various types of housing. A house must supply the proper atmosphere for the people who are to live in it. Equally, the plan of a community must provide the requisite satisfaction for the desires and purposes of the group of people to inhabit it.

This leads us naturally to consider tradition and the part it should play in modern arcitecture. The young man is apt to scoff at tradition; to want to throw aside much that has been done before and confine himself solely to what is new. The advantage of the approach of the youth is that he comes to his problem with a fresh viewpoint and a mind open to experiment. The older architect clings to the things which he learned to like early in his career . . . But he has an advantage over the younger man in that he knows the value of tradition; he has had the opportunity to watch change; to note progress step by step; to learn the value of good features in the old methods. We need both tendencies; the important matter is that there should be mutual understanding as to the limitations in both viewpoints."

Sir Raymond Unwin, an Englishman by birth, talks about the importance of tradition in design of new neighborhoods and cites examples of Hampstead Garden Suburb , Letchworth and the city of Birmingham to substantiate his theories.

EVOLUTION OF THE NEIGHBORHOOD:

In pre-industrial revolution settlements, the men, the methods and the materials determined the size and morphology of the settlements. The method and materials were very simple and the community close. The neighborhood units reflected this scale of intimacy.

PRE-RAILWAY
AFTER RAILWAY
AUTOMOBILE
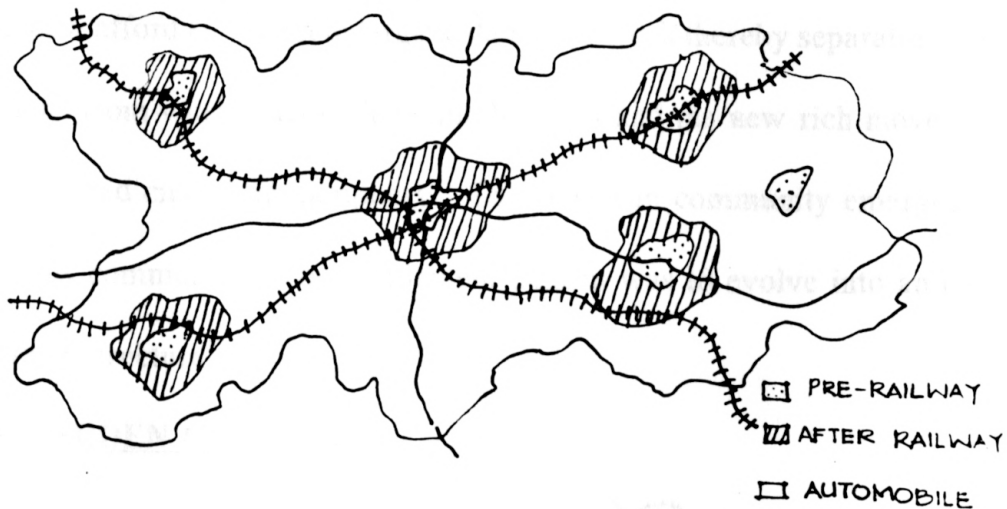
Fig. 3 The Changing Size of the Neighborhood

With the advent of the industrial revolution, the machine brought about a significant change in the living and settlement pattern for many. As the industry drew many people from the rural areas, the urban area acquired a new identity; its social, economic, political and physical character were altered. The influx of

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large population often generated slums. This urban decay became the breeding ground for new patterns in neighborhood-unit design.

Also, railroads, motor cars, telegraph, telephone, newspapers etc., brought about a communication revolution which was fast changing the scale of time and space. This acted as a catalyst in the process of change. "Science and technology has made the world a shrunken walnut."-Einstein (1981), pg 43.

The center of the city no longer held importance as being the primary area for housing because of its close walking distance to offices and shops. People could now afford to commute large distances to work thereby separating residential functions from work places. The middle class and the new rich moved out from the congested city to the periphery. The suburban community emerged as a self conscious community whose settlement pattern was to evolve into an element in the urban structure.

THE GARDEN CITY (1898)
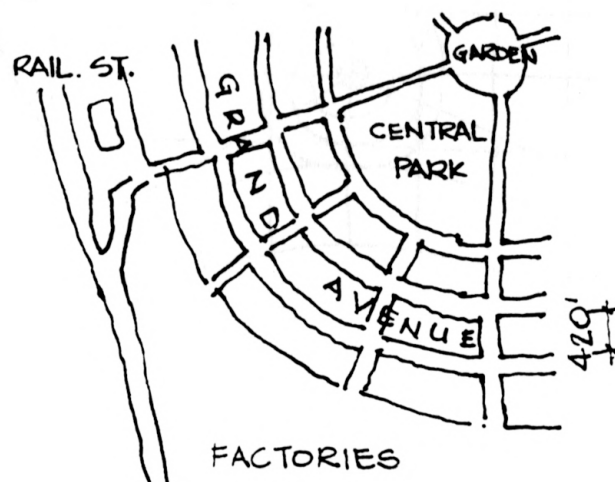
Fig. 4 **Plan of the Concept**

In his book "Garden Cities of Tomorrow", Sir Ebenezer Howard proposed the concept of a garden city. It was very similar in structure and content to the neighborhood that came into being 20 years later in the U.S.A. The circular plan was bounded on one

side by a railway line, linking the district to the main line.

From the central park (the emphasis of the design), boulevards 20' wide situated to divide the zone into 6 self sufficient units of a population total of 5,000 each. An "Annular line" of 420' width acting as a green parkway ran through it, and acted as a local open space, a site for accommodating schools and churches. Ebenezer Howard placed great importance on having schools as an integral part of the design and placed them centrally in each ward.
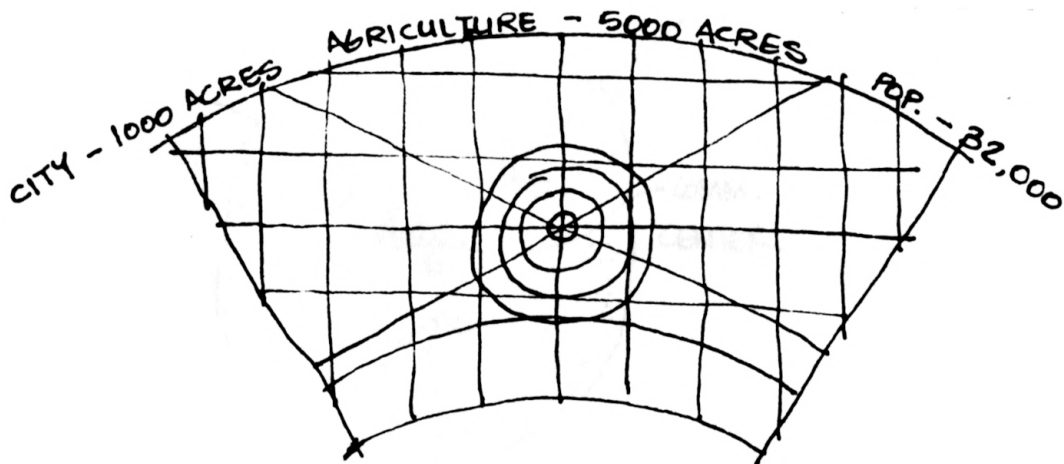
Fig. 5 E. Howard's Diagram of the Garden City

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The garden city concept was an attempt to include nature and landscape as an integral part of the city's fabric. It aimed for a cleaner, and greener environment different from the towns developed around the smog and dirt of factories and mills yet containing "City Making" institutions such as banks, libraries, and schools. Ebenzer Howard tried to segregate these functions by separating them physically by using the landscape as a buffer. One does notice however, the monumental importance given to green spaces and garden in parts of towns, where others would house functions of more importance. This idea though, gave people an insight towards respecting and enjoying the outdoors and its relevance in a concrete and asphalt environment.

GROWING IMPORTANCE OF NEIGHBORHOOD CENTER: (1907)
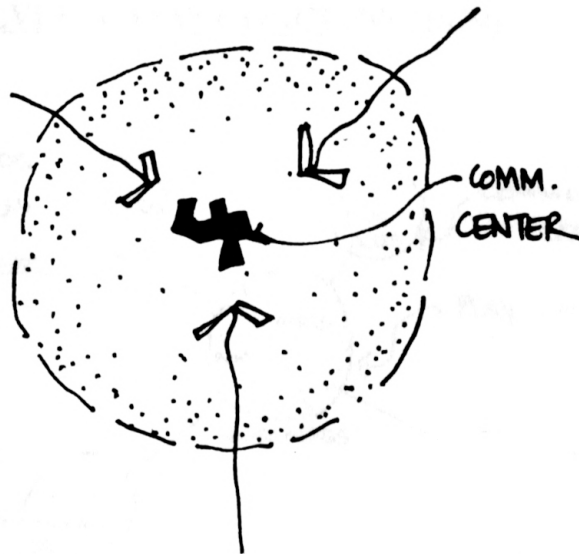
Fig. 6 **Inward Focus in the Community**

In 1907, Sir Raymond Unwin proposed "The Garden Suburb" in which the focus was provided by churches and institutes. Places of public importance and community use became central and the idea of group living was generated. Around the same time based in Canon Barnet's Toynbee Hall, the community center movement was on "To animate civic life by providing a common local meeting place."-Pimlott (1935), pg 52.

The pivotal feature changed from a central park (as proposed by E. Howard) to a community function - church, townhall, library, or a place of congregation. "A society is more than an a conglomeration of houses - it is a collection of ideas, people and feelings together constantly changing and bettering themselves." - Gandhi (1957) pg, 121.

PERRY EVOLVES A NEW CONCEPT: (1929)
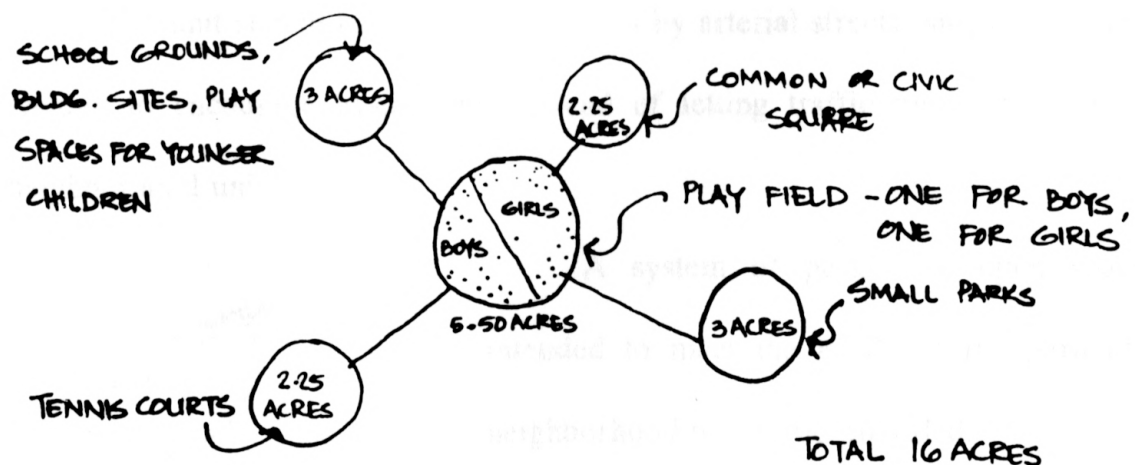
Fig. 7 Recreation Spaces in a 60 Acre Unit

In 1929 C.A. Perry evolved his concept of a neighborhood unit as a reaction to his own environment, a suburb of New York which had a few shops and open spaces and no community center. The underlying principle was that it should be regarded both as a unit of a larger whole and as a distinct entity in itself. He found that certain facilities were strictly local and classified them as:

(a) The Elementary School

(b) Small Parks and Playgrounds

(c) Local Shops   and

(d) Residential Environment.

Perry wanted to bring the universal parts of a residential community together as an organic whole.

SIZE

"A residential unit should provide housing for that population for which one school is required, its actual area depends upon the density." -Perry, (1910)

The unit should be bound on all sides by arterial streets, sufficiently wide enough to encourage by-passing, instead of letting traffic move through the neighborhood unit:

A system of parks and open spaces intended to meet the needs of the particular neighborhood was to be provided.

Fig. 8 **School as the Focal Point**

INTERNAL STREET SYSTEM:

The unit was to have a special street system with the size of the highway proportional to the probable traffic. The street network was designed to facilitate movement within the unit but discourage through traffic.
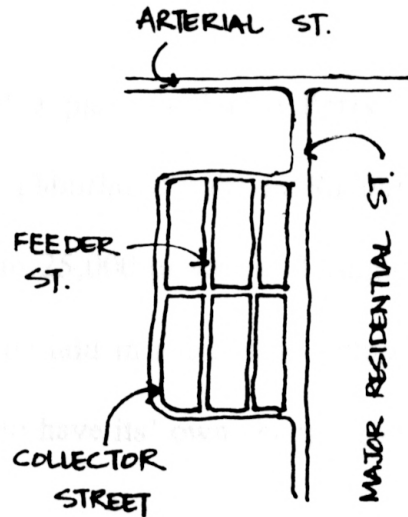
Fig. 9 **Street Network in the Community**

LOCATION OF INSTITUTIONS AND LOCAL SHOPS:
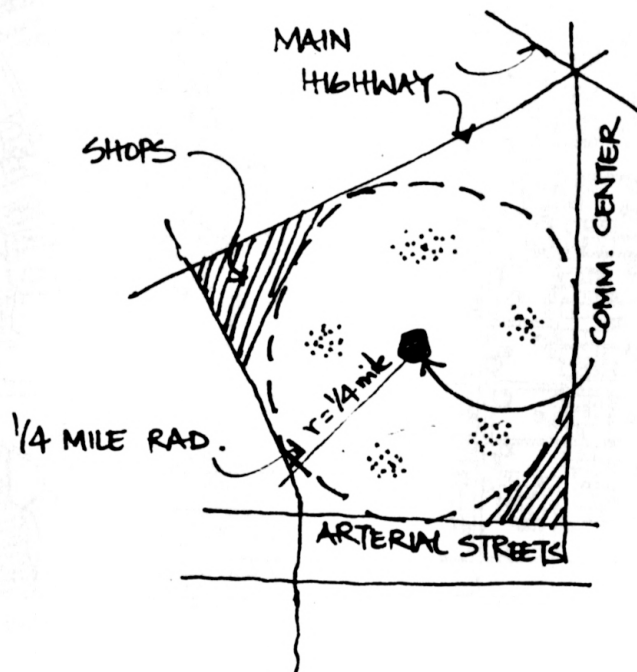
Fig. 10 **Spatial Layout of the Community**

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RADBURN CUL DE SAC: (1929)

In 1929 Clarence S. Stein proposed a plan similar to Perry, but with different detailing. This was a plan for neighborhood units in Radburn - New Jersey. The total population was to be about 25,000 people in 3 neighborhoods of 7,500 - 10,000 each. Each unit was to be laid in a 1/2 mile radius from an elementary school and playground and was to have its' own shopping area. The

Fig. 11 **Radburn Plan**

Fig. 12 **Plan of the residential district**

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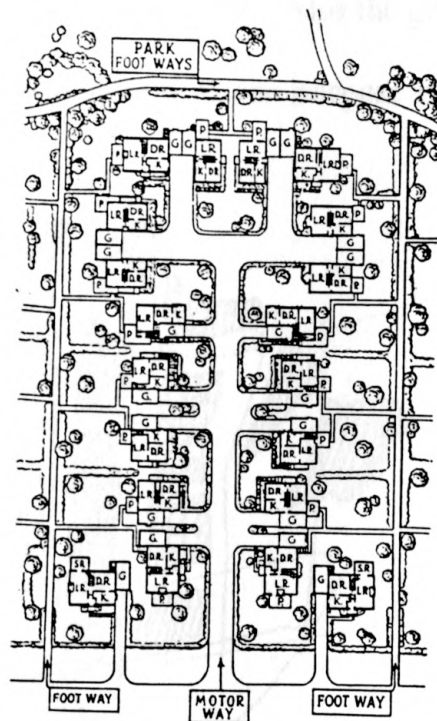
main educational and cultural center was to be equidistant from the 3 schools and within 1 mile of all houses.

Roads And Open Spaces:

The "super-blocks" (Stein, 1966, pg 41) were enclosed by main estate roads within which were the housing blocks and the cul de sac that served them. There were large open spaces in the center of the super blocks on which the houses faced. These spaces were joined together by pathways to form a continuous network of parks.

The meandering pathways also formed a cohesive pedestrian network. The pedestrian and vehicular traffic was segregated for the first time. Also the gridiron pattern was abandoned in favor of a more logical system of one purpose roads.

HOOK ELABORATES RADBURN IDEA:

CENTRAL RESIDENTIAL ZONE
INNER RESIDENTIAL ZONE
OUTER RESIDENTIAL ZONE
SPECIAL RESIDENTIAL ZONE
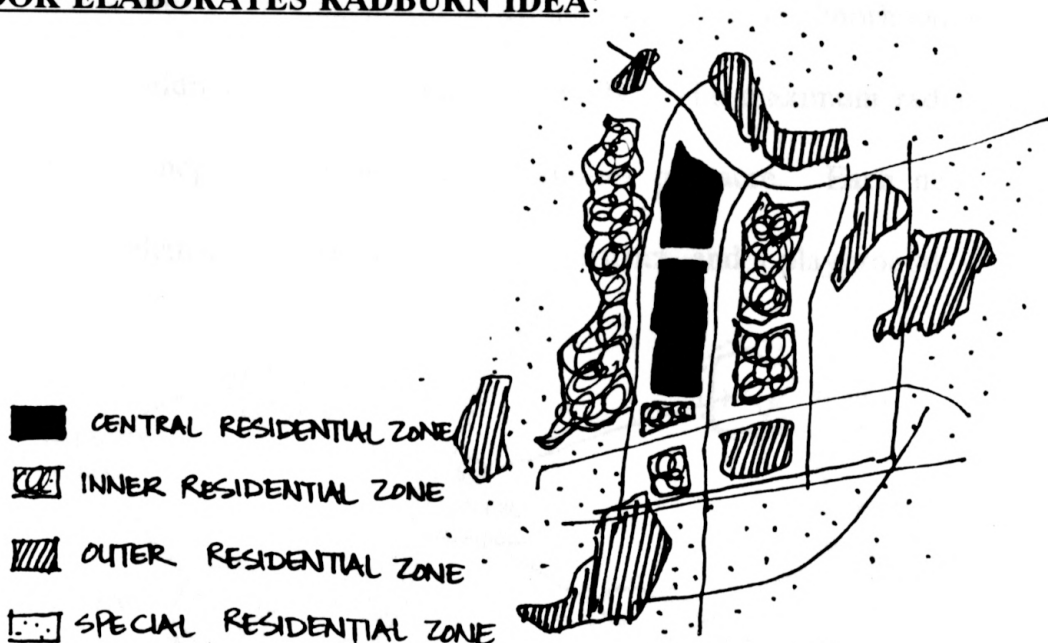
Fig. 13 Hook's Idea for Residential Zones

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The primary school remained the focus of the residential unit of 4,000 to 5,000 persons. The whole town was conceived with pedestrian - vehicle separation and the residential areas were well woven into the town structure. Each unit contained a primary school, a nursery school, a clubroom, a church, a small library, and a small research center.

The residential areas were to be divided into 4 distinct zones, having different density patterns and were unequally distributed in population percentages. The are (1) Central Residential Zone, (2) Inner Residential Zone, (3) Outer Residential Zone, and (4) Special Residential Zone. These units were further divided into groups of 100 to 400 households with 600' cul de sacs serving them.

ENGELHERDT'S CONCEPT: (1940)

Nickolaus Louis Engelherdt based the size of the neighborhood unit on the number of children of various ages per family. The maximum radius was 1/2 mile, with a population density of 6 families per acre. Each neighborhood included an elementary school, a shopping district, and a playground.
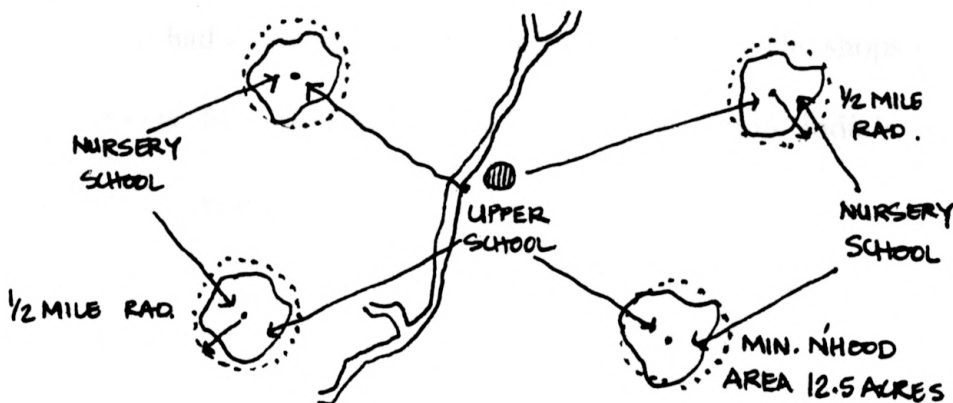
Fig. 14 The School as the Focus

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THE CHANDIGARH CONCEPT BY MAYER AND NOVICKI (1950)
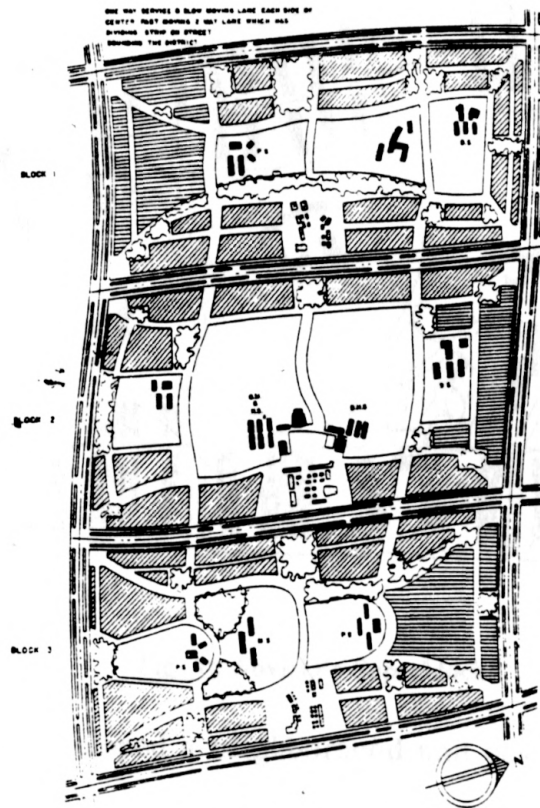
Fig. 15 **Mayer's Superblock**

Albert Mayer, a New York based architect, formulated a neighborhood concept for Chandigarh for 3,500 families. He subdivided the total super block into three smaller blocks and provided community facilities in each of them. Each of them also had a separate green area for recreation. The shops were kept close to the streets for efficient service, keeping in mind India's unsophisticated transportation system.
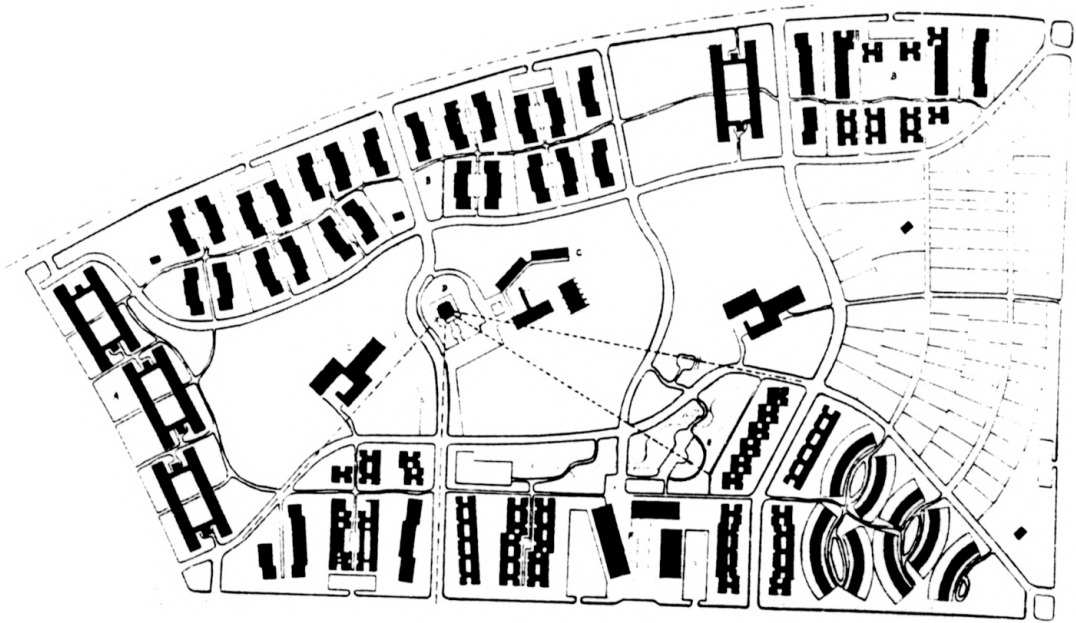
Fig. 16 **Novicki's Superblock**

Novicki also developed a neighborhood unit design for Chandigarh. He integrated all the community spaces with the green areas in his design for the super block. Novicki attempted to achieve an environment which was modern and efficient, and at the same time was Indian enough for the people to adjust with. However, in his design, the super block density was low, and emphasis was on community facilities rather than housing. The shopping center was still connected to the main roots of circulation for convenience of its services.

"His was a romanticized version in which he was trying to adapt idealistic visual principle on the rustication of the Indian rural science. Whether this would have worked is a debatable question." -Evenson (1966), pg 22.

Chapter Two
Case Study 1
Study of Neighborhood Units in Shahjahanabad
Analysis of A Mohalla

Introduction:

"Delhi is a legend that lives. It is an anthology of monuments with their never failing beauty. Delhi is a dream in monuments keeping alive the grandiloquent testimony of the edifice and glory"

Jain (1990), pg. 35

Delhi, India's capital is a unique city, a kaleidoscope of old traditions and new forces. It is believed to be one of the oldest cities in the world. From Indra Prastha (15th Century B.C.) to Imperial New Delhi, it has been a long journey. As popularity believed, Delhi is supposed to be the city of seven great cities These are Lalkot, Siri, Tughlakabad, Jahan Panah, Ferozabad and Purana Quila. The seventh city of Delhi, Shahjahanabad was built by Shahjahan, the Mughal emperor in 1638, on the banks of River Jamuna. It remains a living city housing over a half a million people within its walled boundaries, and is now termed as Old Delhi. Delhi, over the past hundreds of years, has expanded out and Shahjahanabad now lies enveloped by a modern 20th Century world. However, within the fast world of modems and faxes, Old Delhi stands as a strong reminder of the days gone by.

This thesis aims to examine the essence of tradition and to identify architectural elements used in traditional neighborhood design. I hope to look for the unstated design principles used to layout the intricate network of streets and neighborhoods, rich in character and deep rooted in tradition for hundreds of

years. The builders of Shahjanabad produced a city with no formal knowledge of building bylaws and yet created a town with a strong semblance of order which was practical and aesthetically appeasing.
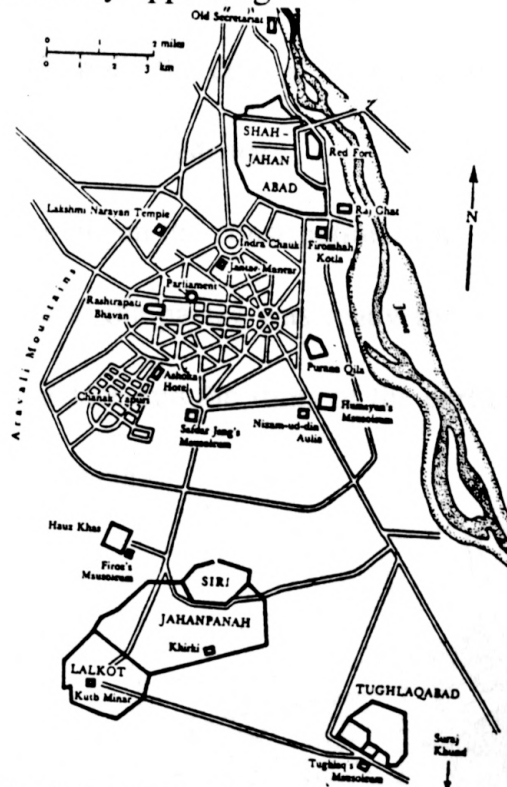
Fig. 17 **Delhi-The Old and The New Cities**

Shahjahanabad conjures a strong usage of human settlements shaped essentially by historical circumstance and presenting a cohesive pattern that satisfied the needs of the occupants. This satisfaction was reflected at the city, neighborhood and individual level.

HISTORICAL PERSPECTIVE:

Akbar, a great king and ruler took over the throne of Delhi after the death of his father Humayun in 1555 A.D. He however shifted the capital to Agra, but continued to add to the glory of Delhi's tombs, gardens and monuments. In 1603,

Akbar's son Jahangir, shifted the capital to Lahore, (now in Pakistan) and as a result Delhi lapsed into oblivion. It stayed in a neglected and forgotten state till Akbar's grandson, Shahjahan, brought back glory to Delhi when he shifted the capital back in 1638. He built the city of Shahjahanabad which still remains a thriving city after 350 years of existence.

In 1638, Shahjahan began the construction of his palace, Lal Qila (the Red Fort) at Delhi. In 10 years, the palace was ready for occupation. The new city that grew up around the palace and the ruins of the earlier city of Firuzabad now came to be called Shahjahanabad.
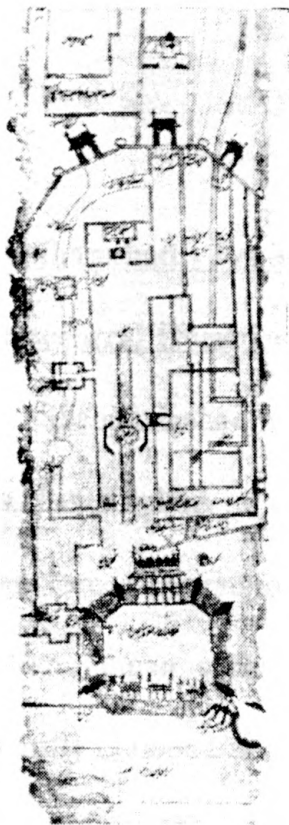
Fig. 18 **Shahjahanabad-1750**   Fig. 19 **Shahjahanabad-1815**
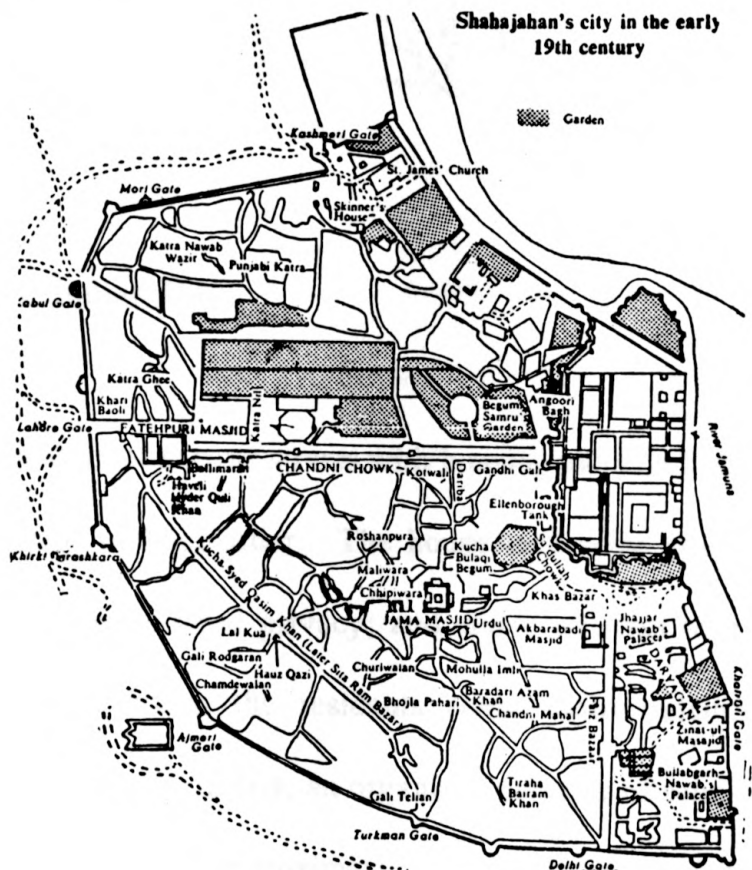
Fig. 20 **Shahjahanabad-1873**

Shahjahanabad - Focus on an Indian City

Architectural Overview:

Shahjahanabad, a combination of narrow streets with housing units on both sides, has resulted in a townscape of high order. The house versus the street design forced interaction, and yet maintained privacy; and above all, was to a sensitive human scale, a scale to which the residents could easily relate. Outwardly cramped and congested, it was, in fact, an organized network of semi-private and private courtyards that occupied approximately twenty five percent of the total space.

The city was built for a population of 60,000 in 1648, but it increased to 381,000 in 1950 and to 420,000 in 1981. The city now has an average residential density of about 350 persons per acre. At certain places the residential density increases to as many as 818 persons per acre.
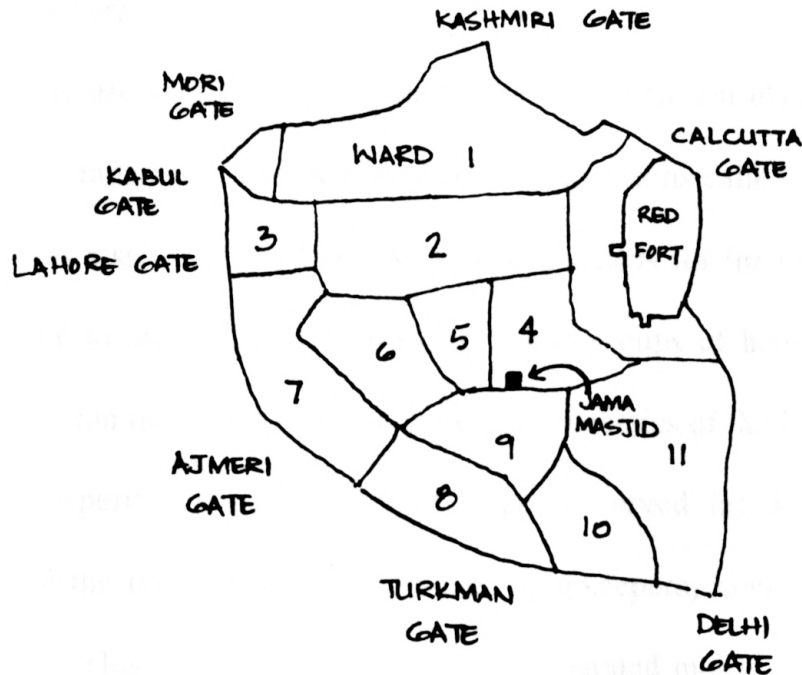
Fig. 21 **Administrative Division in Shahjahanabad**

The walled city was divided into 11 municipal wards or Thanas separated by markets (Bazaars) on primary and secondary streets. The names of these streets can be traced to topographical features, personages, occupations, trades, monuments and important historical events. The wards are named after the most important streets in that ward.

ZONING: (SYSTEMATIC SEGMENTATION OF SECTIONS)

Since zoning is done along accepted principles of town planning,

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Shahjahanabad was divided into separate zones of distinct social groups. The zoning was done according to occupation, commerce and industry. The Vaidwara, the Daiwara and the Maliwara were the quarters of the doctors, midwives, and gardeners respectively. Also the Naiwara and Dhobiwara were those of the barber and the washerman.

There are separate wings called katra's for different classes of tradesmen, guides and craftsmen. The rich lived in large mansions called "Haveli's". Each of these was a self contained unit with thatched sheds for the servants and others who catered to their needs. These katra's had groups of houses along a major spine which ran through it. The architectural aesthetics of the houses could speak for the prosperity of the zone. The ornately carved facades of the haveli's represented the residences of rich traders, shopkeepers, nobles and aristocracy. The smaller, closely-packed houses with hand painted motifs could be associated with the workers and craftsmen.

In all, the overall image created by all these zones was that of variety, interest and large public participation. The katra's (zones) with greater density and a large number of houses had people who were both socially and economically dependant on each other and often thrived as a group; this being the reason why their houses were in such close proximity of each other.

Community spaces were common and often the centers of all public activity. the early maps and descriptions make a repeated reference to Mohalla, Kucha,

Gali, Katra and Chatta. These are vernacular terms still used for different parts which together combine to create a neighborhood unit. These terms can be described as follows:

MOHALLA'S:

Fig. 22 **Mohalla in Chandni Chowk**

Mohalla's are clearly defined areas of commercial and residential activities, fronting on a spinal street that is connected to primary and secondary bazaar streets. It is a unit of social identification.

KUCHA:

Fig. 23 **Kucha from NaiSarak to Chowri Bazaar**

Unlike a mohalla, the use of the word Kucha or Gali, implies a linear entity (Kucha being a persian name and Gali an Indian name). They constitute the spinal street of the mohalla and are usually the circulation artery with the heaviest traffic.

KATRA:

Fig. 24 **Katra Near BaliMaran and Dariba**

The word "Katra" implies a zone. It is by definition a market with residential quarters and storage facilities, which is enclosed by high walls and entered through a gate. A katra does not necessarily constitute of a mixed use pattern of houses and shops, it could be composed of commercial units too.
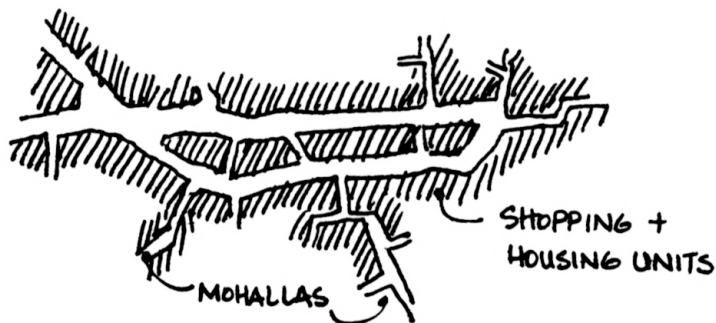
Fig. 25 **Plan of Katra**

BASTI:
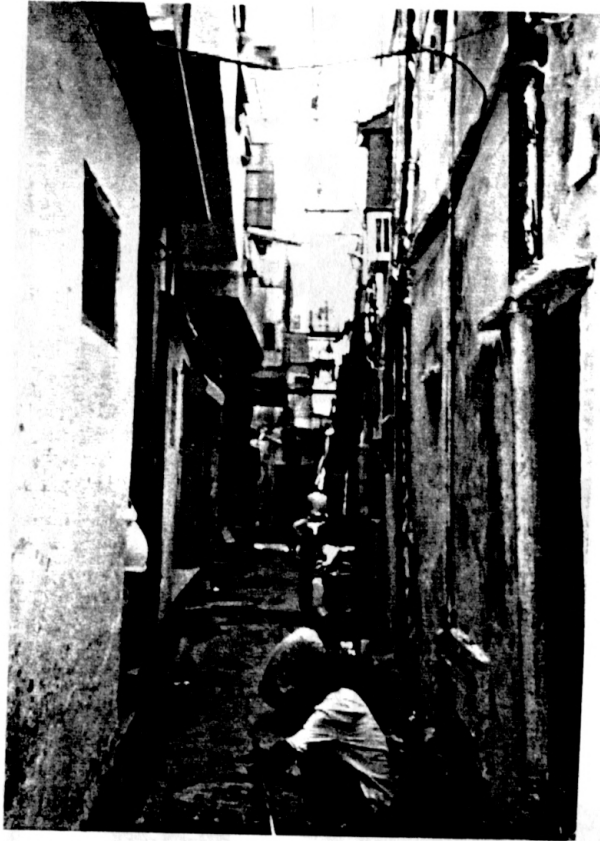
Fig. 26 **View of A Basti**

A Basti is a small residential complex, almost like a residential katra.

However, the population of a basti was often below 100 people.

CHATTA:

Fig. 27 **View of A Chatta**

The term Chatta implies the upper story of a residential structure when it crosses over a gali or a kucha (street).

CHOWK:

Fig. 28 **Chandni Chowk**

This is another unique feature of the urban setting. This is often no more than just the widening of the street at the junction of two or more streets or at the termination of a gali or a kucha.

The chowk acts as a breather space between narrow winding streets, and as a result is the place for group interaction. Men sit under a shady central tree and smoke water pipes while women chat about daily gossip. Children play in this open space and one can see a lot of collective outdoor activity. The chowk is a good example of participation through design and is an important element in contributing character to a neighborhood unit.

All these features together give character to a mohalla. A network of gali's, kucha's, and chatta's spread out from a central spine into the interior of a mohalla.

This system of spread growth can be compared to leaves branching out of a plant in acropetal succession. This fine web of arteries gave life to the city and helped develop a strong hierarchy of both space and function.

Though these elements have a local vocabulary pertaining to the area, they are typical in many older cultures throughout the world. The narrow self-shading streets are also a typical element in the old parts of Spain, Portugal and Morocco, similar small intimate scaled gathering places can be seen in Greece and Turkey. The katra's of Old Delhi bear strong resemblance to the "Casbahs" of Istanbul where evening bazaars are crowded with people and the entire marketplace had an ambience of festivity. The use of the roof tops as an integral plane of activity is seen in Greece and other parts of the Mediterranean.

RELIGIOUS BACKGROUND:

Today Old Delhi is a mix of many cultures and religions, but in the mid 1600's when Shahjahanabad was constructed the major religion prevalent was Islam. Mughal rulers moved to India and brought with them the customs, traditions, architectural knowhow and the language of Islam. Since the Hindu Dynasty came to an end in 1191 A.D., the Mughal's had maintained a stronghold over India till the last emperor was dethroned in 1857 by the British. These 650 years of Mughal influence were a remarkable period in creating an architectural language in India.

In Shahjahanabad, Hindus and Muslims lived together and Urdu was the main language. A strong religious influence was evident in building designs. The Muslims, like the Hindus, were predominantly private people and had an introvert design pattern to their houses. The street was of great communal importance. Islam brought with it rich architectural styles of arches, domes, intricate lattice work and friezes. These over the years combined with prevalent Hindu architecture to create a strong architecture vocabulary.

Shahjahanabad had a monumental axis grid, cris-crossing through the heart of the town - the focal point being the Red Fort (Lal Qila), the king's palace at the end. The Islamic concept of "Purdah" (the women of the household would wear a gown covering their head, and within the house would wear a veil in front of all male members) created the design pattern for screened window faces carved in stone, balconies where women could sit and see the happenings on the street, small window spaces acting as peep holes for catching glimpses of the outside world.

These elements however were also climatically suited to shield off the hot Indian sun and the dusty summer winds.

The "Jama Masjid" or the Holy Mosque was the center of all Muslim religion in the North (India) and was given strategic importance in the design of Shahjahanabad. It was a visual landmark in the Old City and was the seat of all religious decisions and announcements. The Jama Masjid was the place
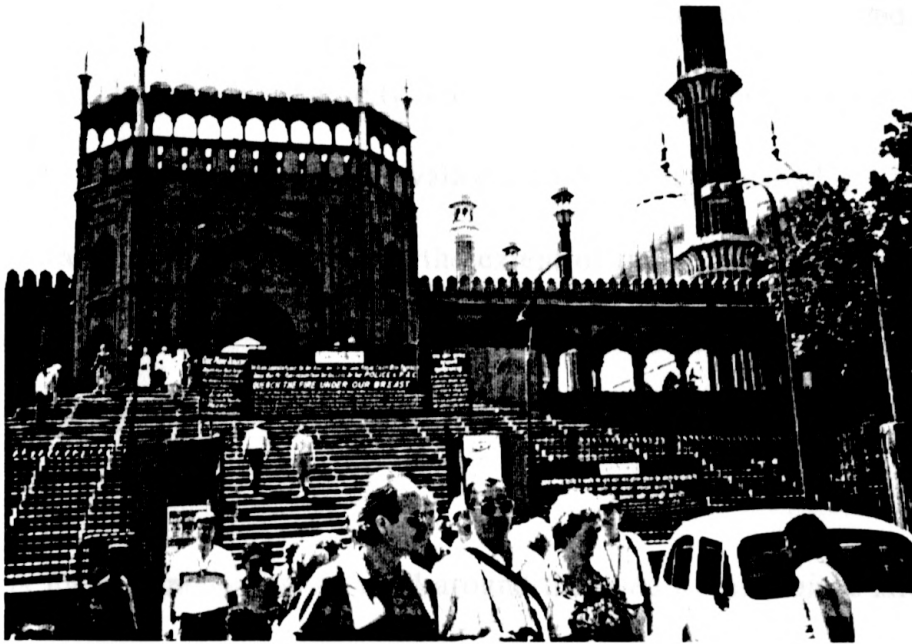
Fig. 29 **View of The Jama Masjid-forms a strong visual landmark in the Mohalla**

where all Muslims gathered to read the Namaz (prayer) daily. This was a typical example of participation through design.

SOCIO POLITICAL CONDITION:

The king was the feudal lord and the trendsetter for all rules and regulations. The emperor resided in the Red Fort around which was spread the entire town of Shahjahanabad. Society was close knit and occupational grouping was common. The nobles and other aristocracy resided in hovels and bigger houses close to the palace. Separate katras or regions were occupied by specific group of people. Cobblers, barbers, carpenters, washermen, soldiers, sweepers, dryers; all had zones where they resided separately, but mixed regularly at the

chowks and other common meeting places.

Houses, like the society, were closely packed and reflected the social condition of the people. The city was well protected from external attack by a high wall (hence the term , "the walled city of Shahjahanabad"). This wall of defense was the deciding factor of the extent of the community. With its outer boundaries defined, the community grew inwards and developed as a fine web of streets, residential units, commercial zones, and community spaces all knit together as one.

A lot of construction focused around the need to maintain a large army to keep the city safe. Evidences of a large number of barracks, exercise areas, parade grounds, and artillery storage areas can be seen.

In general everyone participated in the working of the grand city of Shahjahanabad and each person contributed his effort and support to help make the society safe and liveable.

CLIMATIC FEATURES / LANDSCAPE:

North India faces extreme heat and cold conditions with periodic monsoons. Summer temperatures often touch 47 degrees Celsius (120 degrees Fahrenheit) and drop to freezing in winter. The summer also brings dry and hot sandy winds (loo) which raise temperatures to great levels. These abrasive winds tend to slowly, over the years, sculpt the structures and buildings in their way.

Perhaps the builders of the city were aware of the climatic conditions of Delhi in the 1600's when they moved into the region, because Shahjahanabad boasts of having solved this problem of heat, cold, wind, and water. The narrow self shading streets were an ideal solution for cutting off the summer sun and letting temperatures drop with the use of shade and shadow. These streets also prevented movement of wind passages through them. The houses, too, had a central courtyard which helped lower the temperature in summer.

To further cut off the sun and dust, fine latticework screens were seen everywhere. Balconies acted as airing pavillions or wind catchers to cool the houses. Fenestration sizes were small and the walls thick. The high city walls not only acted as defence barriers, but also helped cut off wind flow into the city streets. This was a very thorough approach to tackle the forces of nature.

The city had an efficient underground water supply and sewage system sufficient for its occupants at that time. This became a problem after many years when spaces were seen as too tight to expand within.

Large shady trees were planted in chowks, public squares and other gathering places where people could sit and talk in the shade even on a hot day. Water was readily available and water carriers roamed the city to provide cool drinking water to travellers or anyone who needed a refreshing drink. Today this social custom has been replaced by water facilities provided in every home. Hence, in new towns public taps are seldom seen.

Construction material was local sandstone and thin brick tile. Both helped keep off heat and helped lower the temperatures of the micro climate of the area. A large central waterway with fountains ran down the middle of the chandni chowk ("Moonlight Way"), which was the main street of the town, and culminated at the Red Fort.

All the above mentioned features and the ones I will elaborate on later during the study prove that there was an awareness amongst the people to combat the harshness of the climate and to create a comfortable and livable city. They saw the problems and tried to tackle them through design, ingenuity and landscaping. This subconscious effort on the part of the people in the mid 1600's shall be commended forever.

ANALYSIS OF 20TH CENTURY SHAHJAHANABAD:

A case study of the following mohallas was undertaken to better understand the design features of a traditional mohalla. Research was carried out in these areas under the following headings: (i) Sociological, (ii) Climatological, (iii) Urban/area design features, (iv) Landscaping, (v) Circulation, and (vi) Community Facilities.

This study was done with the help of (i) Observations, (ii) Interviews, (iii) Sketches and Photographs, and (iv) Study of relevant literature.

CASE STUDY - MOHALLA MIR ASHEGH

This mohalla is a commercial (shops and paper industry) and residential zone. It is situated in the southern side of the Chowri Bazaar ward.
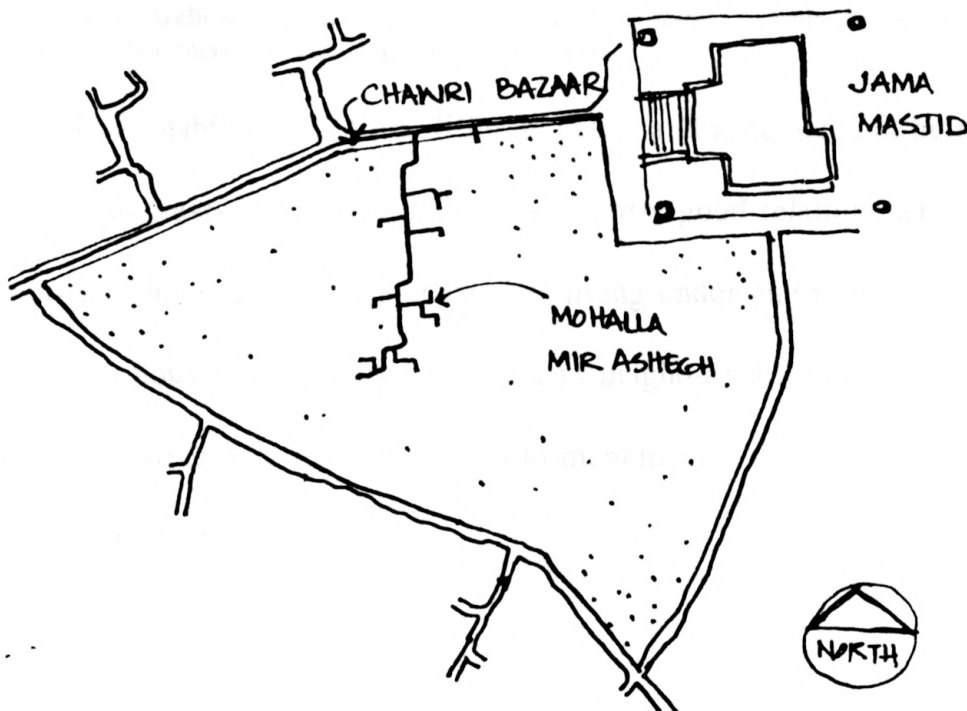
Fig. 30 **Part of Ward-9**

(i) SOCIOLOGICAL ASPECT:

Fig. 31 **Narrow Galli in Mohalla MirAshegh-the street is barely 6' wide, bringing built structures close each other thereby enhancing social interaction.**

The inhabitants are from different castes and religions, but being together for so many years everyone has developed fairly good relations with each other. Majority of households are joint families living under one roof.

The houses are closely laid out, and neighbors are in easy access of each other. The street is a space dedicated to movement, and its narrow width forces social interaction.
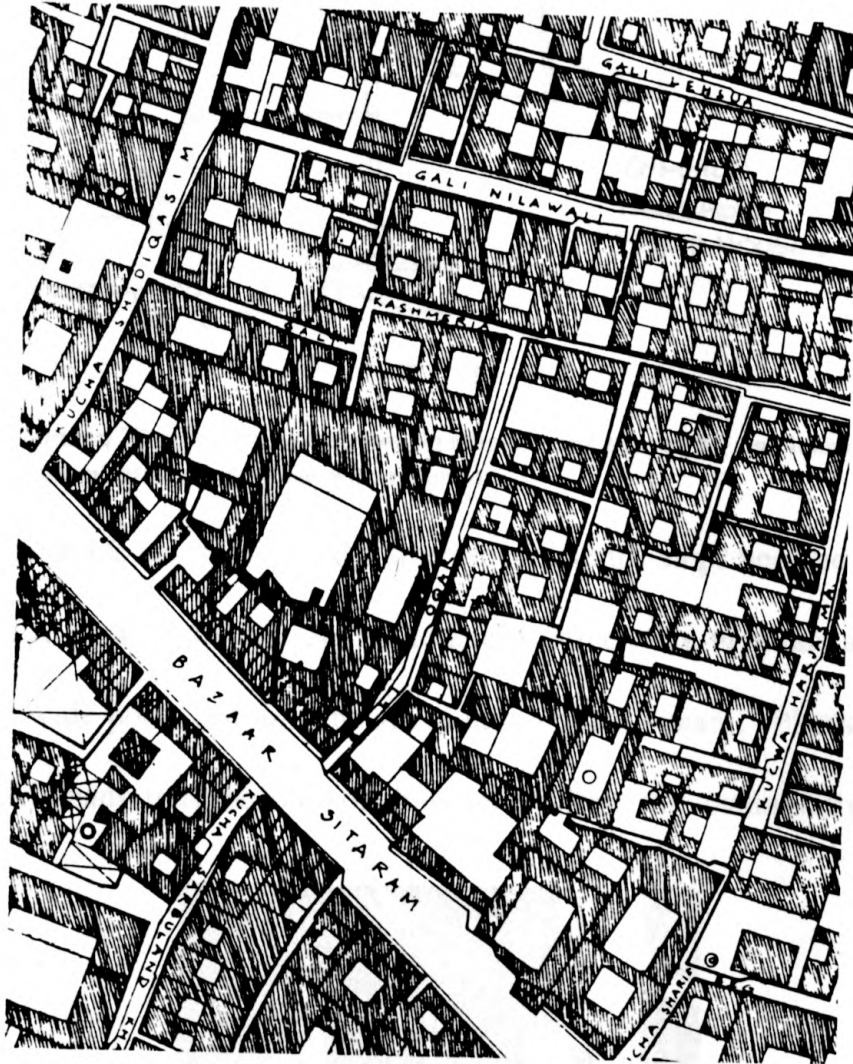
Fig. 32 **The Pattern of Old Delhi-this figure ground diagram shows the built versus the open space ratio in the city. A large number of internal courtyards can be seen in the plan-an important social element incorporated in design in Shahjahanabad.**

In Mohalla Mir Ashegh, I noticed a classic case of achieving public interaction through design. The two thresholds of adjacent houses are on a common step and as a result the residents usually keep them open all the time and the women keep talking and drop in to visit each other all through the day.

The threshold is an important space of transition between the public (street) and the private (house) zones.
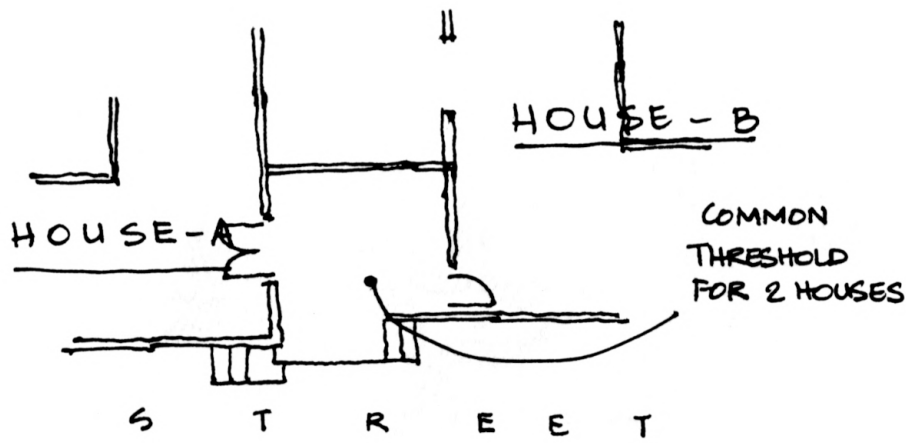
Fig. 33(a) **Common Threshold Space**-shows threshold being shared by two houses. This allows people to communicate and socialize with neighbors.

Thresholds are raised off the street level and the steps become natural seats for people to sit and talk on. A simple kucha (street) can turn into a community space at a wide point and turn the street into a small square. Plinths of houses, rocks under shady trees become outdoor seats within this community space.

Fig. 33(b) **Common Threshold leading to multiple residential units**

KUCHA FORMED
BY THE WIDENING
OF A STREET
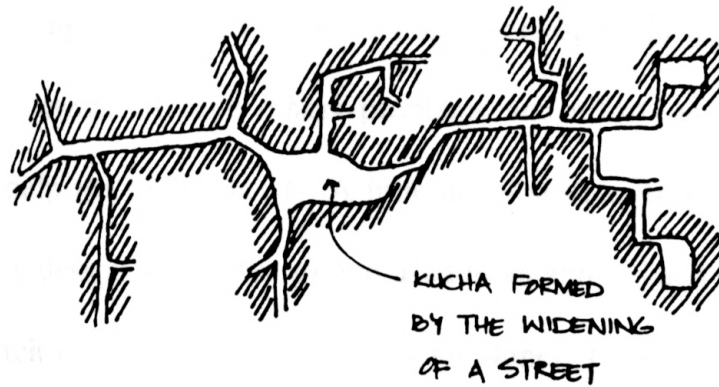
Fig. 34 **Formation of a Kucha**

The edges of these community spaces are often places of multifarious activity. They can range from shops (sweetmeat stands, book shops, restaurants, barbers, tailors, etc.), religious buildings, and bicycle repair stalls to a public bath. All these places act as nodal points around this space and help bring people together by encouraging social interaction.
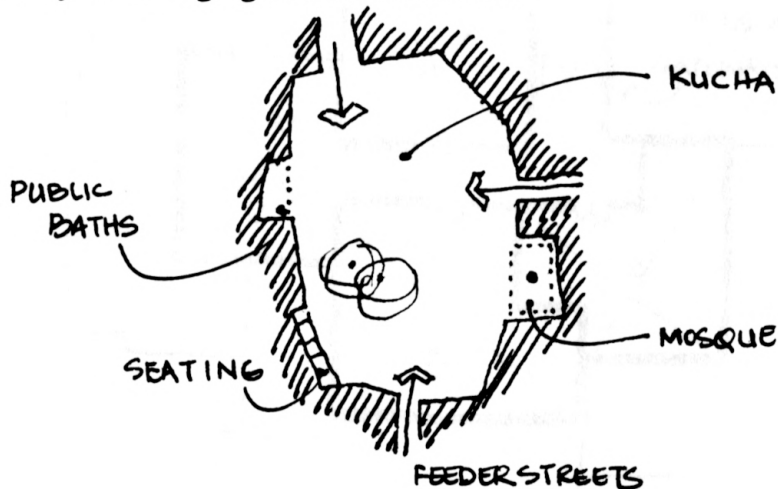
Fir. 35 **Edges Of A Kucha-bound by public functions such as mosque, shops, seating spaces the Kucha becomes the focal point of activity within the neighborhood.**

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These spaces are centers of local gossip where news about events and happenings change hands. This is an important aspect in a social set up as it makes people aware of each other's problems and efforts are usually made by everyone to help the one in need. A little detail such as this is often missed out in modern day design as one has grown used to an abbreviated and individualistic set up in which one's problems are one's own alone. However in India, in older towns even today the general people are in close touch with one another and participate in each others affairs.

"A society in which people don't share is a society at war with itself." - Bajaj (1982), pg 83.
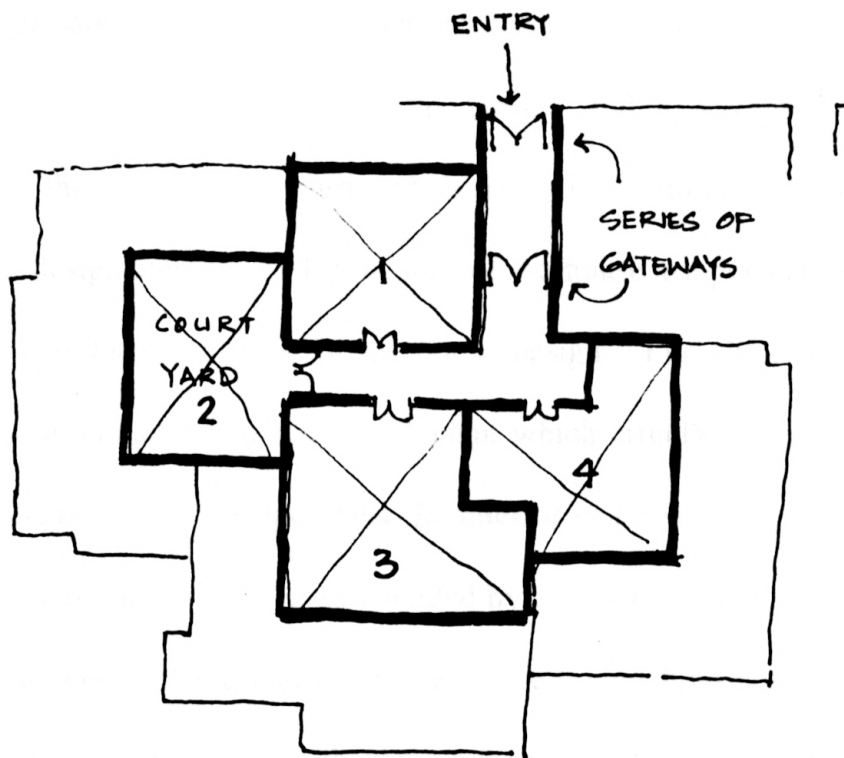
Fig. 36 **Grouping of House Units**

As one proceeds from the main kucha towards the house one passes through a series of doorways, often 2 or 3, that provide added security at night. Most side streets or galis culminate into a dead end. This helps in minimizing all traffic and passers by through the residential zones. All new faces to the area are immediately noticed and newcomers were often asked their reason for being in the area. This traditional and easy way of privacy is nowadays termed as "neighborhood watch" area in housing suburbs. The mohalla's have a gateway usually for security purposes. The mohalla's belong to the residents and serve as a kind of a second home. Other gateways at different parts of spiral street ensure further security.

Progressing into the house from the street, the most intimate level of social interaction is the courtyard within the house. Often described as the "axis Mundi" of the house, the courtyard is in Indian climate a practical and meaningful design solution. All functions of the house are performed within this space and it is the focal point of the house design. For climatic purposes, the courtyard was in summer a cooling element which circulated air drafts into the house, whereas in winter, helped heat the interior of the house.

The courtyard was often surrounded by a veranda which had doorways to the different rooms of the house. Some of the bigger houses had two or more courts; as one progressed into the house from the street, the level of privacy increased. The innermost quarters are for the women of the house, a place

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where outsiders could not just walk in.

Socially the courtyard had met the need for a private family space for all the activities of the women - which is dictated by religious and social criteria. The court is also a place for children to play safely under the watchful eye of the household members. The introvert design of the house into the courtyard provided security for the residents.

(ii) CLIMATOLOGICAL ASPECT:

Mohalla Mir Ashegh has a large number of design elements devised to suit the extreme climatic conditions prevalent in the region. With the year's seasonal changes comprising of extreme heat, monsoons, winter and arid dry winds, baring the climatic conditions can be a traumatic experience. Proper choice of construction materials, covered shady walkways, tree plantations, cantilevers and balconies, lattice screens and water taps at street corners were some of the measures taken by the designers to combat the elements of nature.

Fig. 37 **Kinari Bazaar in the Kutcha-sun penetration into the street below is negligible (photographed at 1:15 p.m.)**

The height of the kucha as compared to the width is such that the kucha stays in shade for most of the day. The height-width ratio provides self shading

streets where people can commit at most times of the day. Besides cutting the angle of the sun, they provide narrow passages of wind movement for air circulation even to the innermost houses in the mohalla. Their narrow width and curved shape separates the dust from the wind and allows for clean air passage. Besides providing relief from the climate the chatta is a unique feature using overhead space in the streets.
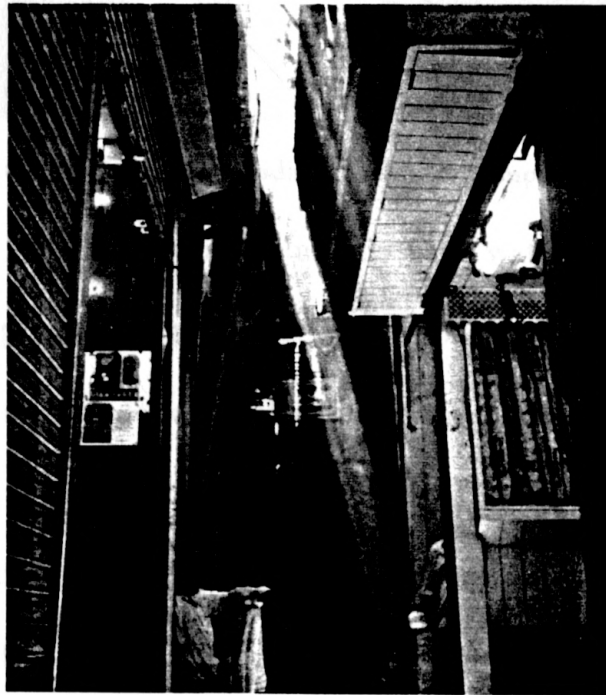
Fig. 38 **Bazaar in Parathe Wali Gali-Absence of sunlight helps keep shops cool and walkways shady**

Chajjas (cantilevers) protect the openings from rain and sun. Most cantilevers were stone slabs laid on sloping brackets to allow for rain water to drain easily. The brackets were carved in stone and added to the aesthetic beauty of a functional requirement.

Fig. 39 **Sun protection in Katra MaliWada-Stone brackets support a cantilever over the windows**

Besides these street corners usually have water pumps for providing cool water relief to people out in the street in summer. Clusters of trees in the chowk became places to sit under and talk in the shade. Occasionally afternoon sleepers can be spotted under these trees on a stone platform built around the tree trunk.

Red sandstone, this brick tile and other local stone has been use in Mohalla Mir Ashegh. This helps in reducing the heat retaining capacity of the structures as compared to concrete buildings which trap heat all day and radiate it during the night. Brick paved streets vis a vis. asphalt help lower the temperature of the micro-climate within the streets, due to the difference in specific heat of the two materials. Varying building heights and offsets in building facades help shade the streets and create shade pockets where people sit and relax during the day.
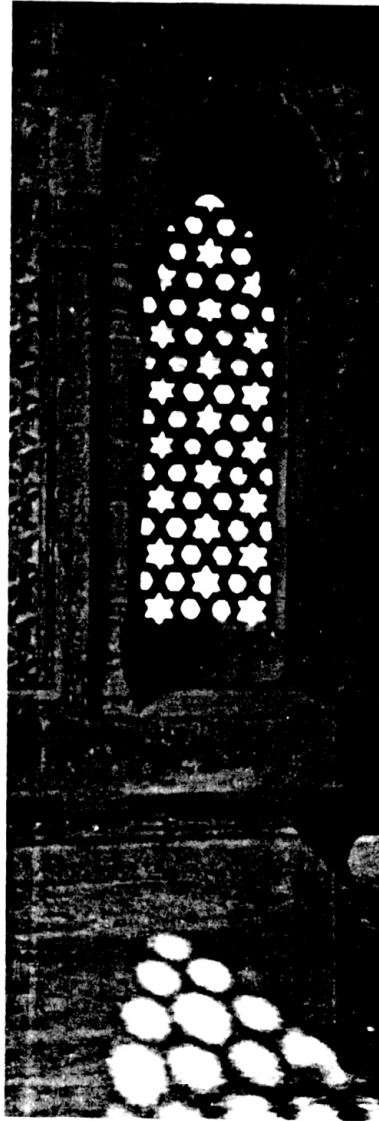
Fig. 40 **Lattice screen jallis used to filter out the sun and dust**

Fine lattice jalis (screens) were carved in stone or marble and helped filter the dusty winds and the hot sun. Women often sat behind these and enjoyed the cool breeze during the day. They were aesthetically beautiful, functionally necessary and created dramatic light effect on the inside of the rooms.

Fig. 41 **Screened balconies/jharokhas used as cooling pavillions on the outside face of the house. These design elements overlook the street and act as wind-catchers which cool the interior of the house.**

Balconies often had jharokhas (lattice screened windows) – acted as wind catchers to cool the house. They were ornately carved and often made of marble; an excellent cooling material under the hot summer sun. These balconies overlooked the main streets and women could sit in privacy and watch the happenings on the street below. Besides these, verandas (covered passageways) were provided around the courtyards and helped in cooling the rooms surrounding it. Figure 41 shows an interesting use of overhanging balconies which throw shadows on one another. This three dimensional play of facade elements increases the surface area exposed to direct sunlight. This helps create cool pockets on the inside of the house.

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STREET WIDTH AND
BLDG. HTS. KEEP THE
STREETS VIRTUALLY FREE
FROM THE SUN

26' - 35'

8'
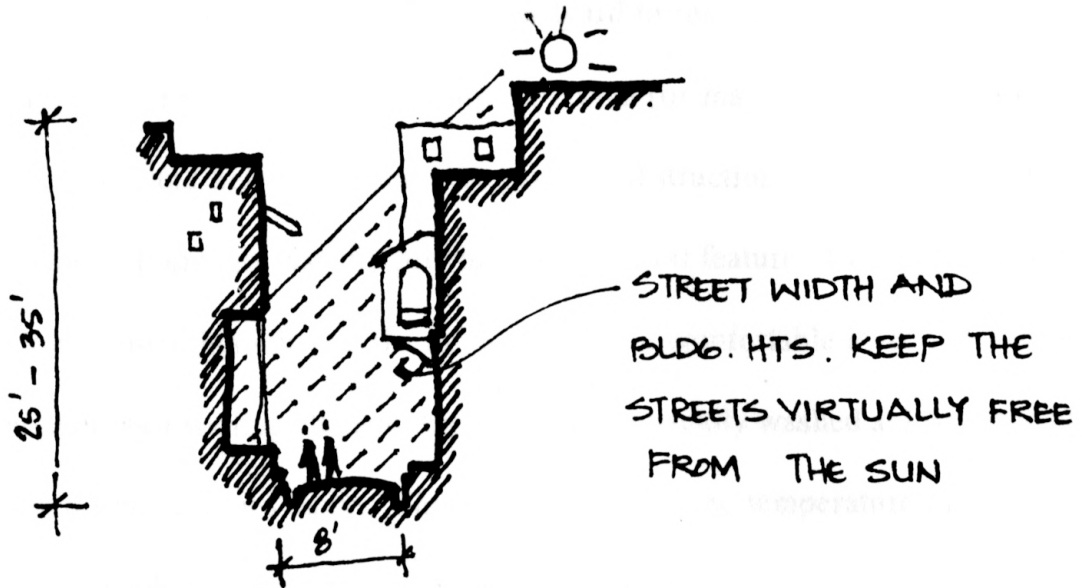
Fig. 42 **Self Shading Streets**

The houses are built around a courtyard. As only a small window opens

out towards the street, the light and ventilation for the rooms is supplied from the

central courtyard. Small external window openings allow for dark, cool interiors,

a must for seven months out of the year.

The courtyard allows for wind drafts to be pulled into the house and be

distributed laterally. Climatically the heat that is lost during the night to the

INTERNAL COURTYARD

PRIVATE QUARTERS
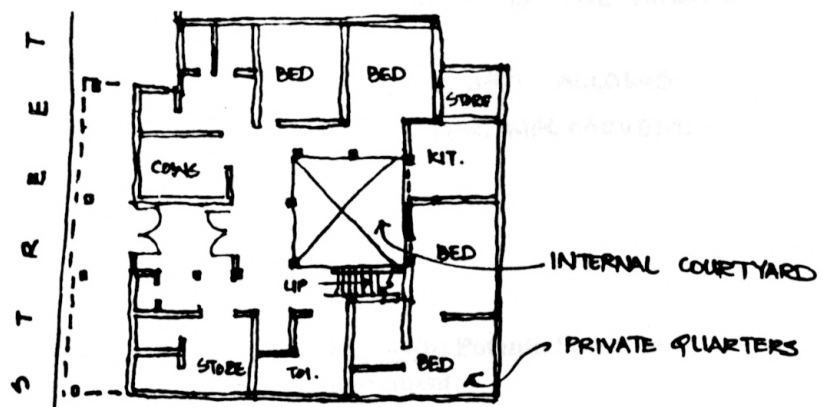
Fig. 43 **Plan of Haveli**

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clear sky through radiation allows the courtyard to remain relatively cool most of the day. Covered terraces are usually on 2 or 3 (or maybe all four) sides of the courtyard and help to reduce heat gain by obstruction direct solar radiation. By means of fountains (usually provided as a central feature of the courtyard) the very low relative humidity of the air is raised to a comfortable level. In addition to fountains as a cooling element, the courtyard is usually washed at least once and showered several times daily. This helps to reduce the temperature of the house plinth and cools it considerably for sleeping at night.

STREET

CENTRAL
COURTYARD

- HEAT DISSIPATION
  DURING THE NIGHT

- COURT ALLOWS
  FOR AIR MOVEMENT

Fig. 44(a) Sun penetration into courtyard during the day

Fig. 44(b) Potential night air movement.

The courtyards are nothing more than a series of doors, which can be opened up completely when it is required.
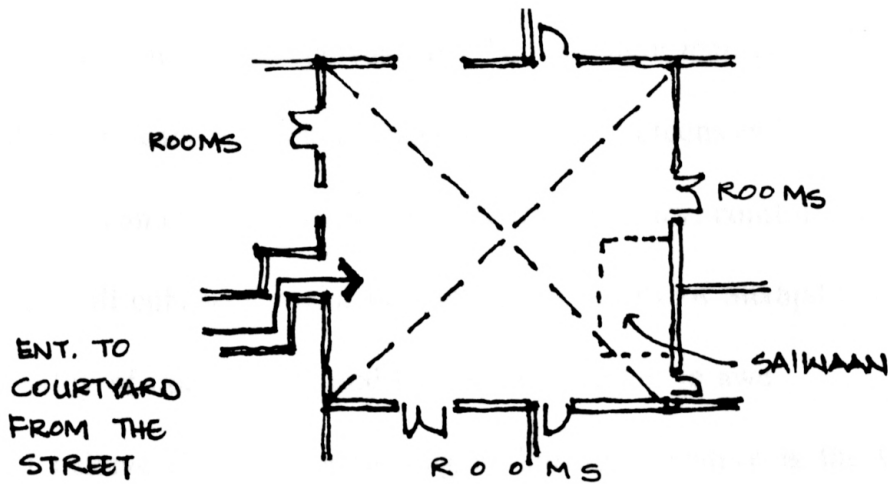
Fig. 45 **Plan of Internal Court in the House**

The Chakutra (Saiwaan) is a light structure raised on timbers posts and capped with galvanized iron sheets during the monsoon months, when it is not possible to sleep outside, the Saiwaan provides as a comfortable sleeping area. Trees within the courtyard help in providing shade in the summer and help cool the house. Besides these, the basement provides a cool atmosphere for sleeping during the hot summer months.

(iii) URBAN/ARCH DESIGN FEATURES:

The richness and style of the architectural design features lent an aesthetic quality to the City of Shahjahanabad. The common man in Shahjahanabad had at his disposal carved brackets, balconies, lattice screens and design elements that provided him and his community with security, privacy, comfort, aesthetic beauty, and above all enhanced social interaction. The city of Shahjahanabad induces a high quality of imageability and leaves the observer in awe.

I believe the most interesting architectural feature is the Chatta, which breaks the monotony of the linear kuchas. It adds to the masing of the streets and creates a positive-negative space aspect. Aesthetically the space contained within creates a boxed perspective of the street, and the bridged section creates a wonderful play of shadows and light.

The linear street corridor is broken by the occasional widening of the street to create chowks. The produces changes in perspective and creates an element of surprise. The street itself is the social center and people spend most of their time socializing and meeting each other. The street furniture adds to the character of the streetscape. Most thresholds are raised off the streets by a couple of feet. the difference in the levels is bridged by steps which act as seating platforms outside the houses. A central tree in a chowk often has a concrete platform where people sit and smoke water pipes (hukka's) and discuss matters of the day.

Building facades add to the architectural character of the street. Motifs, details, features and design elements add quality to the street aesthetic. Balconies cantilevered over the street lend interest to overhead space and create shade pockets to walk under in summer. They also lend an aesthetic quality to the street. The balconies are usually mounted on carved brackets which can be seen when one looks up from the street.
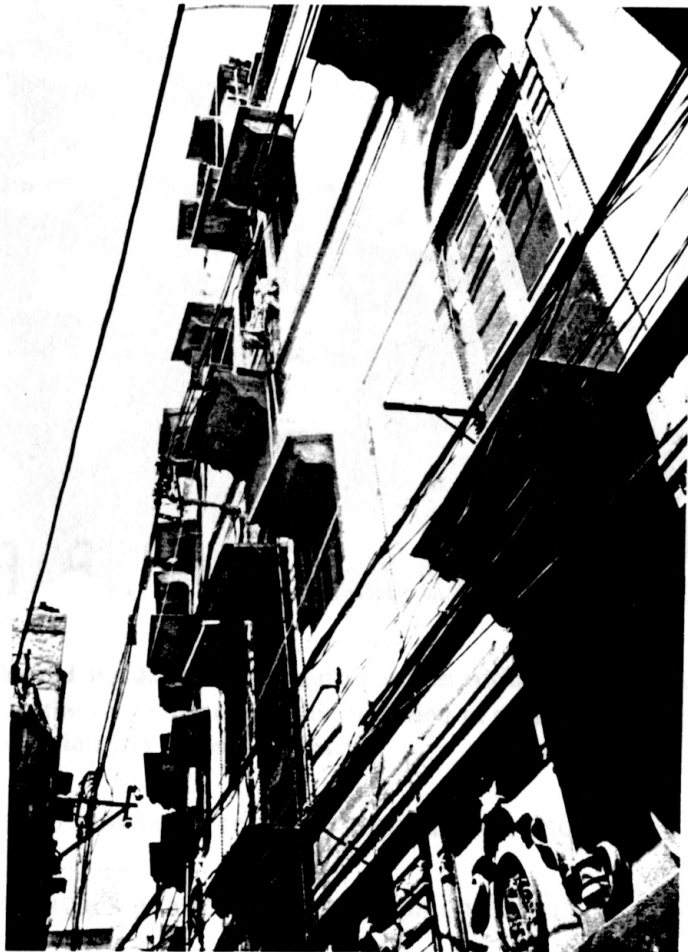
Fig. 46 **Series of bracketed cantilevers add to the architectural aesthetic when viewed from the street**

Over the years, due to shortage of resources such as space and money, some people have leased upper floors to tenants. These second floor tenements usually have open staircases leading up to them from kuchas. This gives a direct relation between the building form and the pattern of movement. Mostly all upper floors are connected by steps from within the courtyard of the house.

Fig. 47 Broken/jagged skyline creates negative spaces within building blocks. This generates interest and adds to the street asthetic. This variation in skyline breaks the monotony of a rue corridor asthetic seen in most modern towns.

Entrances to houses were richly ornamented and carved. Building facades had a number of niches where evening lamps could be set. These niches doubled as bird feed stations where grain could be kept during the day to feed pigeons. Most of the carving was done in red sandstone, a local stone, easily available and

beautiful when worked.

Features like jallis (lattice screens) and Chajjas (cantilevers) adorned the windows facing the street (whatever for there were). As one progressed from the street into the house, the courtyard was an interesting design feature. It was an important element in the everyday life and added to the privacy, comfort and climatic levels of the house.

The rooms around a courtyard are often raised on a plinth attached by steps, making the courtyard appear sunken. This difference of level in the house and court brings variation in movement and experience. The veranda around the court is usually a series of arched openings with carved columns. This adds to the ornamentation of the house.

One design feature of the Shahjahanabad house which is not used or exploited in modern design is the terrace of the kothas of the house. In Shahjahanabad, it was the space saving element used for multifarious activities varying from drying corn, laying out laundry to dry, meeting the neighbors, sleeping in summer, to participate in kite flying competitions and to cultivate the hobby of pigeon raising. The terrace was one space of the house from where the town landmarks were visible, the local clock tower, the city hall or in Shahjahanabad, the Jama Masjid (the holy mosque). This set an orientation pattern for the people toward the nodes of the community.

Seclusion was not the design intention or desire in Shahjahanabad, terraces

had visual contact between them and often one can find people from two or three households chit chatting over the streets. Most terraces were interconnected and one could climb a small party wall and make his way around the mohalla. This formed a private circulation network between houses.

(iv) LANDSCAPING:

The planting of trees does not follow any particular order, however an erratic scheme of landscaping persists within Shahjahanabad. Trees were laid out wherever thought necessary. The self-shading narrow streets seldom had any trees in them, however the chowk was always a hub of activity, centered around a tree. Trees were also planted in courtyards within the house to cool the outside and provide a shady roof overhead for sleeping in summer.

Within the streets general landscaping was supplied by the varied street furniture. Platforms under trees and steps to house doors acted as seats and the local tea shop was the congregation hall. The charpoy (knitted rope bed) was used as a relaxing couch. A number of Charpoys can be seen propped up beside the house door, or laid out in the chowk.

The public/municipal drinking water facility (a hand pump feature, still used in rural India) was a strong landscaping feature in the street. Women with water pots would often gather here in the mornings and talk and meet with each other. It acted as a design implement that enhanced interaction amongst the people.

Flower beds could often be seen at the gates of some houses or flower pots made from milk drums. There was a conscious attempt by the people to incorporate the beauty of nature within design. The city had, adjacent to the Red Fort, a hugh parade ground used to date by travelling circuses, marching bands for childrens games and various other activities. To add to the beauty, the main

street, the Chandni Chowk (Moonlight Way), had a row of fountains that flowed continuously night and day.

Beauty and interest was sought by arranging burnt brick in various design patterns on the street floor. The most widely seen design is the herring bone layout, also seen are cross brick and diagonal designs.

The residents of Shahjahanabad tried to achieve an environment which suited most to their needs and blended perfectly with their daily routines. Seldom had one to change custom or tradition to incorporate a design feature into ones lifestyle that one was not accustomed to. The people were not as well off as the average bourgeois today, but still gave beauty and tradition absolute importance. Architecture was respected in many ways as the preserver of culture; design, language, form, function, habits, and routines all meshed together in one to produce a highly intelligent neighborhood unit system.

(v) <u>CIRCULATION</u>:
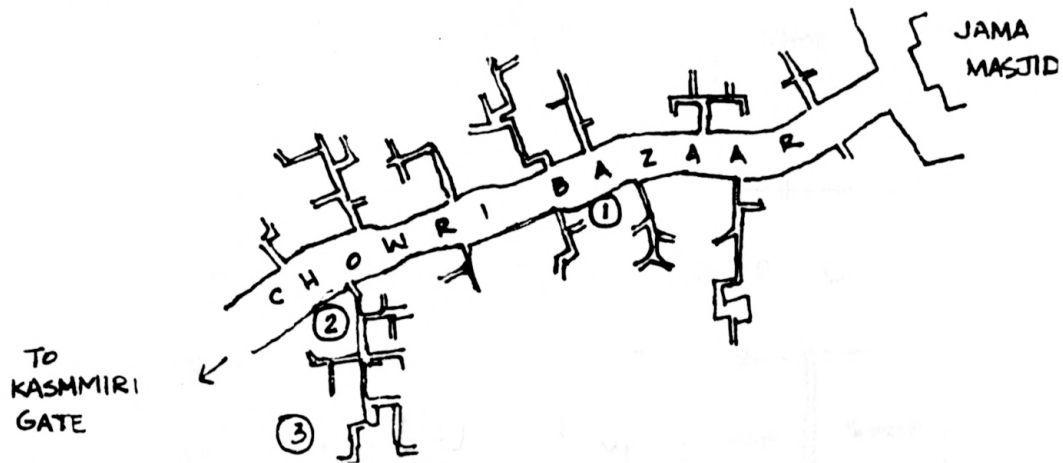
<u>Fig. 48</u> **Plan of Chowri Bazaar-A major circulation route showing hierarchy of street widths within the Mohalla. Three levels of circulation have been identified within the Mohalla and are explained below.**

<u>Level 1</u>: Chowri bazaar is the primary street joining the back of the Jama Masjid to Kashmiri gate. This is a totally commercial street and has both pedestrian and vehicular traffic, the latter however at slow speed. Street width varies from 24' to 36'. The Bazaar has a unique feature of having a double storied shopping design layout. The upper floors are connected by open staircases rising from the sides of the building.
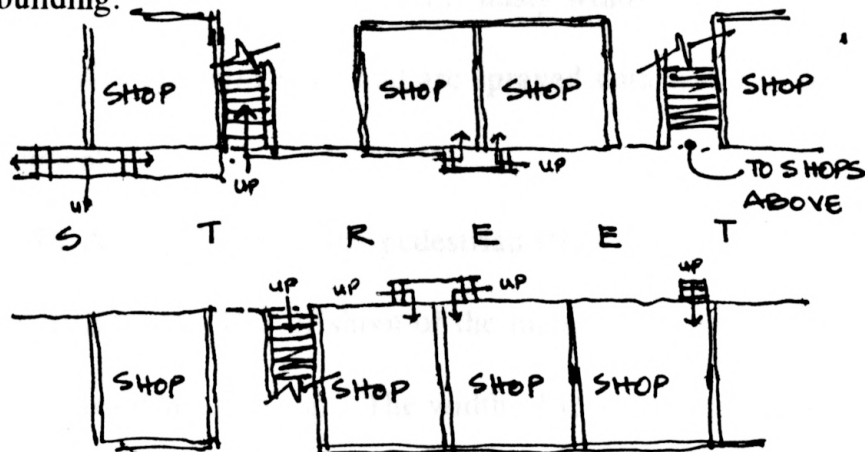
<u>Fig. 49(a)</u> **Street Level Plan-shows commercial activity off main street.**
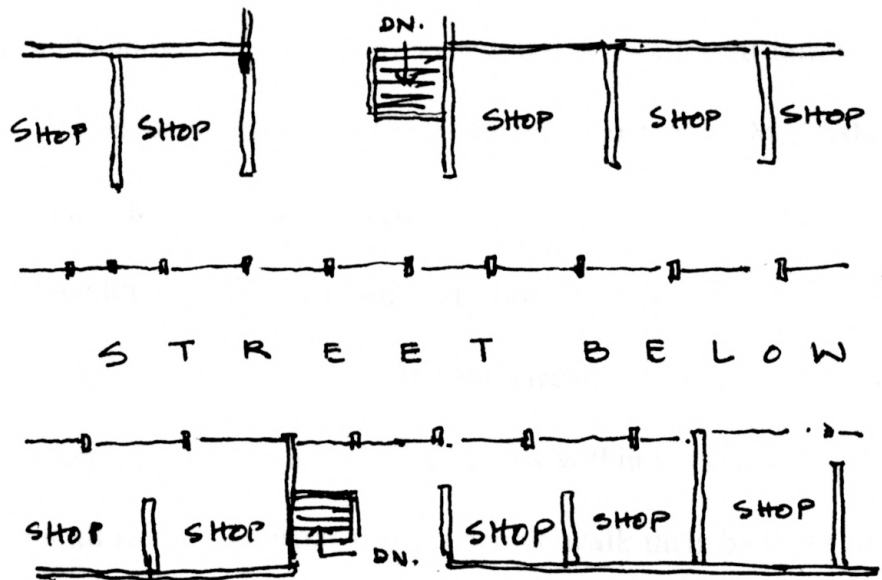
Fig. 49(b) **Upper Level Plan-shows commerical activity overlooking main street. Shops have terraces and verandas in front of them. These terraces act as outdoor extensions of shops during winter.**

This is one of the most popular commercial sectors in the whole of North India. The bazaar has a strong sense of imageability because of its design layout. The shops on the upper level have large open balconies in front of them. During the winter months, shopkeepers often extend their wares out onto this area to catch the eye of the people in the street below. Cloth awnings are very common to cut the sun and break the dusty winds. These awnings, often on bamboo poles are retractable and are sprayed with water in summer to cool the environment.

Level 2:   Mir Ashegh kucha is the pedestrian street joining the residential area to the Chowri Bazaar. This offshoot of the main bazaar street has shops on either side with residences on top. The width of this street is approximately 10 feet, but varies at places. Narrow steep staircases between shops, lead to

residential units above. Cycle and rickshaw traffic is allowed into these areas.

Level 3:	Residential streets - these are sub branches of Mir Ashegh Kucha and vary from 4' to 7' in width. They are usually double storied and due to their narrow width and high side ratio, are often self shading through most parts of the day. Most of these streets have circulation dead ends (a cul-de-sac type arrangement, leading to a group of houses within a mohalla). These streets do not allow for vehicular traffic, people walk their bicycles to store them in the courtyards of their houses.

CONCLUSIONS:

The conclusions and interpretation that I have drawn after having analyzed the Mohalla are based on the five aspects I used to measure it with. These aspects are (1) Sociological, (2) Climatological, (3) Urban/Architectural Design Features, (4) Landscape, and (5) Circulation. The conclusions are as follows:

(1)   SOCIOLOGICAL

(i)   People in this mohalla tend to live in joint families which is a natural course for greater social interaction.

(ii)   In the organic Indian mohalla, people were drawn out of their houses towards the focal points of the mohallas, calling for social interaction. Things that drew people into the public square were:

(1) Common source of water

(2) Social gatherings, weddings

(3) Entertainment

(4) Religious festivals

(5) Shops

(iii)   The layout of the street (kucha), the square (chowk) and the courtyard lead to better social interaction.
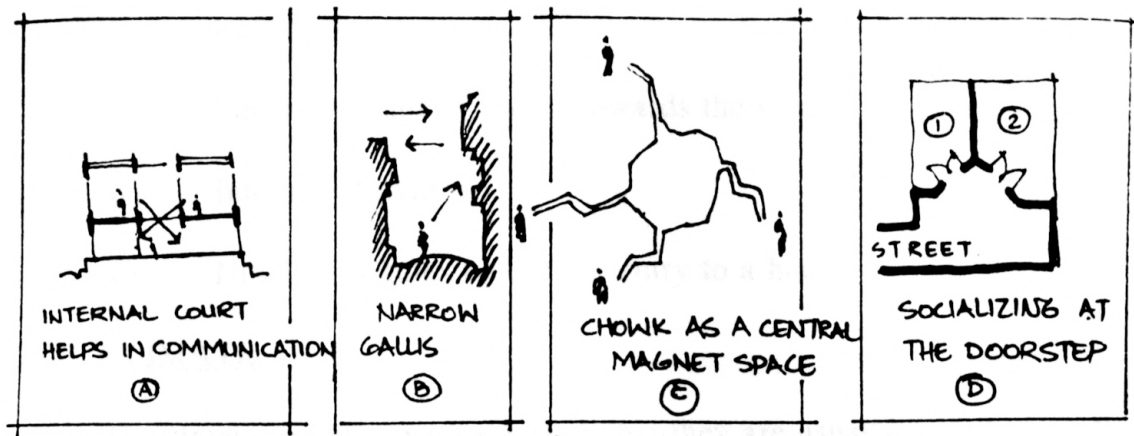
Fig. 50 **Elements enhancing social interaction**

(iv)   There was an inherent harmony in the social, cultural and traditional activities which led to constantly reinforced social interaction.

(v)   There were three degrees of privacy that I noted within the settlements:

(a) 1st degree - interior of courtyard.

(b) 2nd degree - in the street (as an extension of the houses).

(c) 3rd degree - with adjoining mohalla and the outside world .

Security as a sociological element :

Heirachical levels of security as noted in a moholla are:

(a)   The gate of the Mohalla .

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(b)   The dead end kucha as a destination place rather than a through traffic zone.

(c)   Small openings of rooms towards the streets.

(d)   Internal courtyard.

(e)   Number of gates before the entry to a house.

(2)   **CLIMATE**

The streets and alleyways are such that they are usually self shading even on the hottest days. This allows for movement in the street, safe from the sun overhead. Sun protection is provided by creating small shady spaces using the configuration of housing units. The streets were also protected from the scorching sun by external projections over windows and on the edges of roofs. The heat that is dissipated to the clear sky during the night through radiation allows the courtyard to remain cool most of the time. A comfortable thermal equilibrium was thus achieved by the mohallas of Old Delhi by the use of: (i) Narrow Streets, (ii) light and heavy structures, (iii) Reflective whitewash on the walls, (iv) small window openings, (v) Courtyard within the house.

(3)   **URBAN/ARCHITECTURAL DESIGN FEATURES**:

Design elements in the street:

- Streets opening into a Chowk form variations in space thereby creating an element of surprise.

- Variation in skyline provided interest in the building aesthetic.

- Narrow self-shading streets provided cool passages of movement during the summer time.

- Location of key design elements such as religious places within the neighborhood created spaces of regular public interaction.

  Design elements in the house:

- Internal courtyard provided security to the residents and was a private space for the women of the household.

- The courtyard was also an excellent climatic element that helped cool the houses in summer.

- Jallis, Chajjas, Jharokhas, were important elements woven into the design for both climatic and aesthetic purposes.

- Use of local indegenous building materials and local labor helped lower building costs.

- Carved columns, brackets, and archways were used in the house design. These features were both symbolic and traditional to the neighborhood design.

(4) <u>LANDSCAPING/STREET FURNITURE</u>:

- Trees in courtyards and chowks add beauty to the space and provide shade.

- Alternative seating pattern such as steps in front of houses and platforms around chowks enhance intimacy and cohesion.

- There is a concept of an "inverted garden city" - (Martyn, D. "Inner City Areas", A+D, 1990, pg 60) that is prevalent in Shahjahanabad with over 25% of the city area devoted to internal courtyards.

Fig. 51, 52 Part plan of Shahjahanabad showing the rich network of internal courtyards (51) and a street in Shahjahanabad (52) at a wonderful human scale with a strong sense of urbanity.

- Brick paved streets lend texture to the floorscape. Designs have been created by changing the pattern of brick laying or by using different colored bricks.

- Within the house, the open staircases are a typical traditional element, and also create usable spaces beneath. Sometimes on outdoor kitchen or storage for beds or fodder in rains.

- Within the streets the sign boards, billboards, movie posters, flags, banners, loudspeakers, and cloth awnings add color and variety to the bazaar.

(5)   CIRCULATION
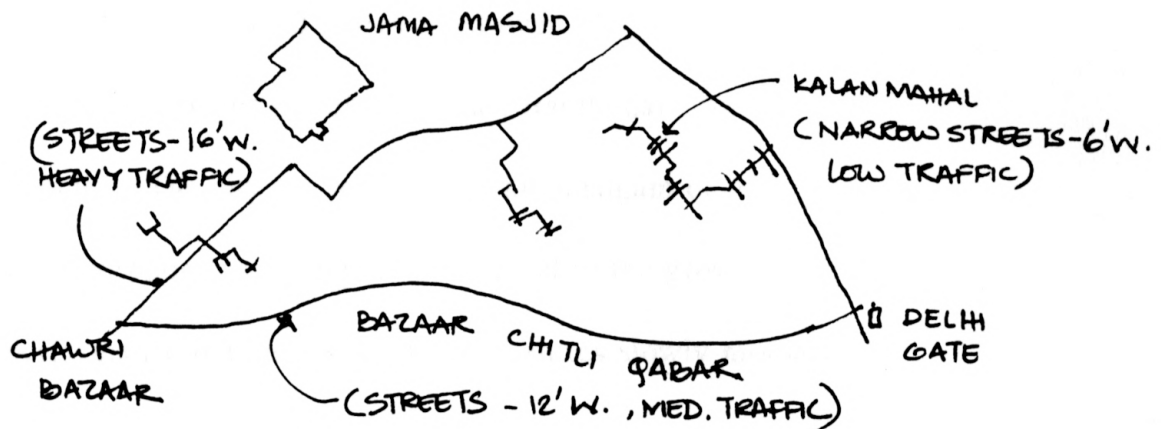
Fig. 53 **Key Plan of Walled City Showing Levels of Circulation**

The hierarchy of traffic and function in the circulation system in Shahjahanabad

produced a sense of order within the streets.   Segregation of traffic types

according to street width and function was done to achieve an efficient

circulation pattern.

Traffic movement was highest in sections dedicated completely to

commerical activity. In areas where street dominance was commerical with

residential on second floor vehicular and pedestrian traffic share the street

equally. The traffic density here was not as high as completly commerical

zones. In areas where street dominance was residential with sparse

commercial, the traffic was fairly minimal. This zone was relatively accident

free due to less vehicular movement. Finally, in areas where street dominance

was completly residential, dead end streets restricted thru traffic through the

neighborhoods.

CONCLUSIONS:

Shahjahanabad has evolved over 500 years and has during this period of time seen changes in cultural ideas, traditional values, rulers/government policies. The city we see today is an amalgam of ideas and efforts. This metamorphosis is an important element in the growth of the city as its performance is time-tested and its features slowly modified to fit the general needs at any given time.

To recreate another Shahjahanabad would be a disastrous proposal as it lacks certain elements that are very important to the urban fabric today. The automobile was not the design criteria 500 years ago, hence the city scale is what it is today. What we need to examine are the design elements which if incorporated in urban patterns today would elevate the quality of the design.

Shahjahanabad is a good example of a society performing as a group. Social interaction was the basis of growth of this society. This social value is reflected at every stage of the design. The urban spaces were scaled to a human level and hence man could relate physically and mentally to the built environment around him. The house, the basis of this growth pattern, was based on man's basic needs and requirements. It was functional, climatically amiable, comfortable, and aestheticaly pleasing.

Though the design elements made it simple for its functioning, the basis of its success was the desire to thrive as a community, as a whole.

Chapter Three
Case Study 2
Study of Neighborhood Units in Chandigarh
Analysis of Sector 22

CRITERIA FOR STUDY:

The criteria for the analysis of sector 22, Chandigarh, lies in the conclusion of the 6 aspects (Sociological, Climatological, Architecture Character, Landscaping, Circulation, and Community Facilities) identified and studied in the design form of the Mohallas of Shahjahanabad. It is also manifested in the basic premise that physical forms are a manifestation of social, cultural, economic formation of a society and the building materials and techniques. "In a society where the physical and the social have come through a process of evolution and refinement, any new environment, planned or designed should be a step further in the refinement so as to be natural liveable (and improved) habitat for that society."- Reza (1983), pg.79.

The question, thus, to be answered is, whether sector 22 is a natural and satisfactory habitat for the population that migrated into it or not.

In the process, one is also to identify the general design of the habitat to which the settlers were accustomed before they moved to Chandigarh. For this Shahjahanabad proved to be a strong parallel as a relative study.

Finally by critically analyzing the neighborhood units of Chandigarh, the strengths and weaknesses of a modern neighborhood shall be discussed. This study is important as it forms the basis of development for new regulations and guidelines which should be developed in designing neighborhood units in the future.

INTRODUCTION TO CHANDIGARH:

The newly acquired freedom of India was to be represented in architecture with the new township of Chandigarh. So thought the leaders of the country in 1950 when they commissioned Le Corbusier, a modernist architect from Europe, to design the city. Starting on a new canvas with no etchings of the past, this was to be a town of multiethnic groups, businesses with an extensive administrative set up to represent the spirit of free India.

" Let this be a new town, symbolic of the new freedom of India, unfettered by the traditions of the past...........an expression of the nation's faith in the future." - Prime Minister JawaharLal Nehru.

Little did the policy makers know the repercussions of this revolutionary idea, and how choosing to design without ethnic significance would produce a city so distant from culture and tradition. This has been the argument of designers and theoreticians for the past 44 years. Corbusier had developed a city of the future with motor transport, green spaces (which he referred to as the lungs of the city), and lots of sunshine. A perfect city for the french riviera maybe, but a disastrous dream in the hot and arid locales of North India. "History is a leveller and even the monuments of the past are in due course reduced to the level of relics. In this respect perhaps Le Corbusiers Chandigarh has started on this path much too soon . . . While the buildings are still in active use." - Sabhiki (1987), pg 45.

The chaos of partition (in 1947) and the disorder due to new freedom demanded a sense of discipline - a rule that could govern order. The West seemed to be the only place to look to and modernist ideas the only solution. Indian architects, prior to independence in 1947, were mostly educated abroad. No designer in India was capable of handling a project of this size. Thus foreign assistance was sought. Indian architecture at that time did not seem to be a torchbearer to produce order. "We could not go on with domes forever." Singh (1966),pg 116.

"India at independence was a nation with an ancient civilization but strangely without past in the sense of an active self-confident culture to guide a rebuilding; more accurately, its rulers chose not to display the culture that did exist. Victorious nationalists imported foreign culture, an act that derived its legitimacy from a belief in universalism of science. And Le Corbusier delivered." - Prasad (1987), pg 15.

Le Corbusier was commissioned in 1951 by the Indian Government to head the design process for building the city of Chandigarh. His design crew included British architects Maxwell Fry and Jane Drew, and his French cousin Pierre Jeanneret. However, when Le Corbusier and his team took control of the design process, Mayer, Whittlesay and Glass (a firm in New York) had already prepared a master plan for the City of Chandigarh. In 1950 a polish architect, Matthew Novicki, started to work on a master plan for Chandigarh.

He commissioned the New York-based firm as his team and himself travelled between the U.S. and Chandigarh. However, on one such tour between site and office, his plane crashed and Novicki died. The New York-based firm found the large city design project almost impossible to handle and subsequently backed out. Even though a rough layout of the master-plan had been prepared alongwith conceptual images of building elevations, a lot of detailing and finishing was required in the overall scheme. It was then that the designers turned their attention to Le Corbusier.

Matthew Novicki's designs for the city and its neighborhood units were remarkable and I shall discuss a few of his neighborhood designs in the latter part of this chapter.

The partition of India in 1947 created a chaotic environment in which the fertile and prosperous state of Punjab was divided and a large number of refugees from Pakistan moved in. The influx of these Sikh and Hindu families demanded space and land to settle down on. Chandigarh was conceived as an administrative township to house and employ a lot of officials and people who had moved into North India.

The city was begun following World War II, after a hiatus in large scale construction, and the theories then current in city planning still drew heavily on the thinking of the 1920's and 30's, a time when attention was largely focused on relieving urban congestion and improving physical standards of building

placement, housing accommodations, recreational facilities, and open spaces in cities. The neighborhood unit patterned like early England dictated that the population would be accommodated according to rank in government houses, thereby setting up an occupational hierarchy within the building pattern which was dictated by caste segregation.

All these patterns dictated the outcome of the design thereby alienating the resident of Chandigarh from its design. The large cross section of the people, their tradition, culture and habits were not incorporated within the design. "Chandigarh was never intended by its founders as a social experiment, instead it was dominated by the vision of Le Corbusier, for whom the overall plan was a sort of vituroso performance" - Evenson (1966),pg. 11

Chandigarh initially had 30 sectors in the first phase of design development (Fig.54). Each sector was a unit 1200 m X 800 m, the mathematical progression of which constituted the city plan. The grid-iron layout was the basis of overall circulation within the city.
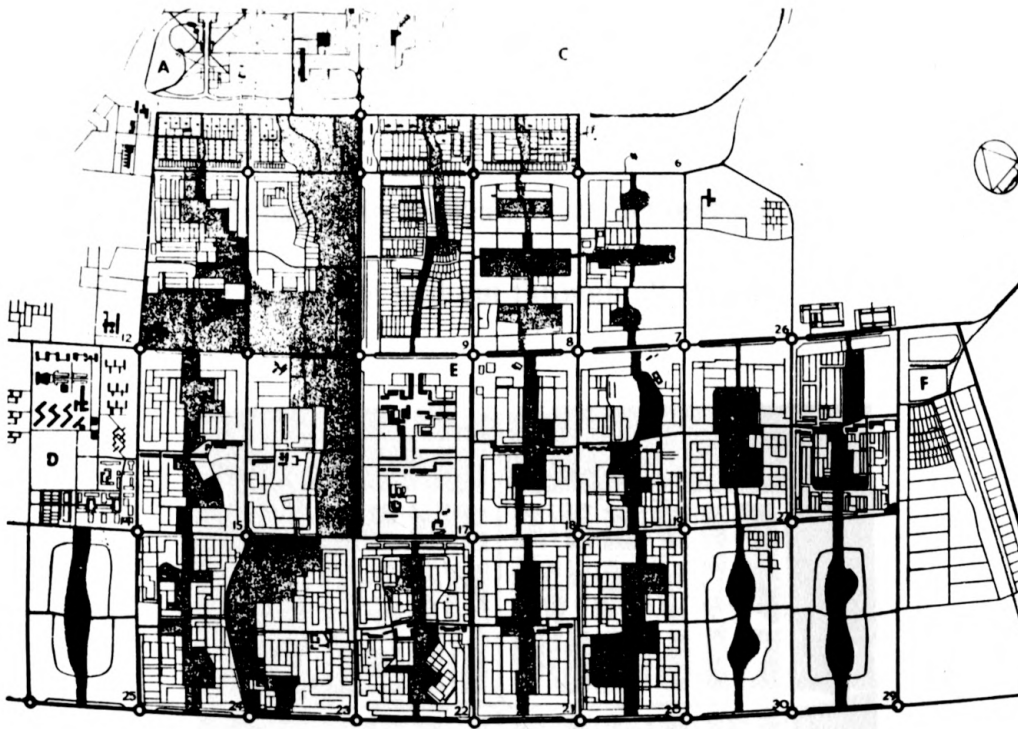
Fig. 54 **Master Plan of Chandigarh showing Phase 1 development**

Each sector, as a design unit ,was laid out as an independent

neighborhood unit within which facilities like schools, markets, dispensaries,

etc. were located for the residents of that area. It was planned to be a self

sufficient unit for daily requirements of the residents. The designed concept is

close to Clarence Perry's design for a neighborhood unit (as discussed in

chapter 1). Generalized requirements were placed in the heart of the city - in

the commercial complex. The sector had housing units, both government and

private, laid out together to form the neighborhood. There was a district

hierarchyof road circulation systems developed by Corbusier called 'les Sept

Vois' (the 7 V's). In the next section I shall explain Corbusiers concept for the

7V's.

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CIRCULATION PATTERN IN CHANDIGARH:

Concept of the 7V's:

Chandigarh has a circulation pattern devised upon importance of street usage/traffic size and speed laid out through all sectors.
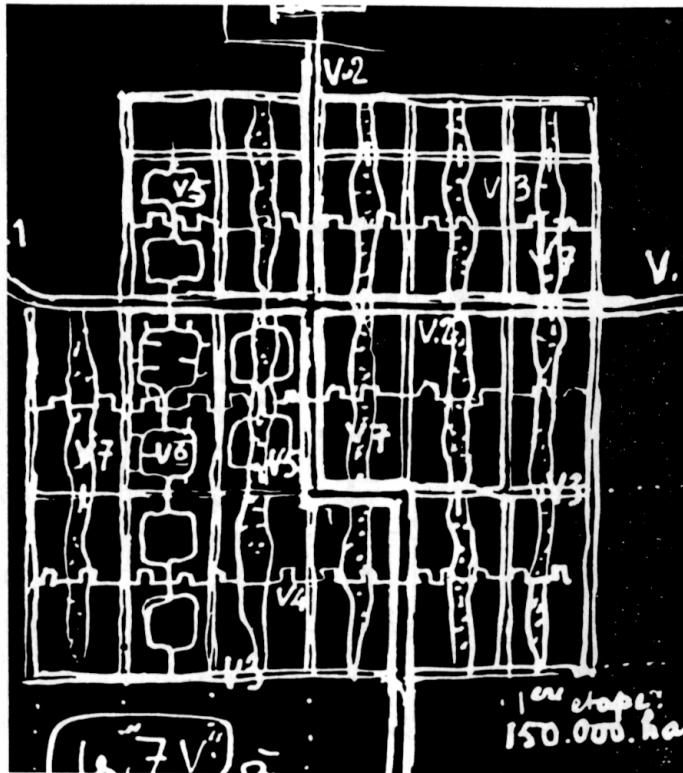
Fig. 55 **Study sketch of the 7V's by Corbusier**
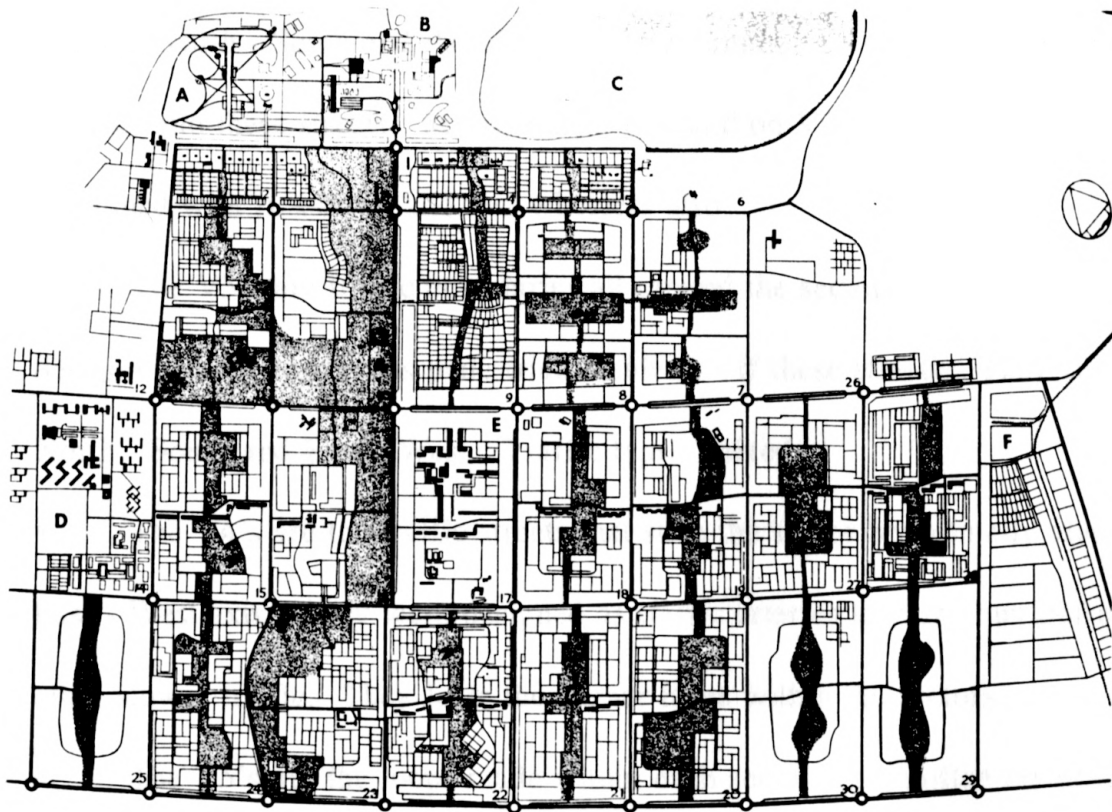
Fig. 56 The 7V's of Chandigarh

- The V1 is the main artery (highway) connecting Chandigarh to its adjoining cities. This is a six-laned, divided highway for fast moving traffic only.

- The V2's are the main traffic roads within the city - the Jan Marg running North - South and the Madhya Marg running East - West. All sectors backed onto these streets. Mixed traffic is found on V2's: Predominantly fast, combined with rickshaws and two wheelers also.

- The V3's are traffic boundaries all around the sectors. The introvert design of the sectors keeps pedestrian residents off these streets. They run both North - South and East - West. Traffic type: mixed.

- The V4's are the traffic streets that slice the sector horizontally along the East - West axis. They were designed as traffic arteries to carry bus traffic and other slower traffic. They form the bazaar lanes within the sectors.

- The V5's are the loops made within each sector which often circulate around public amenities like schools, dispensaries, clubs or swimming pools in the heart of the sector. The V's enter the sector in the middle of the North and South edge of the boundary.

- The V6's are the roads that lead up to the doorstep of each house, the offshoots of the V5's.

- The V7's were the generic pathways formulated as open land by pedestrians who would walk from their houses to the markets. Pedestrian trails

were often marked out on the land depending on the shortest distance between two points or in Chandigarh often the shadiest route.

- The V8's were a concept that never evolved to totality. It was meant to concrete pathways for cyclists to commute from the Southern sectors of Chandigrah to the capitol complex (located in the Northern part of town). Each sector was to have its V8's running North and South.

Le Corbusiers methodical separation of traffic types leads one to believe in his scientific approach towards design. This systematic separtation of traffic types on the town scale is also seen in Stein's Radburn plan (see chapter 1). It also reminds on of the hierarchy of traffic movement discussed in the Shahjahanabad chapter. I shall compare the efficiency of the old and the new approach to achieve traffic segregation in the conclusion chapter.

I shall now discuss the overall design bylaws used in Chandigarh to create an architectural aesthetic of its own. These shall help the reader familiarize himself with the various levels of design regulations used in Chandigarh.

BYLAW REGULATIONS DESIGNED FOR CHANDIGARH:

Chandigarh has a strict regulation code that new construction, be it in the residential, commercial, educational, or industrial sector, has to follow. Certain initial guidelines were laid out by Le Corbusier and his design team

while others were developed after Le Corbusier left, by engineers and architects who were trained to function in the Corbusier fashion. Order and discipline were the underlying principles of Corbusier's design theory, something which he left behind as a legacy to be continued by all architects who designed in Chandigarh after he had long departed. Even today, no attempts are being made at the decision making level to make these bylaws flexible to accommodate the needs of the people.

The bylaws currently applicable to Chandigarh are categorized as:

(1)   Architectural Controls: Design bylaws pertaining to overall shape and material use of structures. It contains within itself the following categories: facade control, full architectural controls, frame control, special controls. These are defined as follows:

(a)   Facade Control: Interior design of the structure is limited in terms of space allocations to different areas with little choice left to the discretion of the owner. The external facades are prescribed due to fixed sizes of fenestrations, material usage, gate locations, and driveway orientation; hence the architectural expression must stay the same. Shops, banks, petrol pumps, movie theaters, and housing units fall under this control section and must all comply with facade restrictions to maintain order and harmony.

(b)   Full Architectural Control: Applies to all residential units within

the sector and all commercial buildings along the V4 shopping

street. Restrictions apply to all 3 dimensions of the building,

construction details, frame dimensions, usage of materials, colors

and even ornamentation.

(2)   Frame Control: Most important of all controls. Fixes the height of all

party walls between houses. Applies to all housing units below 1000 sq.

ft. (plot area). All units whether constructed to the maximum three

floors or not have to be finished with a three story frame to complete the

facade of the building.

Fig. 57 Adaptation of Frame Control in Sector 22

All fenestration sizes are specified under this control. A mandatory 18"

high frame has to be inserted in the facade at every floor level to

complete the elevation treatment. This completed and tied the upper

floors of all houses together thereby creating a continious band.

(3)   Special Controls: Apply to all structures in the Capitol Complex (Sector 1) - The Secretariat, The Assembly Building, The High Court, and The Open Hand Monument.

Besides these, control regulations also apply to boundary wall heights, materials, gate location, size and design, and rear yard enclosures. External lighting on all houses is regulated by size and fixture type.

The Zoning regulations decide the sizes for plots, orientation, density and neighborhood size within the sector. All houses have a front and back yard, however, the smaller houses do not have the luxury of having a big green space.

Bylaw regulations control the aesthetic of the shopping zone along the V4 road. All shops have a fixed bay size, depth and elevation. The signboards on all facades have fixed style, text height and script.
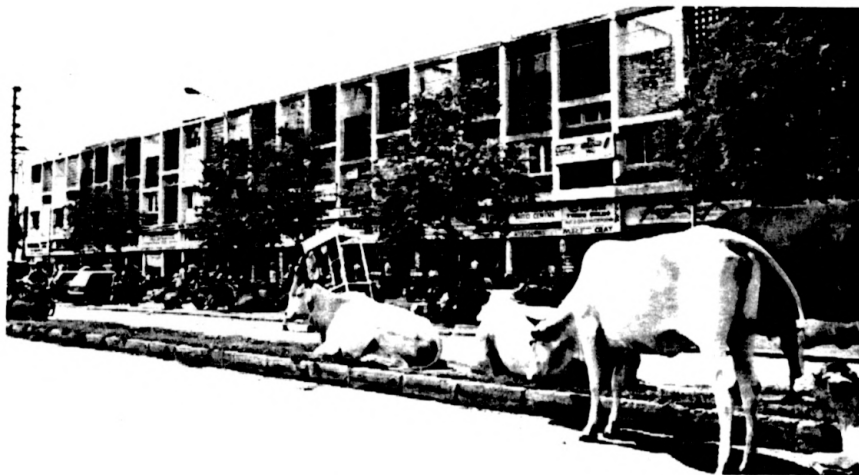
Fig. 58 **Facade Control for V4 Shopping Areas**

The smaller shopping booths have a fixed square footage area and function allocated to them. The bylaws, hence, dictate the aesthetic and the form of the design in Chandigarh. Because of these bylaws, the neighborhood aesthetic is the same all over Chandigarh, in each sector the house elevations, play spaces, street aesthetic, and landscaping pattern are similar to those in another.

In the next section I will discuss the housing types in Chandigarh and the bylaws to which they are subjected.

HOUSING TYPES IN CHANDIGARH:

Chandigarh was started as a Union territory (not part of any one state, instead a city funded by the Central Government - like Washington D.C.) and was conceived as an administrative town. Hence the need for a large number of government houses to house officials was generated. People had to be housed in units depending on their income status in the government pyramid. Hence, pockets of house designs developed. Each section had similar sized houses and was separated by other sections by large green spaces.

The government housing was categorized in 13 types. The first four reserved strictly for governor, chief minister, cabinet ministers, and secretaries of state respectively. Type 5 and 6 were reserved for heads of departments and I.A.S. (Indian Administrative Service officers). Type 7 through 9 were housing types designated to working officials, technocrats, government lawyers, medical staff, and teachers. Type 10 through 13 are houses designated to clerical staff, university employees, hospital maintenance crew, and other government employees.

This categorical distinction in housing types based on income levels was a change from typical Indian housing norms that were based on caste and profession. Attempts were made to distribute government housing evenly over most sectors. Some sectors, however, were dedicated completely to

government housing (sector 7, 24) while others had all private houses (9, 8, and 4).

The government housing was basically designed and laid out by Le Corbusier's design team - Pierre Jeanneret, Maxwell Fry, and Jane Drew. The architectural idiom was to be the same - modern, pure in material, and very basic in spatial requirements (similar to a lot of purist houses and apartment complexes done by Le Corbusier in France). Ornamentation and the use of motifs had to be avoided and aesthetic beauty was to be discovered in brick and concrete. All government houses had to be finished in exposed concrete only. With these as basic design parameters, the design team then set out to frame design bylaws for government housing.
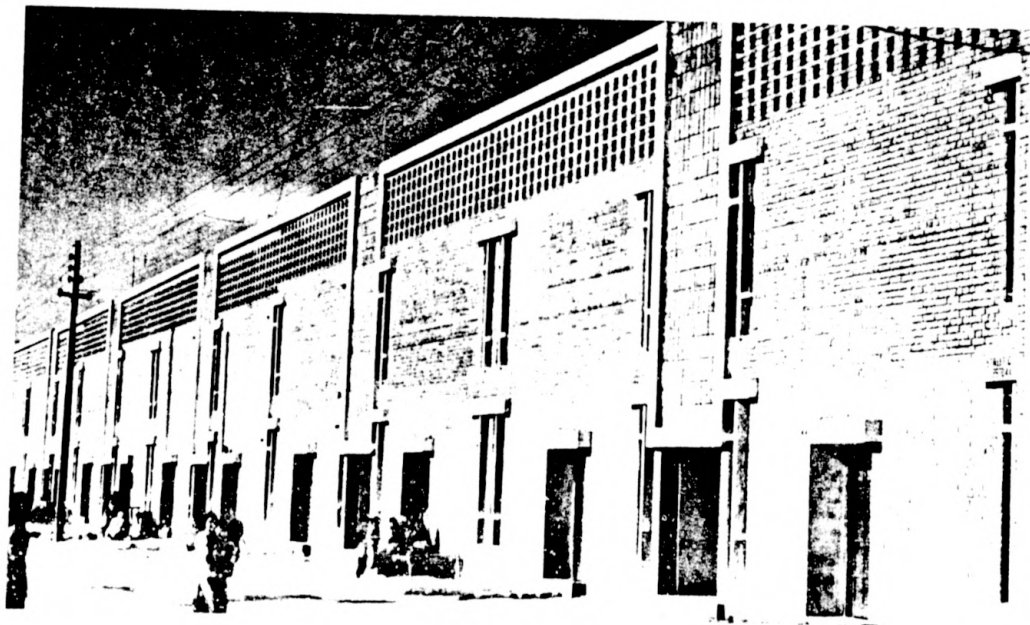
Fig. 59 Type 12 Government Housing
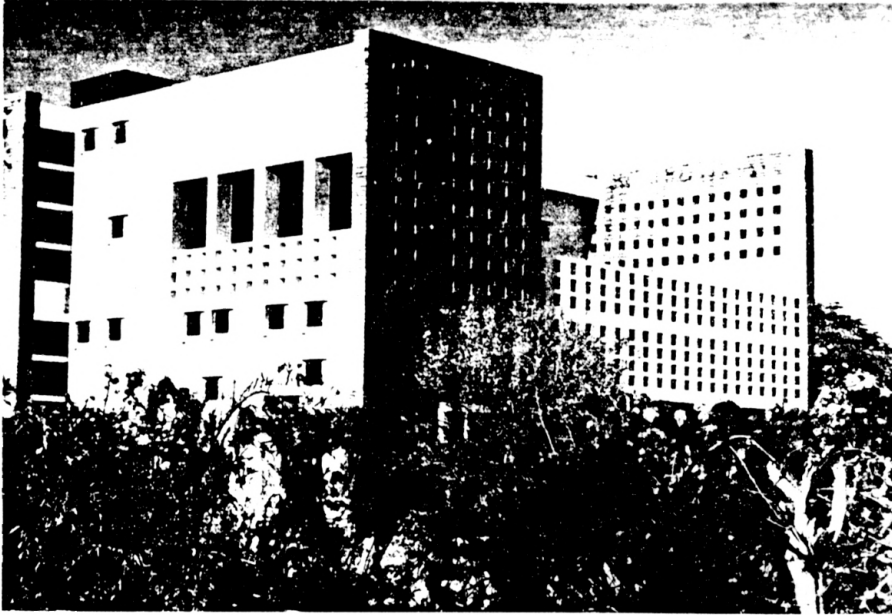
Fig. 60 **Type 5 Government Housing**

I will now discuss a few design regulations that government housing in Chandigarh had to adhere to in the housing sectors using sector 22 as a typical example.

BYLAWS FOR GOVERNMENT HOUSING:

Sector 22, the neighborhood section that I am studying in Chandigarh has government housing in various types spread all over the sector. Sector 22 has type 9, 10, 11, and 12 housing styles intermixed with private housing.

Out of all these, type 9 housing has the largest number of units in government housing types. It has housing units designed by Jeanneret, Jane Drew, and Maxwell Fry, hence type 9 has three separate categories - 9F, 9D, and 9J, named after its designers. This personal signature produced a mixed response from the residents as aesthetics and space design differed in all three types. The other types, 10 through 12 were designed by Pierre Jeannert alone.
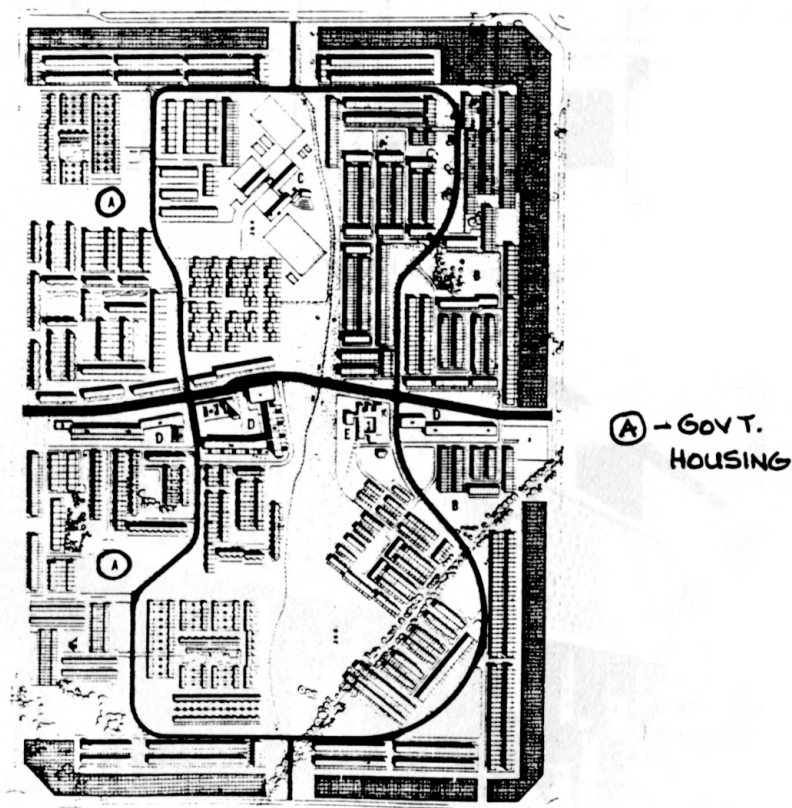
Fig 61 **Plan of Sector 22 showing location of Government Housing**

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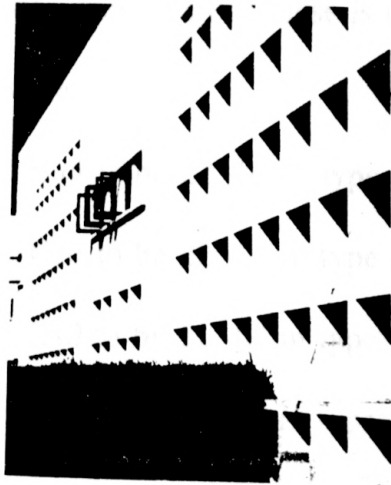
Fig. 62(a) Type 9F-by Fry

Fig. 62(b) Type 9J-by Jeanneret

Fig. 62(c) Type 9D-by Drew

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The basic features one sees in all of these is certain bylaw restrictions that are common to all housing types.

HEIGHT: Had to be 22'-0" in type 9.

Had to be 22'-0" in type 10.

Had to be 11'-0" in type 11.

Had to be 11'-0" in type 12.

This height regulation in multiples of 11'-0" produced long horizontal planes of building masses laid out mirrored on an equally long and wide street.

No variation in height was allowed, the idea being to achieve "clean and unbroken lines of design" Maxwell Fry "Marg" Vol. 15, No 1 (1961).

ELEVATION: Building facades were the most important feature according to Jane Drew, and hence had the maximum bylaw regulations applied to them. Door openings could not be more or less than 6'-9" X 3'-0", and window modules had a sill level set at 2'-9" and a lintel height at 6'-9".

No balcony projections were to be allowed; they had to be flush with the facade. Most facades were to be finished with single material only - either brick or painted concrete. However, some type 9 houses (by Fry and Jeanneret) have a combination of both brick and concrete.

A continuous band had to be provided at the separation of floors to demarcate levels. All houses had to follow the layered look (type 11, 12, 13) and hence internal heights could not be different.

ORNAMENTATION: No ornamentation was allowed on building facades. Motifs, murals, stucco images or painted drawings were prohibited. This regulation was a bylaw restriction that applied to all construction in Chandigarh - government or private. Bricks were not allowed to be colored or whitewashed unless an exception was granted in certain design areas. All houses near the Capitol complex (sector 1) had to have whitewashed faces, to isolate the exposed concrete structures of the administrative sector. Door frames could not be polished natural material or painted any color, other than white. No railings were allowed; verandas had to be surrounded by brick parapet walls only. Boundary walls around houses were allowed to be constructed in exposed brick (towards street) and only whitewashed plaster towards the houses. Permissible heights were set at (A) - 2'-6 1/2" or (B) 3' - 6" only. No house would be sanctioned complete without a boundary wall enclosure on all sides. Gate width and design had to be painted (white) steel strips with angle frame. Any other design or color was not permissible.

MATERIAL: Brick and concrete were to set the design aesthetic for Chandigarh's government housing and hence it is the staple material of use. Concrete had to be whitewashed and brick had to be used in the exposed form only. No other material could be used. Glass panes for all window openings and side light could not be tinted, or covered with posters, pictures etc. Water tanks atop houses had to be 64 cubic feet concrete cast on site tanks only.

These had to be whitewashed on the outside to make all houses look similar. Gates had to be made of steel only. Wood or any other material could not be used.

With all these bylaws and zoning regulations governing the setbacks, floor area ration and building footprint, all government houses acquired a cookie cutter aesthetic that is dotted all over Chandigarh. Community facilities like swimming pools, tennis courts and landscaped parks were not laid out in between housing, instead a large number of open lots were left unconstructed in the hope of them developing into gathering places.

All government housing being built even today follows this same set of bylaws and no changes have been made since their inception in 1952.

In the next section I will discuss the bylaws for private housing.

BYLAWS FOR PRIVATELY OWNED HOUSING:

Private housing in Chandigarh is on a land ownership system. Houses can be built on lands that are purchased from the government, another individual, or at a public auction. The zoning plan laid out in 1952 set the lot sizes for residential construction. Two adjacent lots cannot be used to construct one single family dwelling house. They shall have two separate houses with separate utilities even though owned by a single owner. Lot cutting and land division or sale in parts is prohibited as it defies the zoning regulations.

As building progressed, the planners of Chandigarh realized that private housing needed the controls and bylaws similar to government housing, to achieve a similar aesthetic. They felt, if left unattended, the private housing in Chandigarh would develop haphazardly, contrary to the spirit they sought to establish through the uniform terraces of government housing. In order to remedy this situation, a form of architectural control was applied to all plots up to 250 square yards, requiring construction in terrace formation. This law, termed "Frame Control, comprises in fixing the extent and height of the party walls and a top course connecting these, thus forming a frame. The building portion which can be of any design, stays behind the frame. Certain standard sizes of doors and windows have been specified from which a person may choose and use in any manner he likes. In this harmony was sought through the frame and variety by the individual treatment of the facade" -Evenson (1966), pg 55.
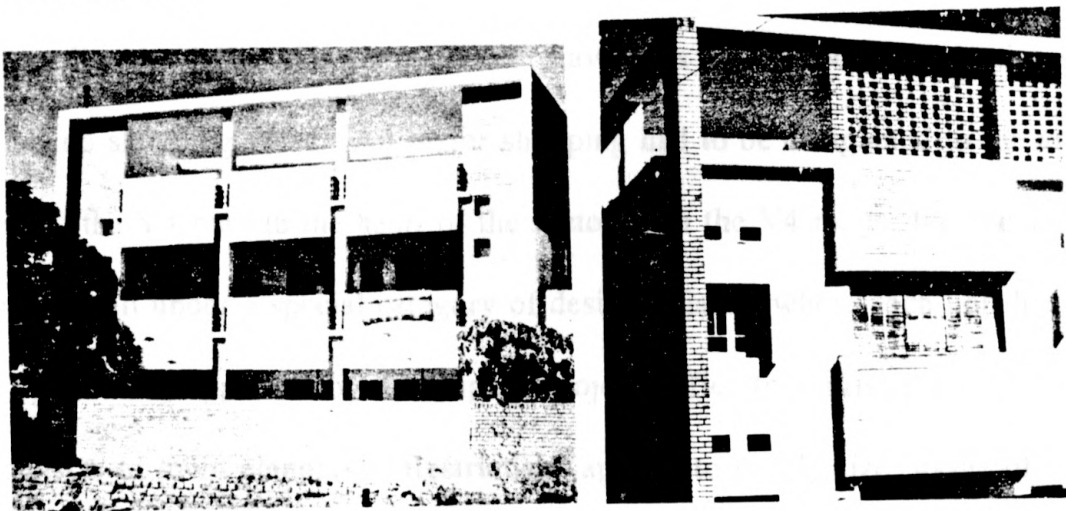
Fig. 63(a),(b) Use of the Mandatory Frame

The compulsory frame has to extend 18" beyond the building line, and has to be finished in a cement plaster mix with a whitewash coat applied to it. This finishing material is also required to verandas or projecting frammings abutting the party wall. The 18" frame depth, limits all projectry elements of the facade, and hence one notices the absence of traditional balconies as found in older towns.

Further uniformity in design was achieved by regulating the finished material on boundary walls to brick only. Also prohibited are "applied decorators" like Swastikas, names of houses/areas, symbols or motifs.

"The result only increases the monotony of the city, for the varied roof lines and projecting balconies of traditional houses often gave a pleasing diversity to the street facade, while the present regulations have succeeded only in restricting diversity of form without substantially improving design." - Evenson (1966), pg.55.

Residential neighborhoods can't have lots sanctioned out to businesses to set up shopping areas. All major shopping had to be designated to the area around the V4 road in the heart of the sector. On the V4 roads, the private housing fell under a special category of design bylaws, where each unit had to be specifically approved by the Capital Project Office (comprising of chief architects of town planners). Restrictions applied to family size, usage of property and density per block. This was to make sure that no small private

businesses opened up in houses opposite the market street. Other facade, height, frame, material, and finished aesthetic restrictions still applied over and above these regulations. Although there are variations in design throughout the sectors in the V4 houses, the plans consistently provide for terrace groupings of identical three story buildings employing the customary brick and white trim seen in government housing, and relating in general aspect to the frame control houses.
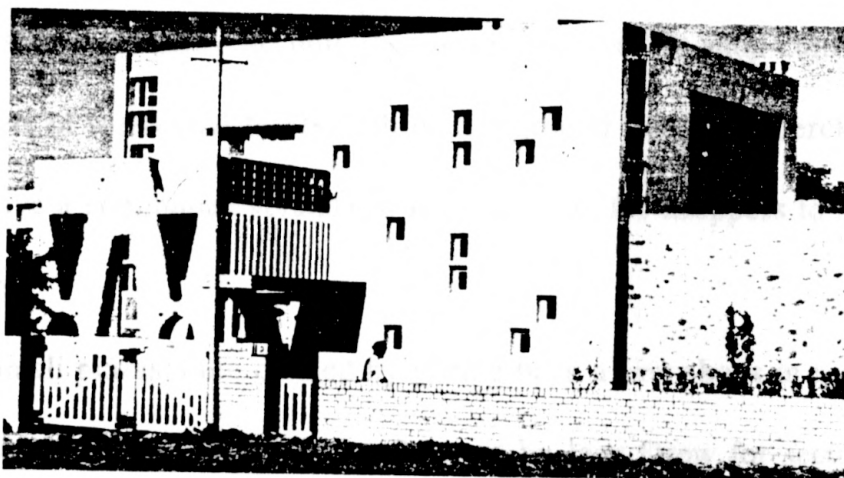
Fig. 64 Private Housing in Sector 8-with all the bylaws regulations, the private aesthetic is very similar to the government housing units.

Despite all the strict regulations and bylaws, the designers in Chandigarh constantly attempt to achieve new variations in design form and often try to read between the lines and grab every loose end to justify a new and different design. Overall, very little is left to the imagination of the designer who is struggling in between rules and guidelines.

The government policies have not changed over the years as all bylaws

are considered "sacred" by the policy makers who continue to enforce them with no flexibility. In the next section, I will briefly discuss the so called "bazaar" aesthetic and bylaws laid out for shopping areas on the V4 roads.

BYLAWS FOR SHOPPING AREAS:

Although the facade treatment of the shopping areas varies a little bit throughout Chandigarh, basic bazaar design adheres to the scheme established by Jane Drew in sector 22. Because in India, all shopkeepers like to reside on their business premises, all buildings were conceived as shop-cum flats - with two levels of residential floors built over a ground floor commercial level. All shops have a continuous veranda in front of them for shoppers to stay cool in summers.

Small plazas were created by setting back a few shops in a continuous run. Two basic shop designs were laid out by Jane Drew for sector 22. It is these two designs that are basically used all over Chandigarh.

GROUND FLOOR

BATH | W.C.

COURT
17'-0" X 13'-0"

OFFICE/
STORE

UP

SHOP
19'-6" X 13'-0"

CORRIDOR

FIRST FLOOR

COURT BELOW

UPPER
PART OF
KITCHEN

DN | UP

LIVING ROOM
29'-6" X 13'-0"
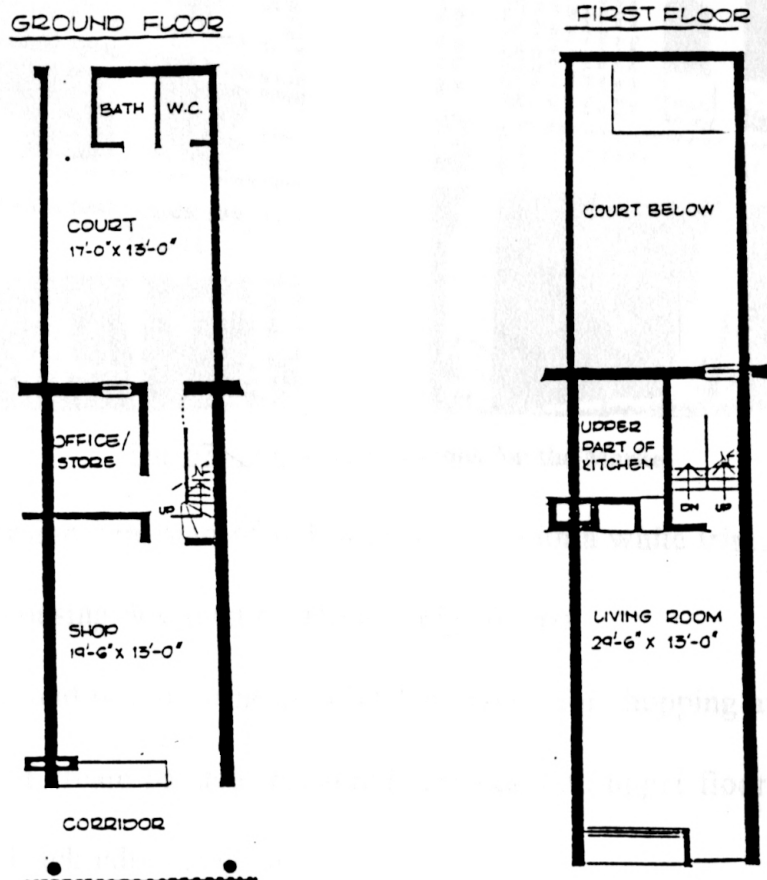
Fig. 65(a),(b) **Plans of Shop-cum flats, Sector 22 Market**
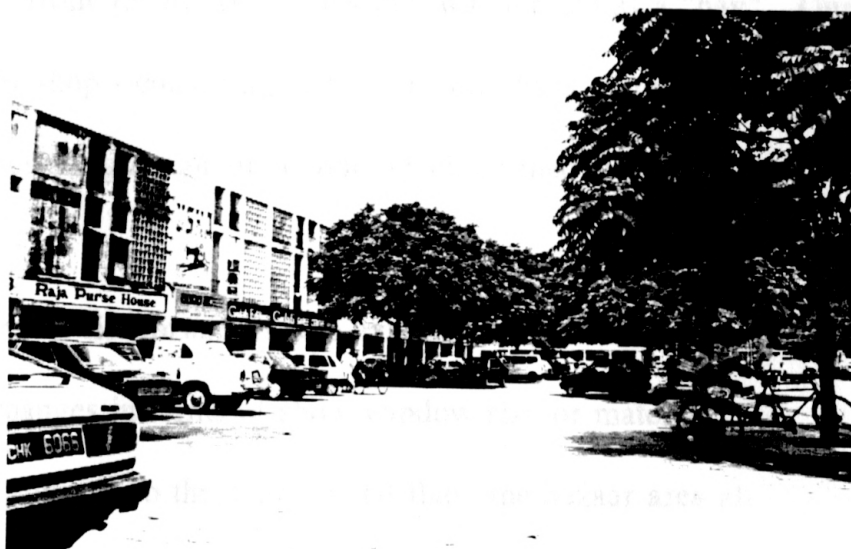
Fig. 66 **View of Shop-cum flat Shopping Area**

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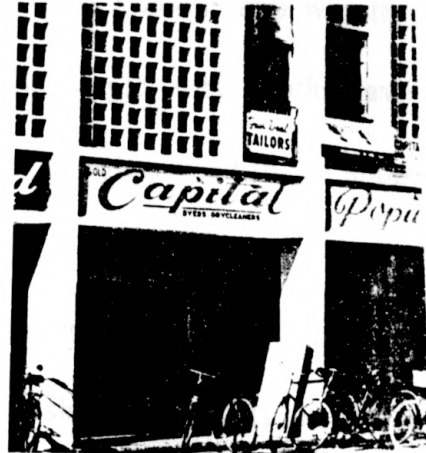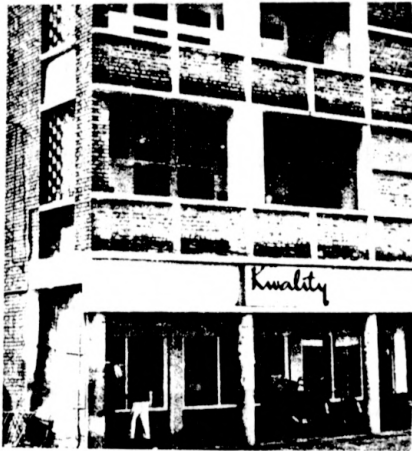
Fig. 67(a),(b) **Shop elevations for the Market**

One design consisted of red brick facing with a white trim, as seen in the government housing designed by Drew. (Fig. 67(a))

The second design form used by Jane Drew for shopping areas in sector 22 consisted of cream painted plastered surfaces with upper floor balconies masked with brick jallis. (Fig. 67(b))

All shops in the market areas, had a frontage of 17'-3" x depth of shop which varied from 75' to 100'. This unit was termed as a "bay". One could have a bigger shop - consisting of two or more bays. Internal space had to then follow another design regulation code which defined spatial layout within the shop.

Under all circumstances, the external facade had to be maintained as usual. No changes in terms of show window size or material usage were allowed. In addition to the shop owned flats, the bazaar area also included rows of small one story shops called "booths". These booths were grouped

together and catered to smaller businesses. Each booth area was fixed at 80 square feet. (Frontage 8'x 10' depth). The single story booths have a design regulation similar to the brick and white trim bylaw used in the shop-owned-flats.

The shopping streets do not have commercial activity designated to both sides of the street. The V4 road (44' wide shopping street) has all shops on the Southern side with housing on the north. This design solution was contrary to the typical Indian bazaar which had narrow passages between rows of shops and seldom were any open plaza like spaces designed within the bazaars.

V4 ROAD
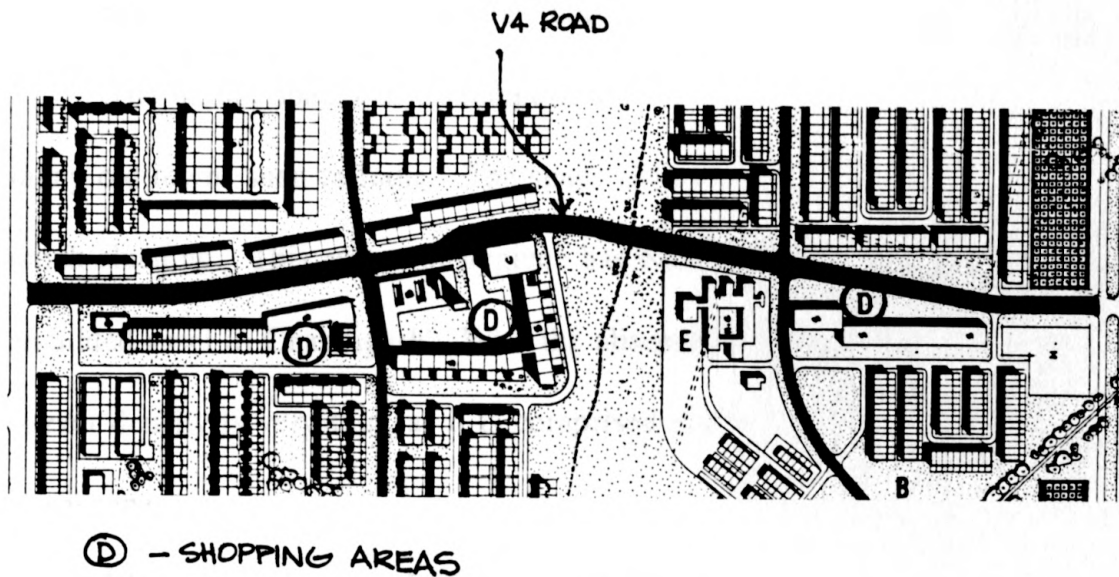
Ⓓ – SHOPPING AREAS

Fig. 68 **Location of shopping areas on the V4 road-Sector 22**

The word bazaar brings to mind images of crowded streets, narrow, often cobblestone paved, bustling with smells, colors and things of great variety. Traditional Indian bazaars are very colorful, and festive and are

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everything one imagines a bazaar to be. Street vendors, hawkers, sweetmeat sellers and outdoor kitchen shops fill the atmosphere of an old town with excitement and liveliness. However, Chandigarh fails to present such a scenario. With its clean cut blocks placed with piazzas and green spaces between them. Chandigarh makes shopping a very formal experience, unknown to the average Indian who still lives in hustle bustle of old towns.

The community spaces tend to be the soul of a neighborhood setup and hence need to be visited, revisited and visited yet again with greater anticipation each time. I shall discuss the repercussions of Chandigarh's bazaar design on new construction in the next chapter (conclusions).

The bazaar spaces in Chandigarh are very clean and hygienic contrary to many old towns seen in India. The space allows for easy maintenance and quick cleaning. This aspect of hygiene has been praised by most residents to be an added asset in Chandigarh. With the absence of street vendors and hawkers, bazaar density is very thin, as it is comprised mainly of shoppers and a few shopkeepers.

"The atmosphere of the Chandigarh bazaar street as it has been developed, reproduces much of the antiseptic vacancy of an American suburban shopping center, lacking only the twenty-acre parking lots to complete the illusion" -Evenson (1966), pg 56.

Fig. 69(a) **Chandni Chowk-Old Delhi**

Fig. 69(b) **Shopping Piazza-Sector 22**

Besides the sector shopping area, on the city scale, a larger shopping area has been laid out in the heart of the city, and designated for shops, restaurants and government offices. This is sector 17. It has no residential units as the designers wanted this to be a strictly commercial zone. This sector also houses the local bus station, petrol pumps (gas stations), estate office, public library, movie halls and the head fire and police station.

Sector 17 has design controls which limit the use of materials to brick and exposed concrete and the form to pure windowless cubes tied together by a continuous veranda.
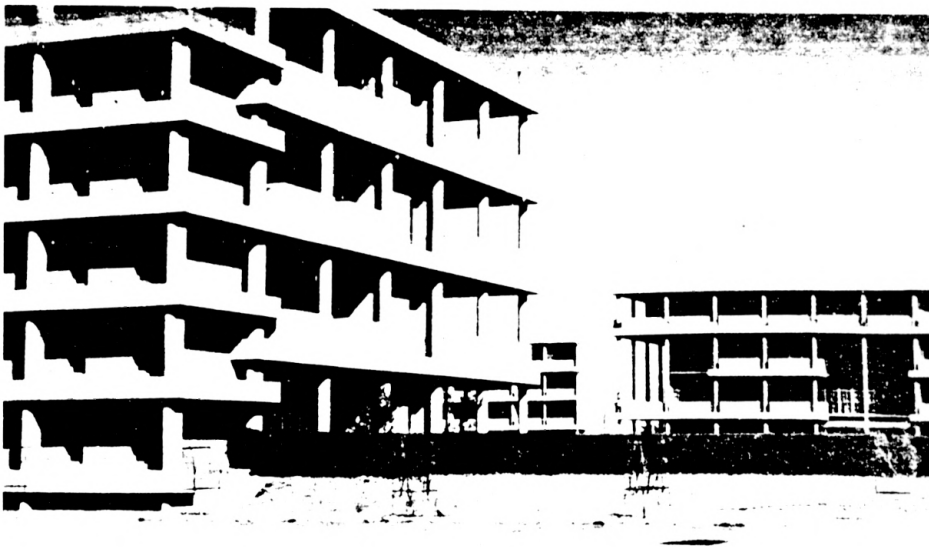
Fig. 70 **Sector 17 City Center-Detached buildings over fifty feet tall fail to contain spaces which are adequately scaled.**

Sector 17 has a large piazza in the heart of the commercial area. This a large concrete paved 350'x475' open to sky plaza with three storied buildings

around it. This was conceived by Le Corbusier as a gathering place for shoppers, and is laid out much on the lines of the European Plazas where sun is the basic requirement of design.

All buildings have to be finished as four story structures on the external facade. On the inside they could be three or more floors or be split up by mezzanines. This was done to maintain a continuous four story facade elevation throughout Sector 17.

In Sector 17 the bank buildings, cinema halls, petrol pumps, shopping arcades, hotels, and offices are all subject to similar design regulations and no private construction is allowed.

The bylaws have been methodically laid out for every construction type in Chandigarh - government, private, commercial, educational, community structures or laying of roads is done under the government of Chandigarh supervision. Every one of the above mentioned construction sectors has a separate set of bylaw extensively laid out. Copies of these can be procured from the estate office or the municipal zoning office.

I have documented the zones within a neighborhood that are subject to bylaws. The reason for this documentation of Chandigarh's bylaws is to make the reader aware of the design regulations Chandigarh is subject to. I shall now briefly discuss the neighborhood design layout in Sector 22 - Chandigarh.

HISTORY OF SECTOR 22:

After the conception of Chandigarh, Sector 22 was its first sector to be developed. This may be due to the presence of "Bijwada"[1], just beyond the area acquired for the first phase, which could cater to the needs of building contractors, laborers and technical staff of the government in terms of food, household goods and repairs.

Sector 22 was a high density, low income district located just below the ultimately intended commercial city center, and it was this sector, somewhat hastily planned, which set the pattern for all subsequent sectors in the establishment of house types, building patterns and street layouts.
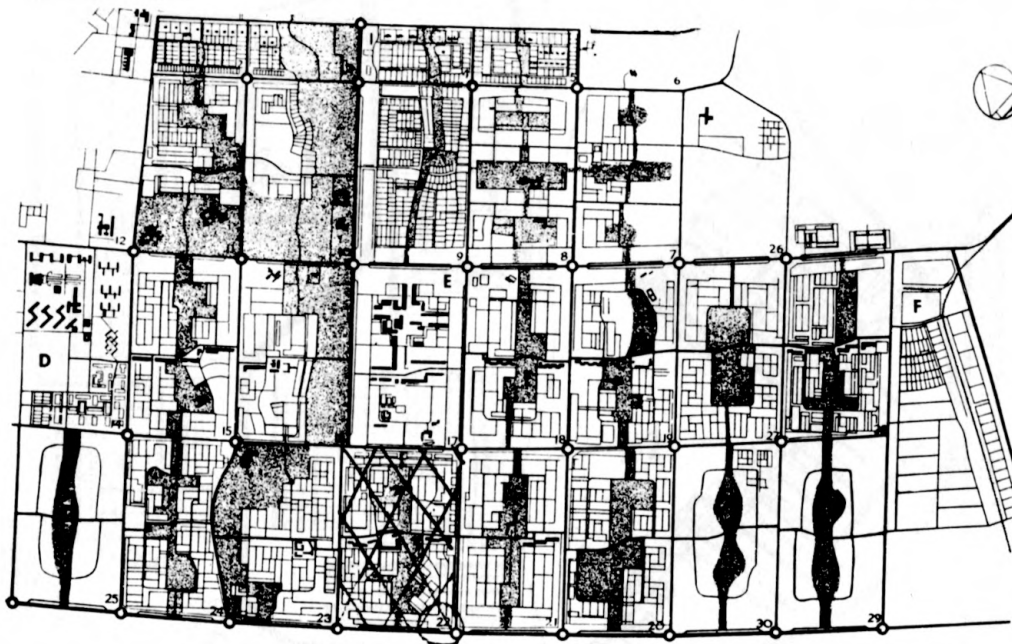
Fig. 71 Chandigarh Master Plan showing location of Sector 22

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[1] BIJWADA; Old market place set up by early settles in that part of town - had shops, repair stores and vegtable vendor carts. A true image of an old Indian informal market.
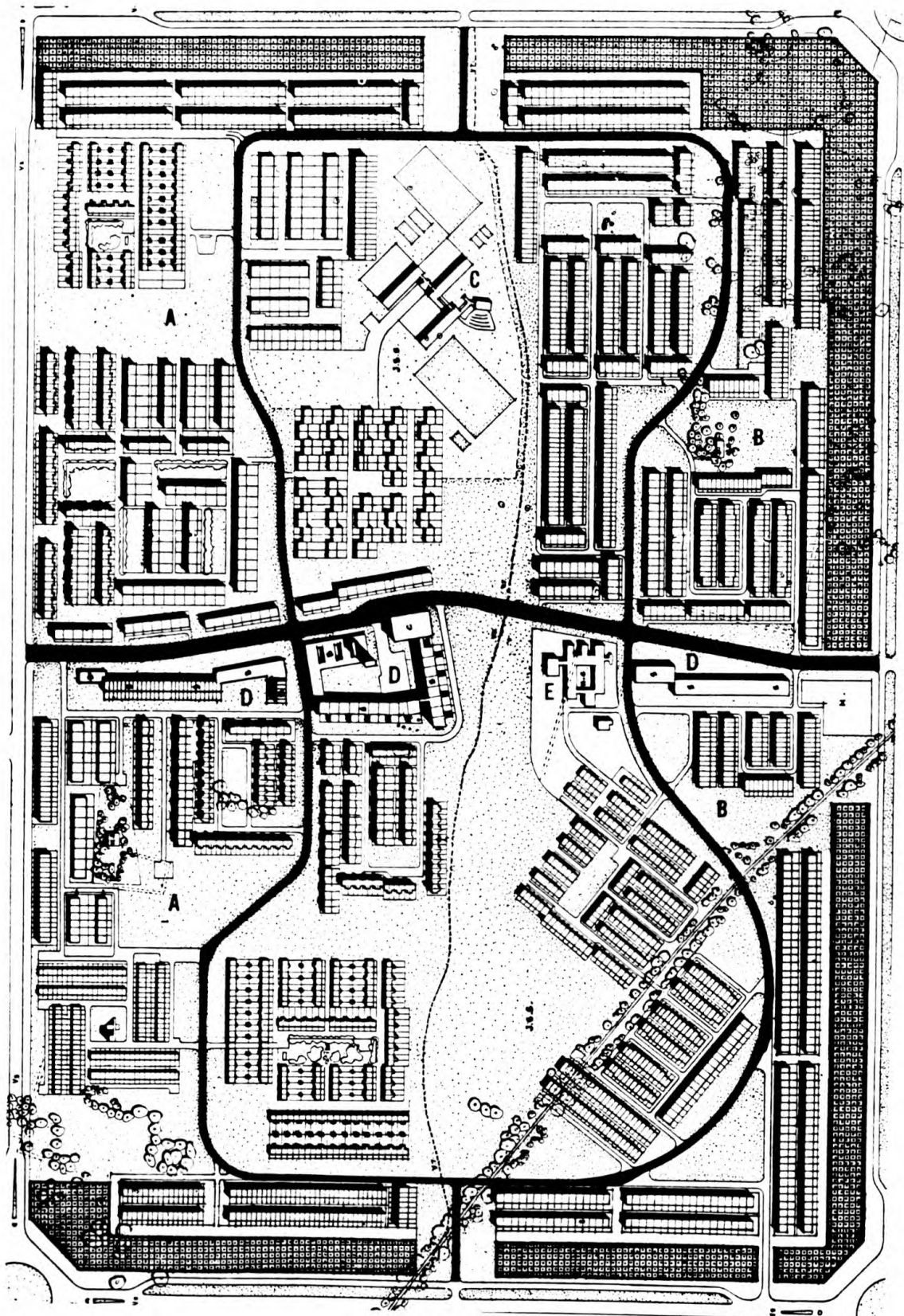
Fig. 72 **Plan of Sector 22 Chandigarh**

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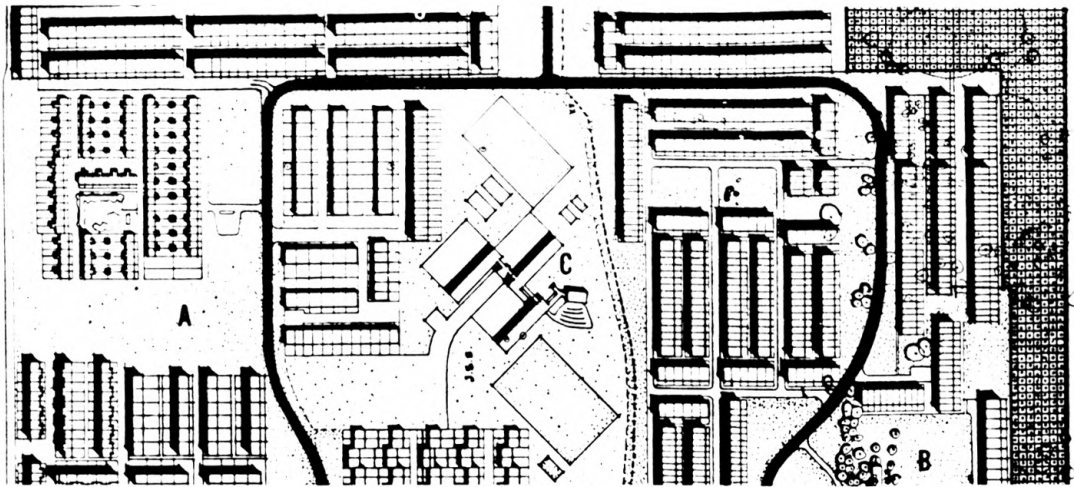
Fig. 73 **Governement and Private Housing in Sector 22**

The major plan of the sector is the same as the other sectors based on Le

Corbusier's master plan. Maxwell Fry, Jane Drew and Pierre Jeanneret all

worked together designing separate sections of a sector, Jane Drew has

commented (in urban and rural planning thought) that one of the failings of

sector 22 is that the housing designed by three different architects has created a

chaos of experiences as each architect has a different sense of space and order.

She felt it was necessary for all the architects to have concentrated their efforts

to different sectors rather than create conflicting designs within one. Maxwell

Fry was also of the opinion that house designing and sector layouts should have

been considered as one.

Sector 22 has a big market area laid out along the V4 road with

government housing on one side. It has movie halls, shops, booths, restaurants

and a temple. The V4 road is about 44'- 0" wide with a subsidiary road and

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parking opposite the shops which is another 40'- 0" deep. This makes the houses and shops on either side of the V4 road 210'- 0" apart. (includes pavements, medians, and sidewalks).

The shops are typical shop-cum flats as discussed earlier in the bylaws section of this chapter. Within the shopping belt, are booths (also discussed in the bylaw section), interspersed to complete the shopping area. The shopping area has a few trees that partially cut the summer sun.

The building elevations follow the typical brick jalli facades above shop type elevation treatment (now seen in most sectors).

Fig. 74 **Kiran Movie Theater-Use of the curved aesthetic is a refreshing change in the cubic environment.**

The only structure that stands out isolated from all of the shopping blocks is the movie hall. The "kiran" theater is a block designed different from

all other brick faced movie halls in Chandigarh. This has a pale blue and white painted stucco facade. This adds color to the brick surrounds, however has no other building to be tied with, and hence stands alone, and apart.

The housing itself in sector 22 is of mixed type, that is a combination of government and private housing. The government housing ranges from type 9-14 in sector 22. This makes sector 22 a sector of relatively high density compared to other sectors. The type 9 housing is designed in part by Fry, Drew, and Jeanneret and their distinct styles are visible all through sector 22. The private housing has developed along lines similar to the government housing, with a few more flexibilities allowed to them.

Street furniture is minimal and the skyline is dotted with T.V. antennas, (cable T.V. is not yet readily available). The street elevation comprises of a few trees and a series of telephone and electric wires laid out on overhead poles. Building elevations follow the frame control and other applicable regulations.
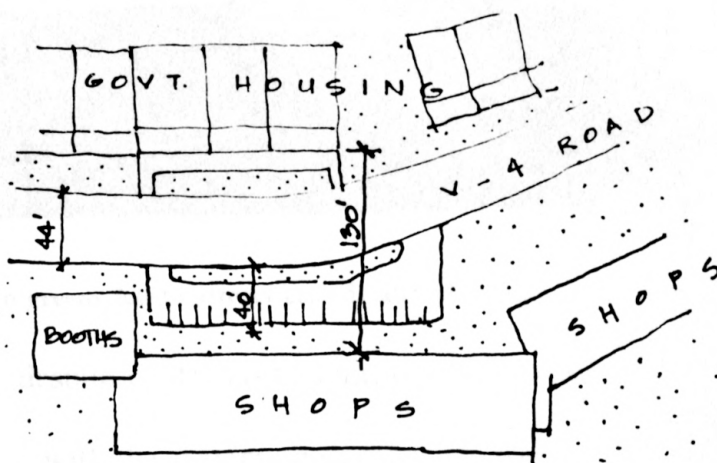
Fig. 75 Street Width in the Market Place

Spaces between houses are left as open greens. These tend to scatter housing units apart and dot the area with many unmaintained open lots. Also people who own lots, but do not have them constructed as yet, do not maintain them as green spaces rather let them grow wild. The city does not have enough budget attributed towards maintaining the large number of greens laid out in the master plan and yet to acquire and to auction them to the public is not considered a good solution. Most neighborhoods in sector 22 have unattended greens and same the is the case with most sectors.

Fig. 76 **Large open greens fail to attract crowds and often become desolate leftover spaces.**

Sector 22, despite of its shortcomings is the busiest sector in Chandigarh and is also the one with the maximum density. It performs and functions as any other neighborhood unit would and its residents by now are used to the

architecture style. But one can often tell the desire of the residents to have something more than what was offered to them - designs are often modulated by people and adapted to fit their lifestyle.
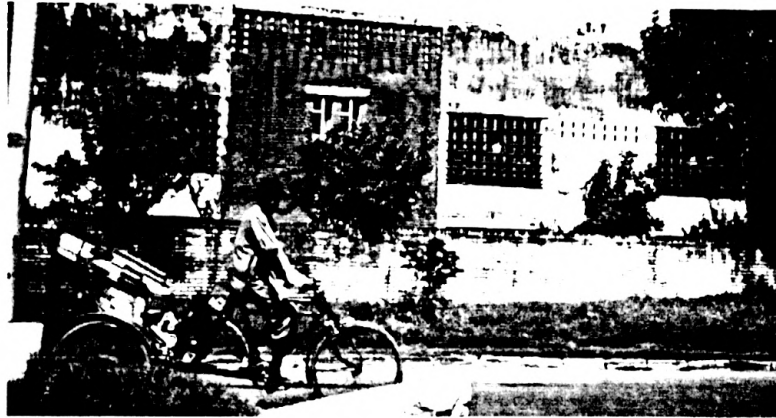
Fig. 77 **Since the brick screens do not serve much climatic purpose, they're often bricked up to create an additional room within the house.**

People have tried to brick up lattice brick verandas, or widened the narrow driveways to their houses, or added cantilevers and projections illegally beyond the face of the house. The municipal department serves notices and fines people for doing so. In some cases demolition of the obstruction by the local municipality is the only answer when residents fail to respond to letters and notices.

The next chapter shall deal with some of the architecture shortcomings of residential neighborhoods in Chandigarh and its neighborhoods shall be critically compared to those of traditional India as studied in Shahjahanabad.

However with Le Corbusier's design ideologies and the format used by him to build Chandigarh fresh in mind, I will end this chapter by briefly discussing Matthew Novicki's plan for neighborhood units for Chandigarh. This will help the reader see the dissimilarities within both design solutions.

NOVICKI'S CHANDIGARH:

In the last section of this chapter I will briefly study and discuss the conceptual scheme laid out by Matthew Novicki for the neighborhood units of Chandigarh. I believe this section is very important as it attempts to show the sensitivity expressed by a foreign architect towards the vernacular language of Indian architecture. All these sketches and schematic diagrams were drawn by Novicki himself prior to his death and formed the basis of justification for his design theories towards the grand plan of Chandigarh.

Since not much information is available about Novicki's work, I have used plates from Norma Evenson's "Chandigarh" as illustrations in this chapter.

Matthew Novicki based the plan for Chandigarh on the organic form of the leaf. Novicki's leaf plan was different from Corbusiers geometric principles and allowed for curvilinear roads and varying perspectives. The street pattern produced as a result of this organic layout was flowing, snakelike, modulating constantly, creating small interesting spaces within the road network.
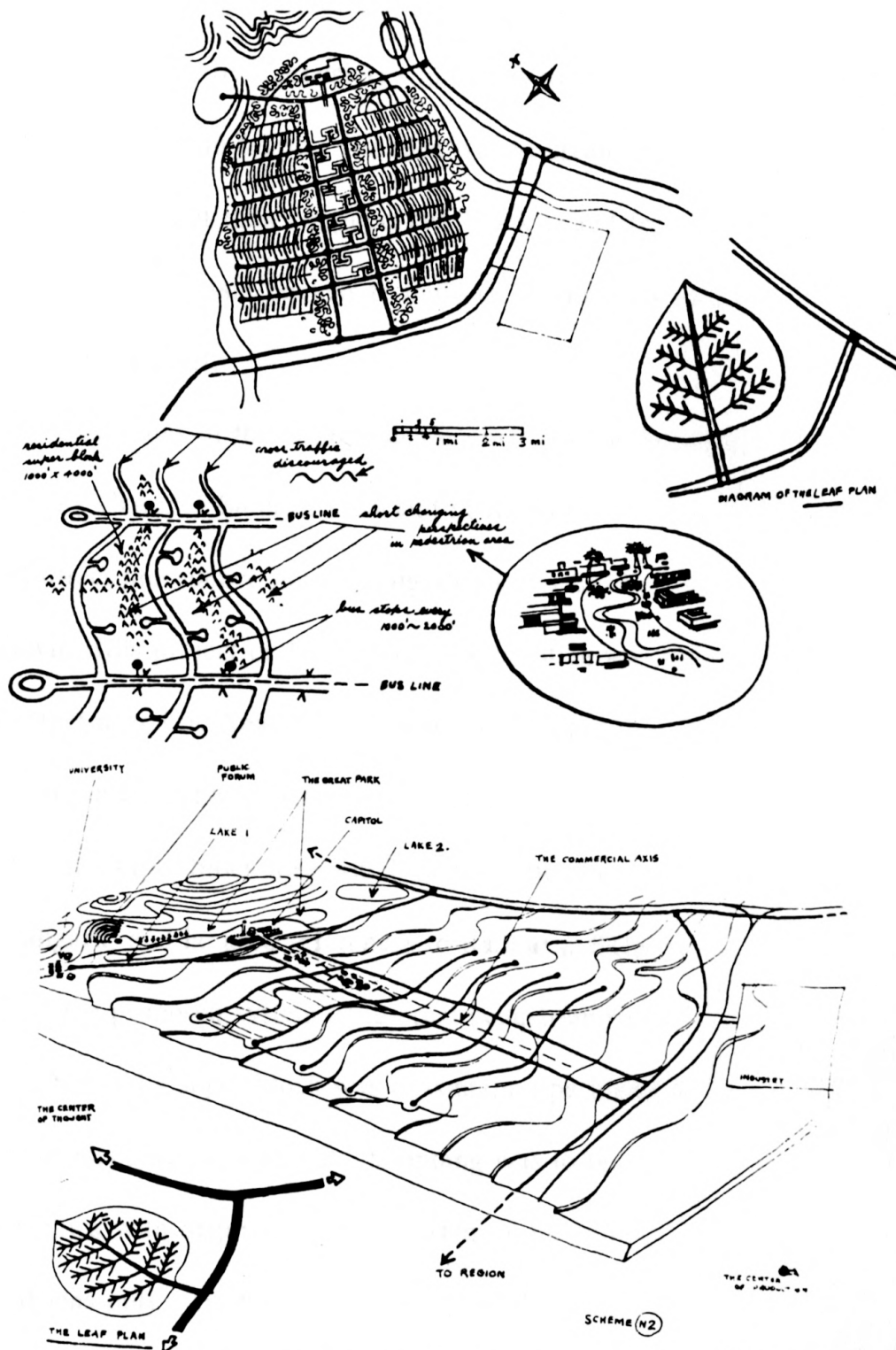
Fig. 78 Leaf Plan for Chandigarh by Mathew Novicki-extensive use of the cul-de-sac element to create spaces within the neighborhood. Similar to Stein's Radburn Plan (see chapter 1).

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Novicki designed the "super block" (like the neighborhood unit called "sector" designed by Corbusier) which was to be the basic constituent of Chandigarh's urban fabric. His idea was to create the neighborhood unit fairly large (much larger than a regular city block), and free from high speed traffic. There would be lesser pockets to build up the town as each unit was fairly spread out in itself.

Variations of this design idea occurred in the Sunnyside Gardens, in New York, by Clarence Stein in 1924 and in Radburn, New Jersey in,1929. "The most direct precedence for Chandigarh's super block, however, was the Baldwin Hills project of 1941. With which Stein was associated. Here an 80 acre tract near Los Angeles was designed with housing around and area of parkland in the center. Mayer sent a plan of Baldwin Hills to India in order to explain the super block idea which he was intending to use in the new city of Chandigarh, and he used references to Radburn, Baldwin Hills and Greenbelt to explain the proposed system of internal pedestrian paths."-Evenson (1966) pg 17.

Novicki's super block was to contain a parkland in the heart of the unit with schools laid out within it. Shopping was to be restricted to the end of the super block with major movement system in the bazaars to be restricted to pedestrians only. He felt that each neighborhood needed a vertical element to help people orient themselves, and it would be this landmark that would give neighborhood its distinct character.
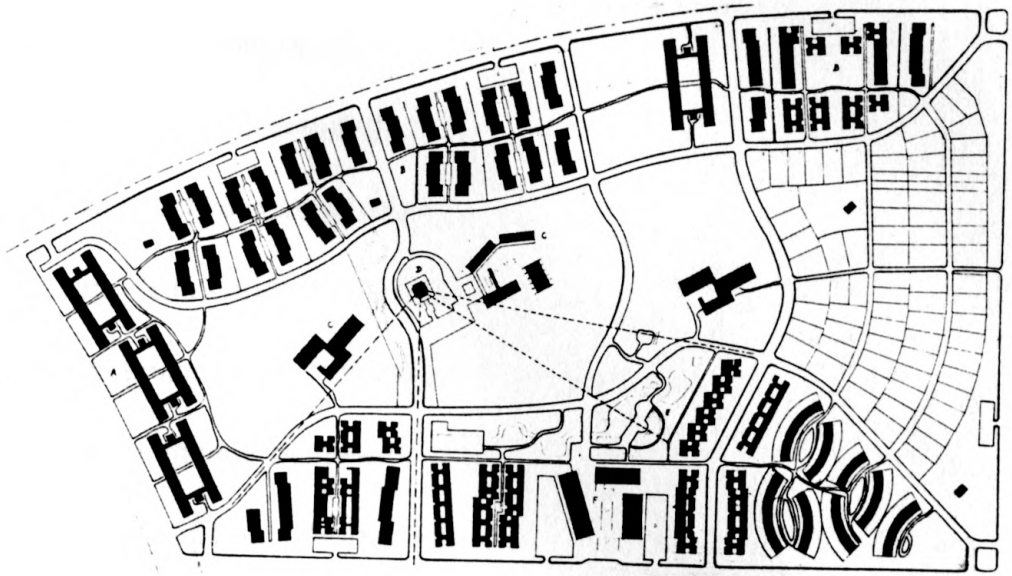
THE SUPERBLOCK

Above. Superblock plan developed by Nowicki.
A. Apartment housing. B. Low-rise housing. C.
Schools. D. Temple. E. Outdoor theater. F. Bazaar.
Below. Perspective sketch showing temple, parkland,
and bazaar.
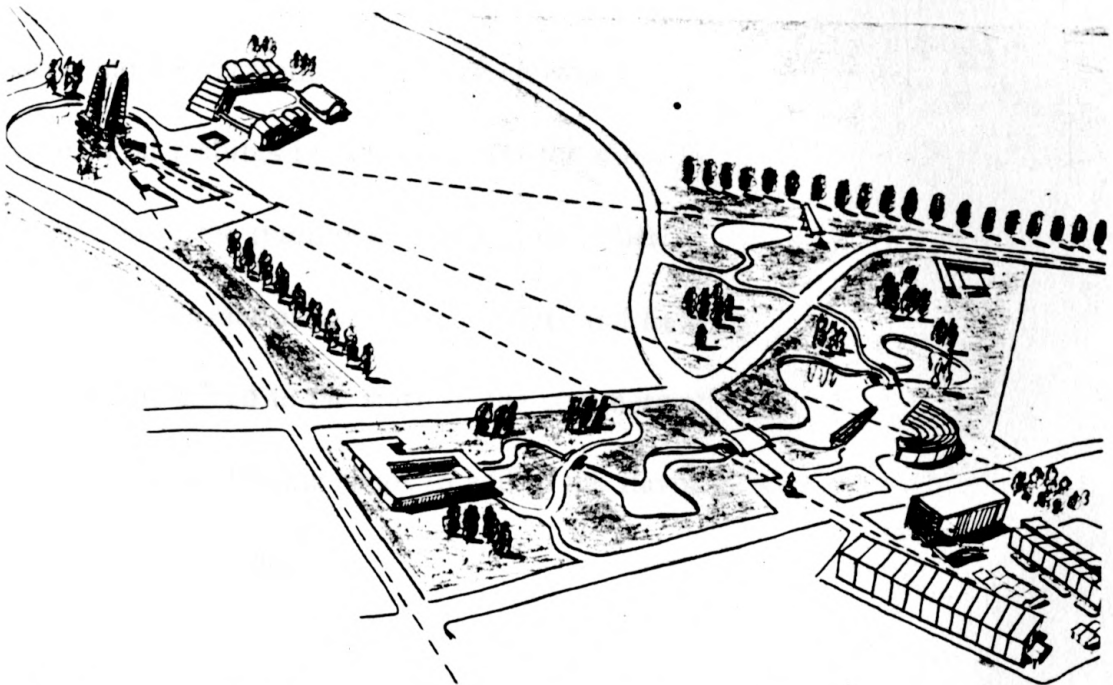
Fig. 79 **Plan and view of the Superblock neighborhood unit. The temple used as the focal point in the community.**

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The bazaar area was to have buildings of varied styles and shapes, rectangular blocks juxtaposed with vaulted structures and an infinite variety of aesthetic elements. He proposed brick jallis, deep verandas, long overlays and covered walkways between small shady spaces all ideal solutions to combat the hot summer sun. The buildings themselves were to be oriented so as to enclose "self shading shopping areas." Matthew Novicki's intention throughout Chandigarh was to employ modern architectural solutions without losing touch with the Indian way of life. - Norma Evenson, Chandigarh

Novicki dotted the commercial landscape with Indian elements and motifs and tried to recreate the village shopping area within a modern contextual setting. Projecting balconies, enclosed internal courtyards, small community spaces and the recreation of village chowks (gathering spaces) were architectural features in the design for the super block - all elements reminiscent of the traditional Indian way of life.

In the bazaar areas, street vendors and hawkers were to have a special place as they added to the spirit of the commercial zone. The bazaar area had houses mixed within the shops to add to the flavor of shopping and make it a less formal experience.
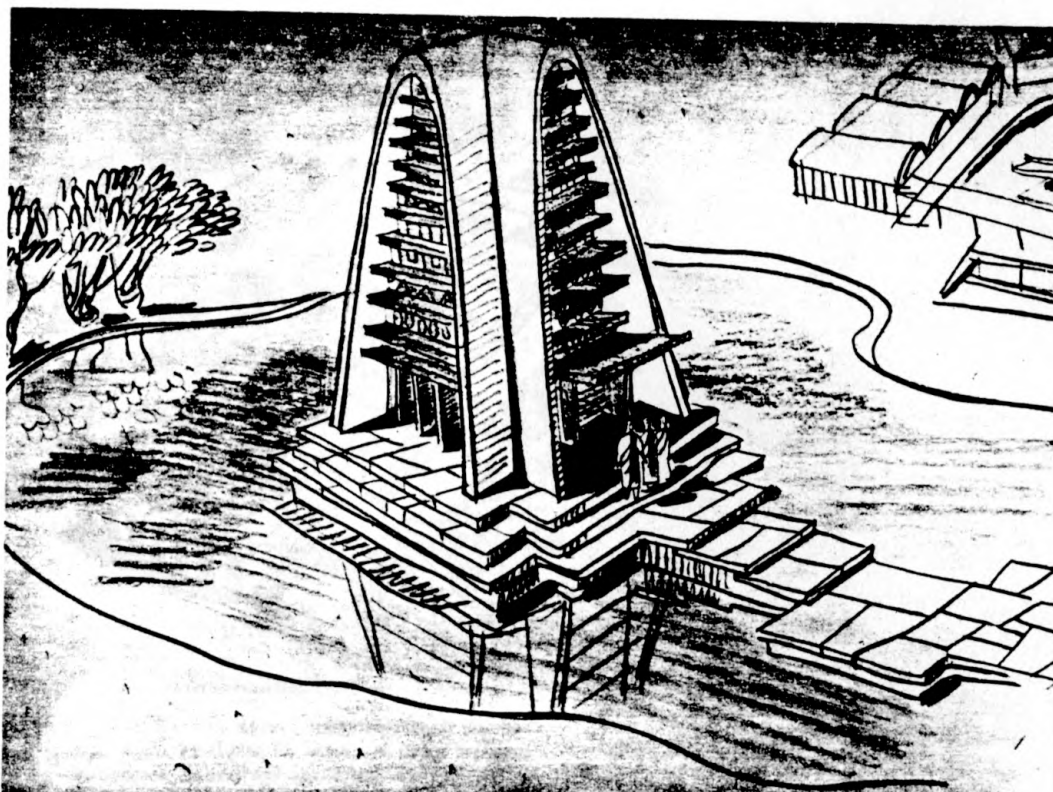
Above. Temple. *Below*. Middle school.
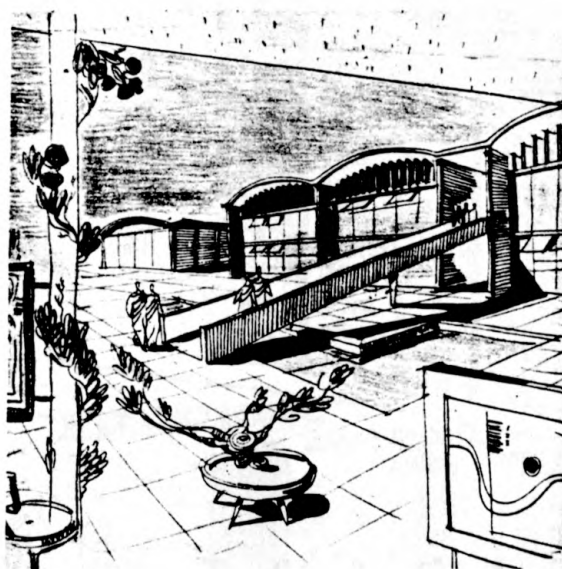
Fig. 80 **Community Facilities as planned in the Superblock-the Temple was based on traditional design principles (top). The school was the second most important design element considered to be a place for social interaction in the neighborhood.**

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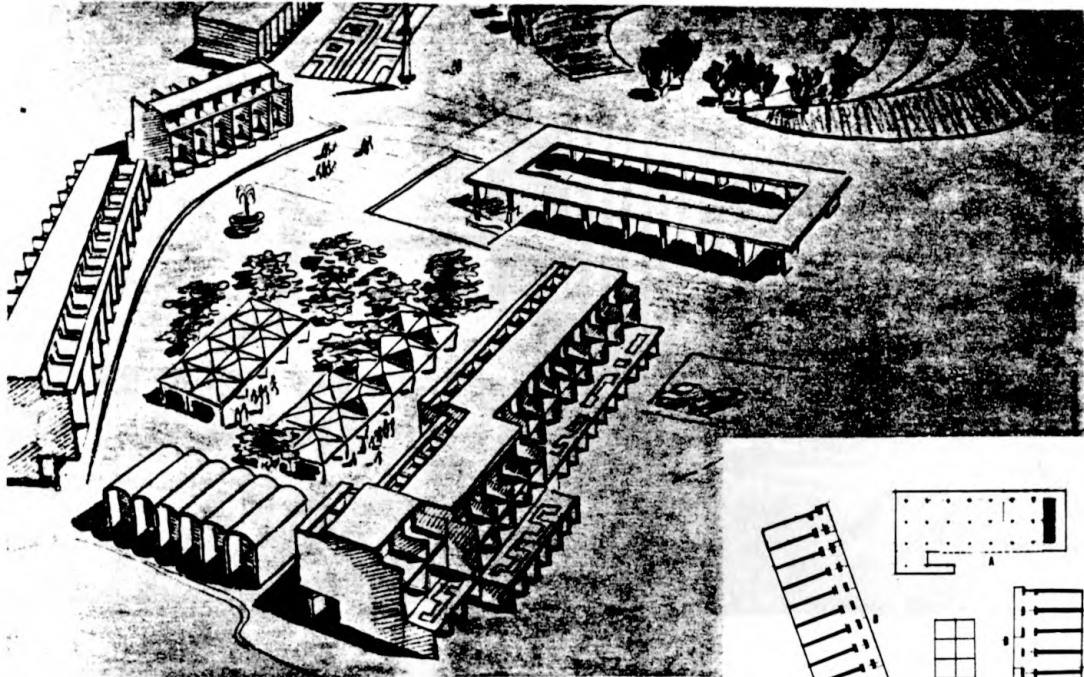
THE BAZAAR. *Above*. Preliminary study for bazaar. *Right*. Final plan for bazaar. A. Office building. B. Shops with overhead apartments. C. Booths. *Below*. Study for a block of shops. Screen or *jalis* masks overhanging verandas of owners' living quarters.
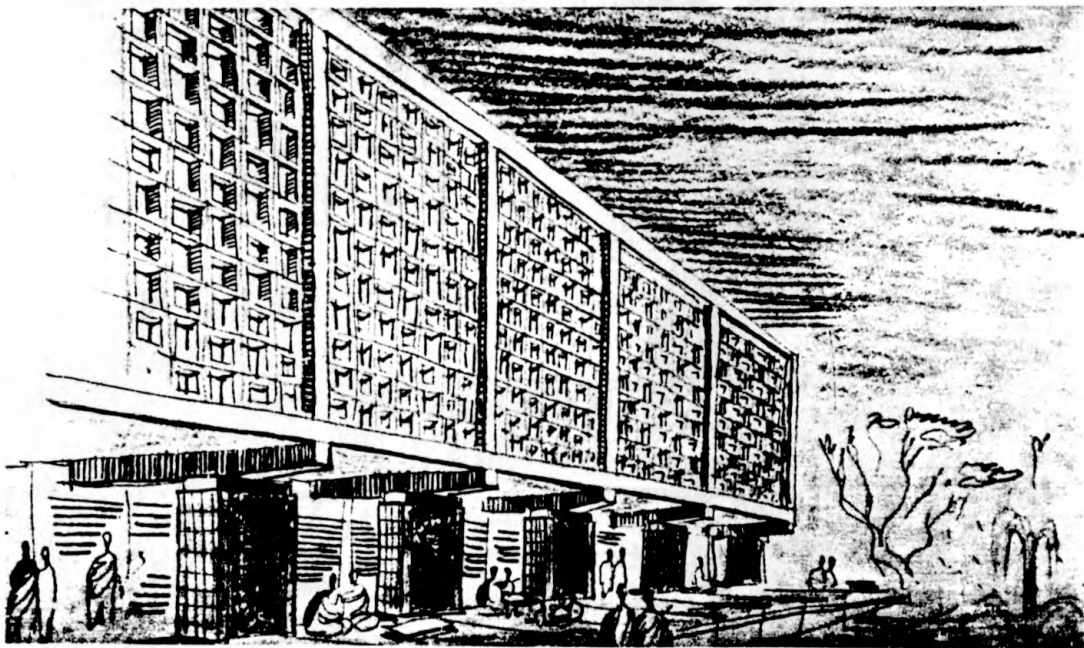
Fig. 81 Aesthetic of the Bazaar Space-Novicki's preliminary sketches show extensive use of small kiosks and tent-like structures to house street vendors and hawkers. Also, Novicki attempts to create small informal spaces within the Bazaar space which would function as outdoor community areas.
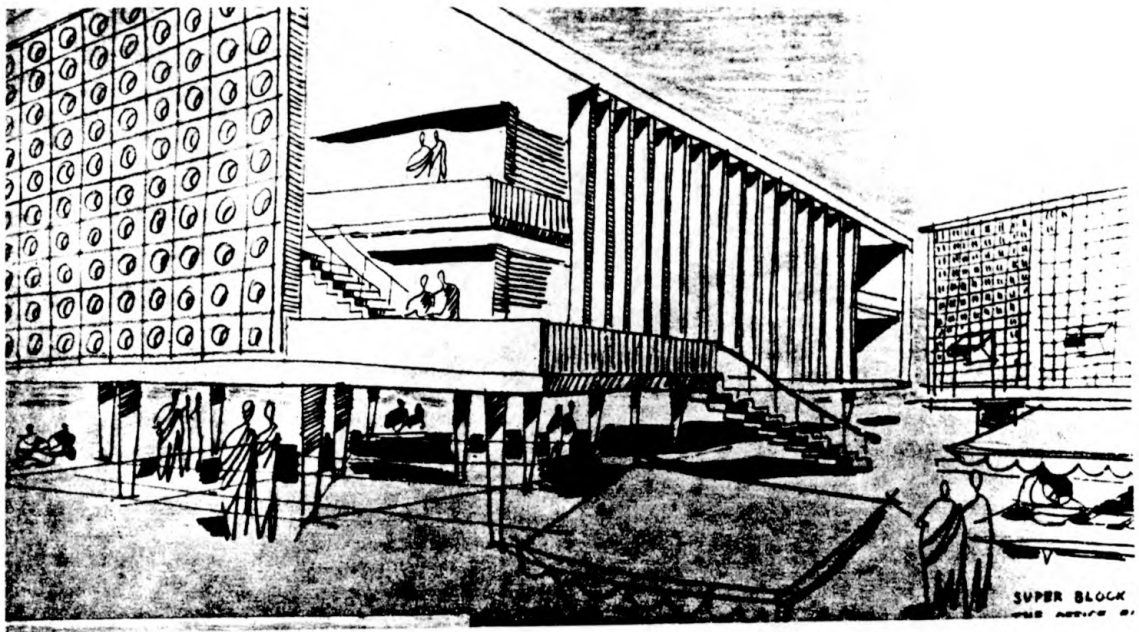
Above. The bazaar office building. *Left.* Loggia entrance of office building. *Below.* View of bazaar looking toward office building, with shops at right.
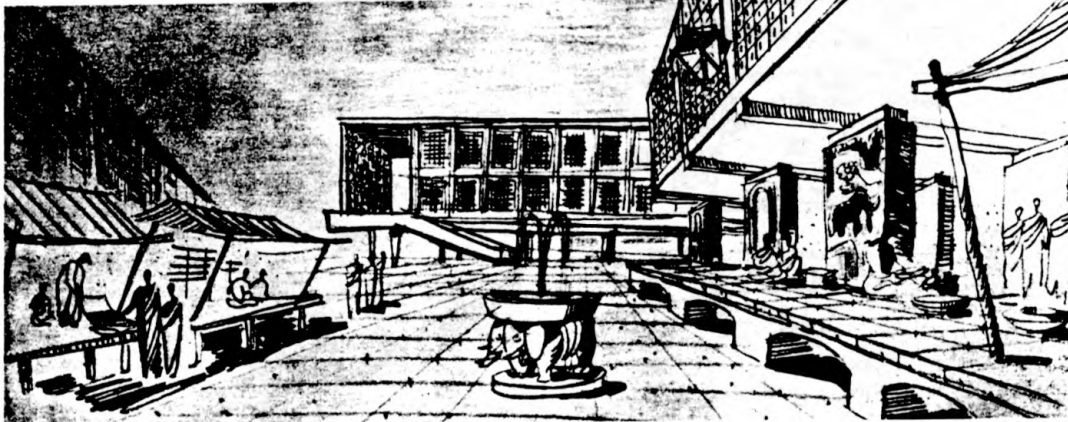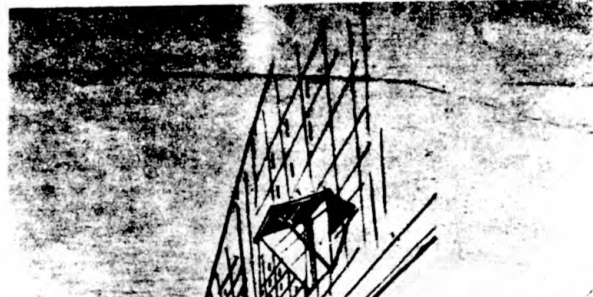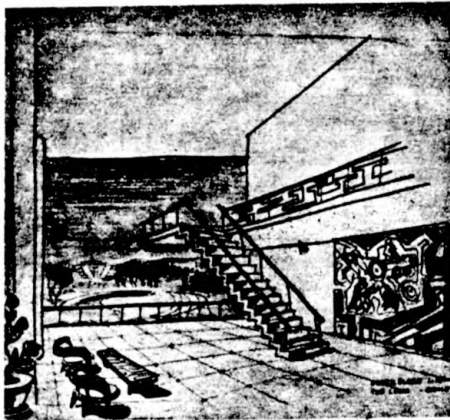
Fig. 82 Use of Multiple levels in the Bazaar area creates interest and breaks the monotony of shopping experience. His extensive use of louvers, jallis, verandas, awnings, and cantilevers shows his sensitivity towards the elements of nature.

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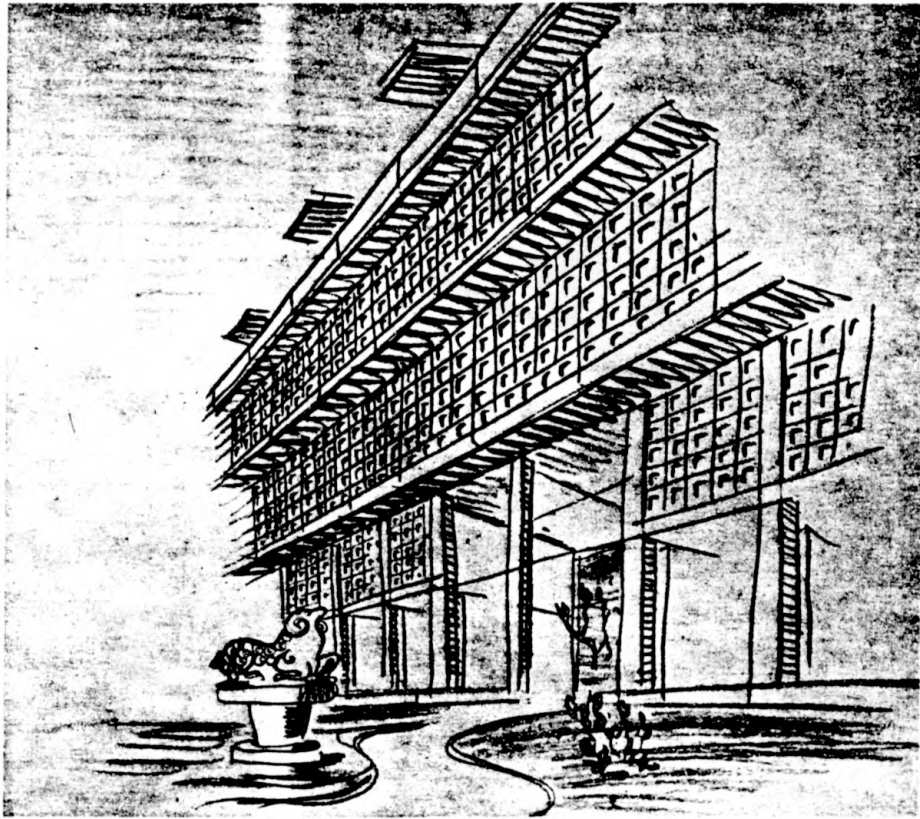
Apartment house project of reinforced concrete.
Above. Main entrance. *Below*. View of apartment
block. *Right*. View of apartment courtyard.
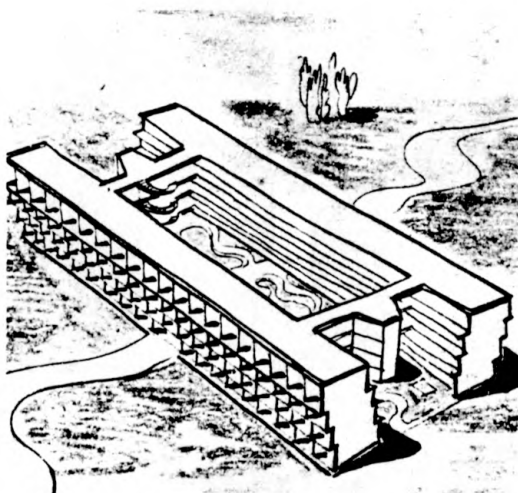
Fig. 83 Group housing blocks with common greens.
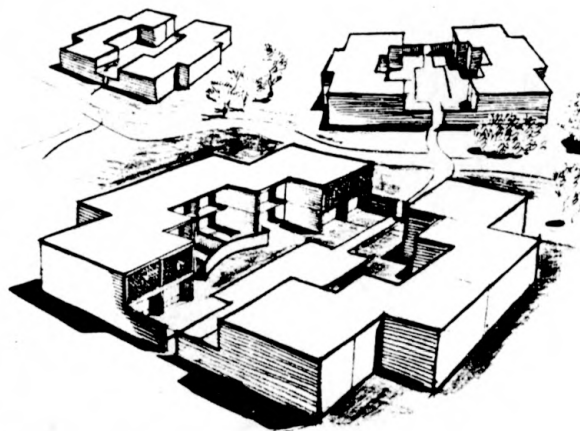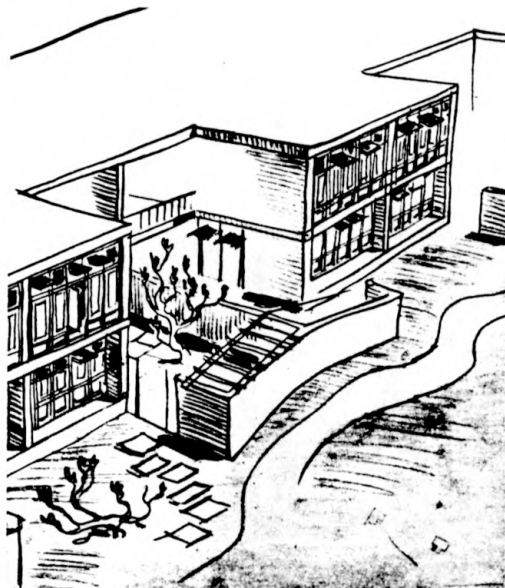
Studies for houses grouped around a common
courtyard. *Left*. House entrance detail. *Above*. View
of compounds. *Below*. View of courtyard.

SUPER BLOCK L.57.
THE COURT — HOUSING TYPES B_1
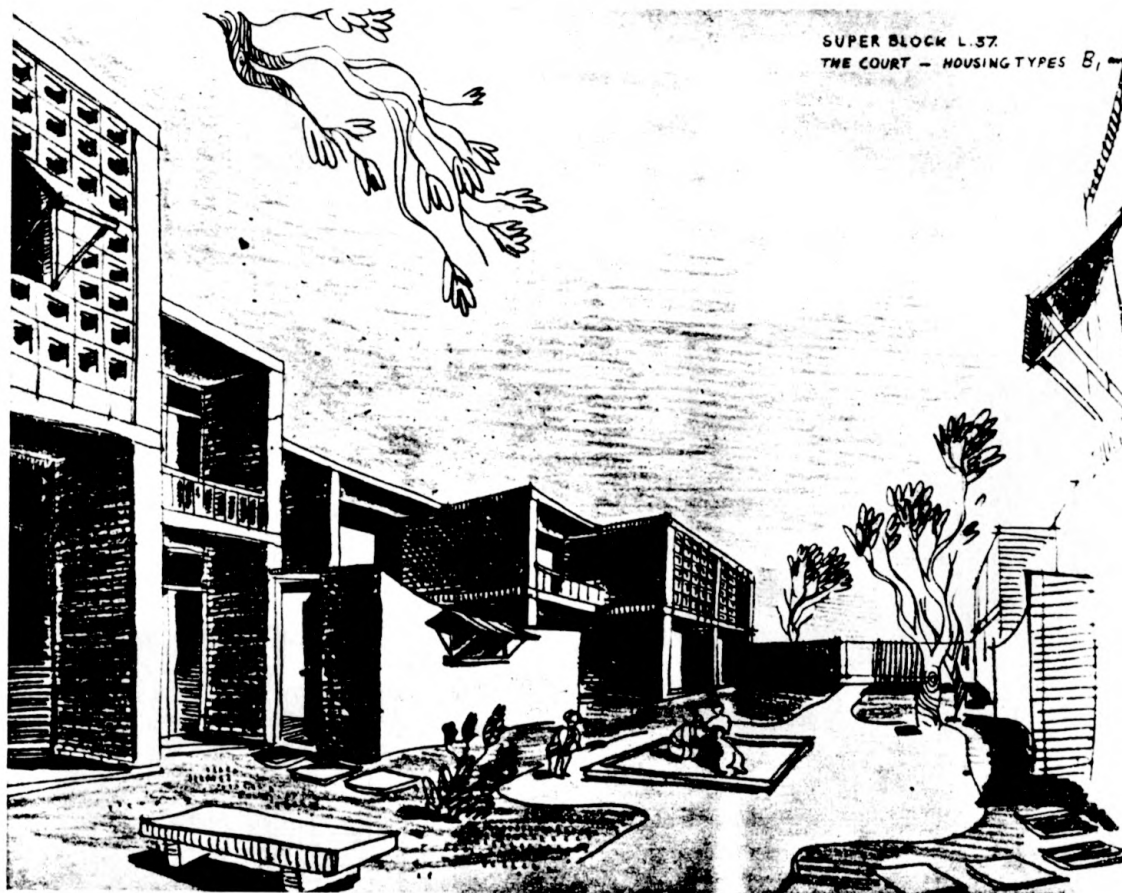
Fig. 84 **Shared community spaces/compounds in housing layout are similar to traditional Indian design elements. Also worth notice are the setbacks and three dimensional play of facade elements.**

House with interior courtyard *Above*. Facade.
Below left. Courtyard. *Below right*. Plan.

GROUND FLOOR

VERANDAH

KITCHEN

OPEN COURT

LIVING ROOM

FIRST FLOOR

BATH

BEDROOM

BEDROOM

OPEN COURT

BEDROOM   SHOWER
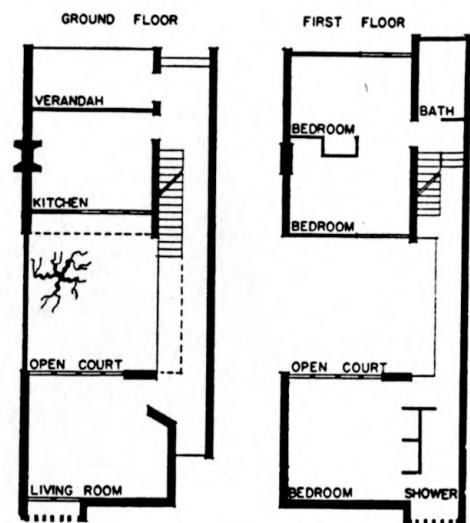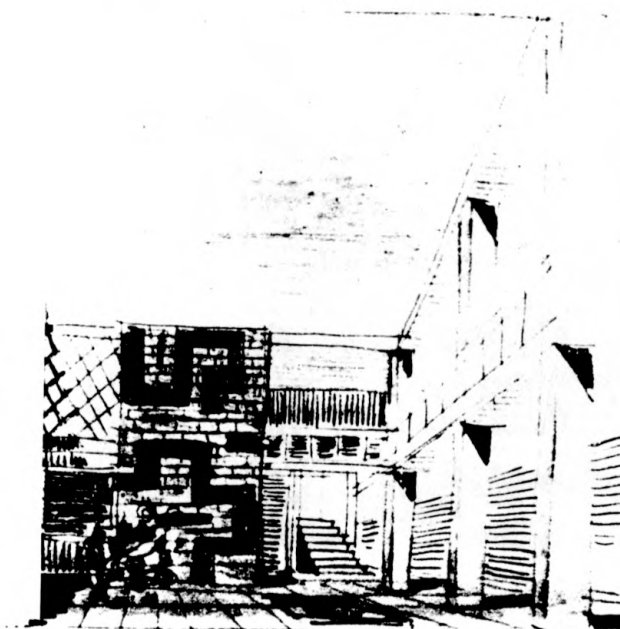
Fig. 85 Use of internal courtyard as a design element in the house. Ornamentation and motifs accentuate the elevation treatment for the houses.
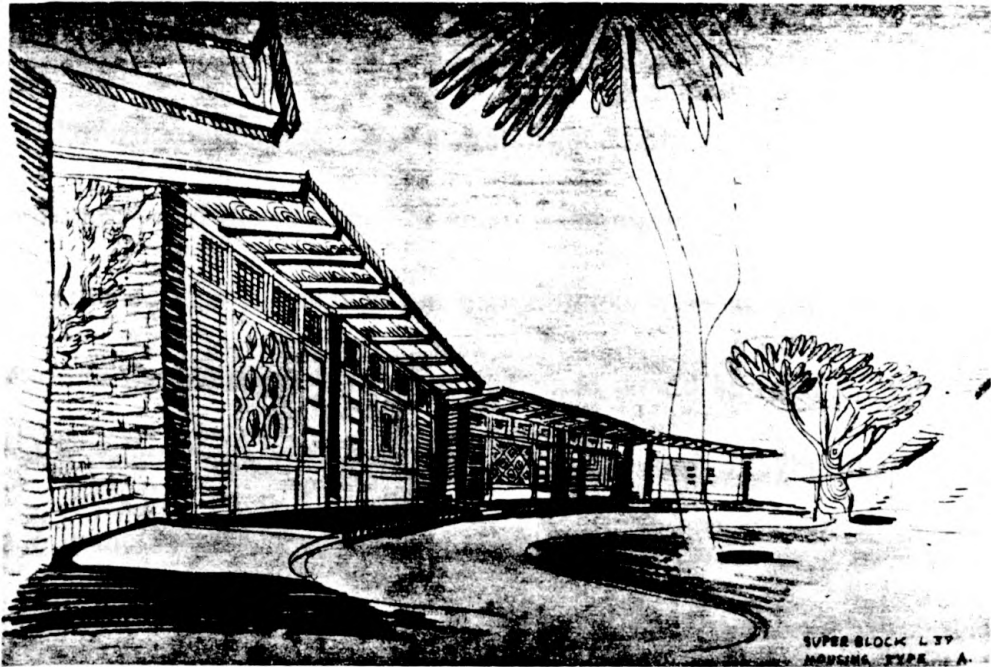
Studies for housing.
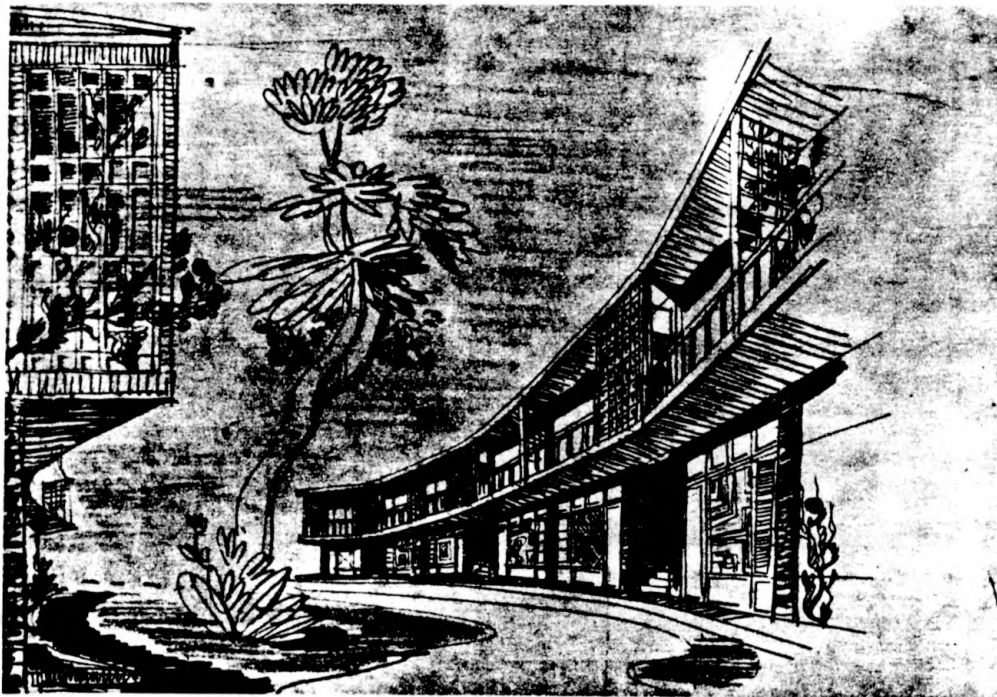
Fig. 86 Use of curved facades and screened balconies (reminisent of old Jharokhas) in housing units.

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Novicki attempted to achieve a neighborhood design layout, which was modern, efficient, hygienic and clean and yet remain close to its rural/traditional counterpart. The neighborhood was to serve the purpose of "neighborliness" and the presence of small community spaces forcefully laid out at street intersections and between housing blocks were attempts to allow public interaction in the everyday way of life. People would know, see, meet and greet other people in the neighborhood as due the design layout they would be forced to come in visual contact of each other.

The curving and meandering streets were representative of the narrow organically developed "gallis" in traditional towns. They helped create shade spots, maintained element of surprise and above all rendered a certain informality to the neighborhood design.

Novicki read about Indian mythology, visited old North Indian towns and met with a lot of village folk, to familiarize himself with his "client" and to get a feel of the region he was to build in.

"It is of course, the residential super block which represents Novicki's concentration of effort in design at Chandigarh and his most detailed rendering. It was in portraying the more intimate textures of the city that Novicki seemed to excel, and one invariably finds his conception of the small-scale houses more humane and visually appealing than the coarsely detailed and monotonously composed housing of the existing city"-Evenson (1966), pg 24.

Chapter Four
Critique of Case Studies 1 and 2

This section shall deal with comparative critique of the two case studies Chandigarh and Shahjahanabad. Their architecture character, social impact, design type and movement systems shall be compared. This section as a conclusion to the thesis is not to prove whether the designed environment of Chandigarh is better than the neighborhood units of Shahjahanabad but to recognize the design elements that are woven into society and help better the environment of neighborhood units.

Shahjahanabad is now about 500 years old, whereas, Chandigarh is not even fifty. Chandigarh is a physical manifestation of the conceptual imagery of the masterminds of the century who, living in the greatest age ever, had the histories (cultural, social, physical, political, economic) to back and aid them. They also had the powerful asset of technology and building materials to suit their purposes. On the other hand, Shahjahanabad evolved as an organic growth, guided only by the immediate necessities operating on incremental bits and pieces.

Hence the interaction here as an architect is to integrate the modern and the traditional, the planned and the unplanned and try and constantly better the neighborhood unit that we live in. This chapter picks out traditional elements in neighborhood design and discusses their importance and reason why they have been past of design for hundreds of years. This chapter also helps us understand the direction 20th century architecture is headed and discusses the

physical outcome of modern neighborhood design. This chapter forms a stepping stone for further research and will aid the reader to build upon in trying to create a new language for architectural design.

I will discuss key elements which were used as basic aspects to measure the tow case studies; social aspect, Architecture character, landscaping, climatical, circulation and community facilities. The social aspect shall contain review on privacy, social behavior within the neighborhood, a study of open spaces and road types (the 7V's) in the neighborhood. {The reason I included the analysis of roads in this section rather than circulation is so that the social implications of design are understood too.}

The aspects to be measured in both towns are:

(1) Social Aspects

(2) Architecture Character which contains:

    (a) Urban Aesthetic

    (b) Landscape

    (c) Circulation

    (d) Community Facilities

    (e) Climatical Aspect

(1) SOCIAL ASPECT AS PLANNED IN CHANDIGARH

POPULATION:

Although Chandigarh had been planned to support a population of only 1.5 lakh (150,000) and the population of each sector was to vary from 5,000 to 20,000, today the population stands at more than 6 lakhs (600,000). The projected estimate of the person count of sector 22 is about 35,000.

Study of different elements of Chandigarhs sector 22:

Concept - The sector was conceived as a neighborhood unit in an attempt to create a social and physical unity which would form the fundamental unit of the city. The size 800m X 1200m Was concerned socially and physically viable. It was conceived as a unit facilitating ample social interaction, leading up to a totally socially integrated community.

PRACTICAL REALIZATION:

(a)   As described in the chapter "evolution of a neighborhood unit", formation of neighborhood units and development of relations in them is a continuous process. They achieve a state of dynamic equilibrium through time and at a point in time may be static. Thus the size of a neighborhood, which is established by extension and formation of communication is constantly changing.

(b)   The sector as a whole is not socially integrated. The compartmentalization of the various income and occupational groups creates a superiority complex among the government officers and rich people, thereby limiting social interaction.

(A)   STREETS OF THE SECTOR:

(a)   The V4's with vast vehicular traffic destroy the physical unity of the sector. People pass through the sector, often in cars or on fast motorcycles along with public buses, and hence the street loses its identity as belonging to the sector and neighborhood. The V4, hence fails to fulfill the design purpose of being a bazaar street.

(b)   The V5's, the street that loops through the sector carries vehicular traffic and thus have an excessive width. This destroys the idea of proximity as seen in old Indian towns, and hence the streets play no social role and retard social interaction.

(c)   The V3's with fast vehicular traffic and boundary walls stop any easy social relationship between the sectors. "The sector plan, because of this disparity is anti-social, isolated and escapist". -Prakash, pg 35.

(B)   OPEN SPACES:

The green areas in a sector run North and South and join the green bands of adjoining sectors on one axis only. Also these green spaces have no

direct access from the houses, and are usually lying idle and serve no social function. Either divided through by V5's or circled by V6's, the green spaces fail to become extensions of the houses and act as normal greens to fulfill informal functions. It is important to have direct access to these spaces as otherwise they become backyards of refuse instead of playing a social role.
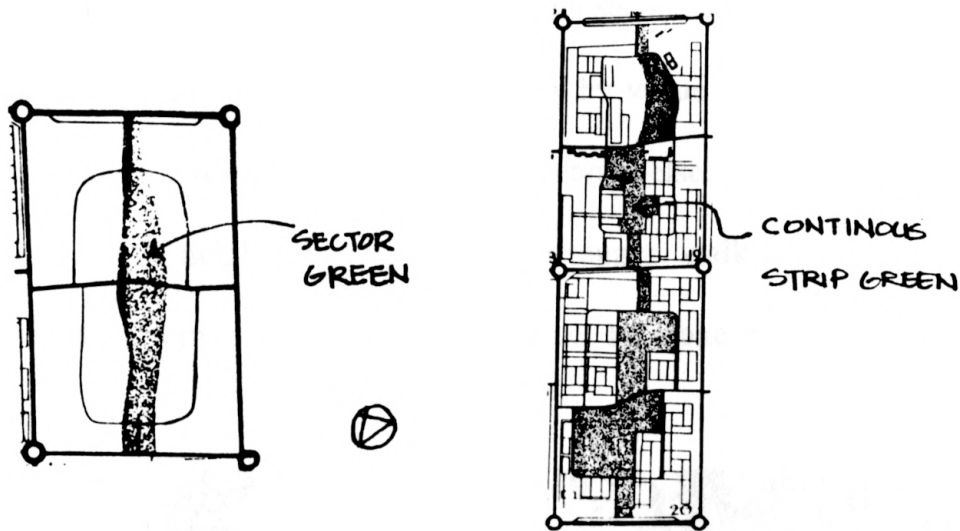
Fig. 87 **Location of Sector Greens-Plan of sector (left) continious sector greens (right).**

The concept of community open space is to invoke social interaction. The open spaces are meant to attract people, to rejuvenate, to sport and above all to encourage social intercourse. Why do these community spaces lack community repose? Because most open green spaces without direct access became useless. This appears to be S.L.O.A.P. (Spaces left over after planning) now forcefully being subjected to fulfill functions for public activity. Boundary roads around these spaces segregate houses and thereby bring about social disunity.

Open spaces are often wasted and have no direct social role. Excessive spaces are not conducive to getting together informally. However, small spaces between activities attract people to interact. This is the design form of open chowks of Old Delhi.

(C)   PRIVACY AT NEIGHBORHOOD LEVEL:

Traditionally, the neighborhood is the second home in an Indian community. It grants privacy and intimacy by virtue of the fact that being on a human scale where everybody knows everybody else. However, this is missing in the sector 22 neighborhood. If you, a stranger, walk through the street, no one will even turn to question your presence, let alone notice you.

Fig. 88 **Houses on V4 street opening directly onto a fast traffic artery.**

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The houses on the V4 road lack privacy as the V4 is a public thoroughfare. One steps onto a fast moving traffic artery as one steps out of these houses onto the V4. However, in a village group, which is similar to the traditional katra, social interaction is more pronounced. The small size of the village street and the similar income of its occupants, brings them together and facilitates communication across the street.
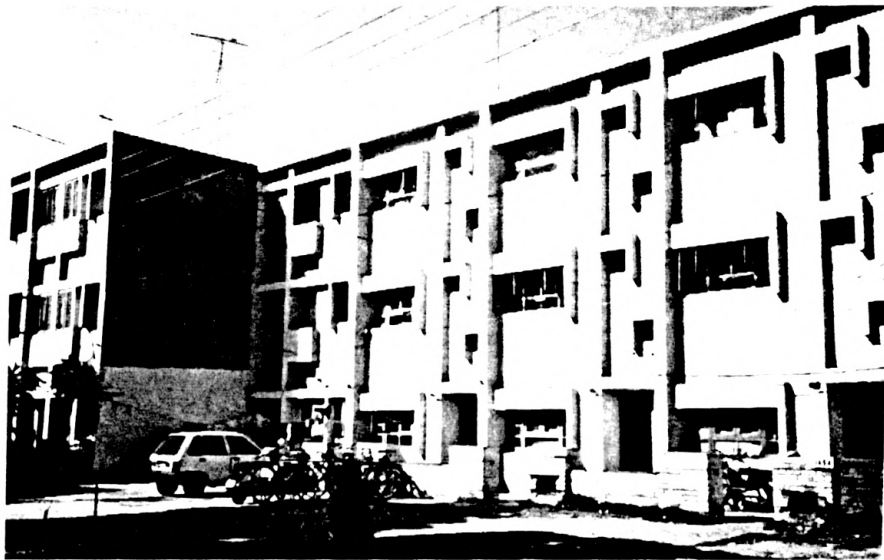
Fig. 89 **Private Housing in Sector 22-little or no privacy as building facades are block-like with no setbacks for balconies or roof terraces.**

All houses have a compound wall defining the plot. All houses have front and back yards. This separates activity within the house from activity outside. Also adjacent houses can look down in each others frontyard and it is the same case in the backyards. Back-to-back house lanes allow easy view from one house into the yards of another. This is one reason that the front and back yards are rarely used.

NO HOUSE IN CHANDIGARH HAS INTERNAL COURTYARDS. THE

BYLAWS DO NOT PERMIT IT.

The low income group houses that open out onto the V5 roads have their living rooms opening out directly onto a major street. The privacy level is low, especially in summers when the front door to the house is open all through the day.

Most houses have low boundary walls around the front yards. The bylaws permit only two types of wall design; Type A - 2'-10" high and Type B - 3'-6" high. These however, fail to make the front yards private enclosures. They do not serve the intended purpose of being private outdoor family spaces and hence are sparingly used.

Even though social norms have changed over the last century, social values still demand privacy in lifestyle and daily activities. Though the set up is slowly becoming westernized, the average Indian still wants his privacy to be maintained. Social events, gatherings and attitudes have certainly changed for making ideologies more liberal, but the idea of privacy stays almost the way it was in the 1800's. Indian society being orthodox in values needs its time to become aware of social changes in the Western world. We need to keep in mind that India is a society where divorces, and love marriages are almost unheard of. It is a place where people still live in neighborhoods looking out for each other and share each others joy and pain. Hence privacy means a lot to them and is almost necessary in everyday design.

"The sectors do not appear to function as integrated neighborhood units as do the caste quarters of more traditional towns." -Evenson (1966), pg 95.

The social structure as laid out in Chandigarh was designed on economic ranking as opposed to caste ranking, as it has been forever. This sudden change in a social set up forced people who continue to believe in the caste system to live in areas populated by multicaste groups. This seems to have greatly influenced the low degree of socialibilty within the neighborhood unit.

SOCIAL ASPECT IN SHAHJAHANABAD:

Shahjahanabad has a social structure almost 500 years old. These five centuries have molded design and social norms and customs together to produce a city which has seen wars, oppression and above all stood the test of time. It is a much stronger and older society, no doubt, and can be considered one of the oldest neighborhood groupings in India.

The design is a reflection of the needs, habits, and behavior of its residents. The closely placed living quarters depict the state of its society; large, tightly packed and close knit. People have resided in these neighborhoods for generations and take their society for granted. Very little has changed socially over the years, despite of the modernization and change of pace of general society. Shahjahanabad (Old Delhi) remains a community where people still depend upon each other for everyday functions and look out for each other.

Fig. 90 **Importance of the social space in traditional communities-figure ground shows over 25% of the city of Shahjahanabad devoted to internal courtyards.**

Lack of space is something that Shahjahanabad is plagued with today. There isn't much room for improvement due to the tight fit of the buildings (like a jigsaw puzzle). Sanitation and cleanliness are big concerns for the Delhi municipal Authorities.

"One of the essential qualities of a town is that it is a gathering together of people and utilities for the generation of civic warmth. However, overcrowd, dingy, insanitary and airless the old towns may be, which is the essential quality without which a town is no town, with which lack of air is merely a minor nuisance - let us call it towniness." -Cullen (1953), pg 34.

Shahjahanabad is a good example of a typical traditional town where old customs are still prevalent, the "mohalla" doors are still shut at night and

outsiders are looked upon with a cautious eye as if demanding the reason for their presence.

Streets of Shahjahanabad:

The hierarchical separation of street types according to traffic, usage and density is evident in Shahjahanabad. The moholla, the galli and the bazaar street all perform efficiently at their own levels and are important avenues of movement and circulation. The streets however are very important socializing spaces as the narrow size assures strong public interaction and promotes communal feeling. The size also helps in cutting down the harshness of the climate. Openings on the street routes form important modal points of social activity.
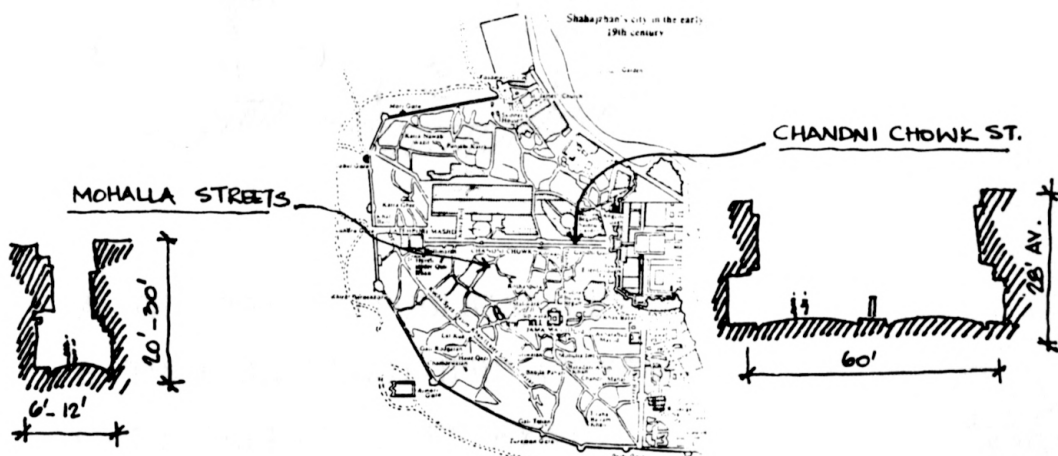
Fig. 91 **Street types in Shahjahanabad**

Open Spaces:

As explained above, the 'chowks' are mere underlings of the street, but serve the purpose of a piazza. All people usually know one another and constantly communicate with each other and discuss events of the day. Socially, this is very important as it keeps each individual bound to the community and in close reach of everyone within the house, as explained in the documentation of Shahjahanabad chapter. The courtyard contributes as a socializing space. All activities concerning the running of the household are performed here and it formulates the hub of the traditional house design.
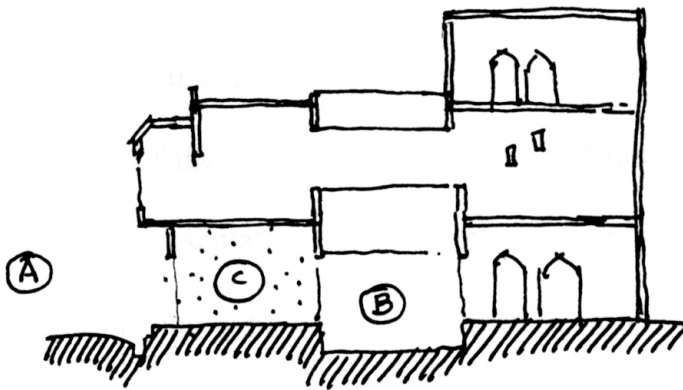
A - THE STREET - [PUBLIC SPACE]

B - THE COURTYARD - [PRIVATE SPACE]

C - THE THRESHOLD / ENTRY VEST. - [TRANSITIONAL SPACE]

Fig. 92 Hierarchy of Spaces-the street and the house.

Privacy at Neighborhood Level:

Small window openings and the Jharokhas assure privacy to the women of the household and yet keep them in touch with the happenings on the street. The 'jharokhas' are typical to the Indian culture (mesh screens for filtered viewing) and are also evident in parts of Persia, Iran, Morrocco and Egypt.

The courtyard is an important factor in maintaining a high level of privacy in the household. All daily activities can be performed by the women without constant scrutiny of neighbors and passerbys. The introvert design of the house assures great privacy and cuts off the house function from the street.

CONCLUSION OF SOCIAL ASPECT STUDY:

Society plays an important role in neighborhood design, and vice versa. Both the people and the community should offer to make a society that is representative of the culture of the people. Chandigarh fails to produce a social norm that is representative of the people, and creates a social setup rather alien to the Indian people who have never lived in physical/social conditions as created for them in Chandigarh.

"In Chandigarh the sense of a society in transition is dominant. The people of the city through the relative mobility of their government employment, their relatively high educational standards, and their physical proximity both in working and dwelling to people of different social groups have departed from the traditional pattern of Indian town life in which age old

social usages were tightly bound into established patterns. However, although, much of the old had been abandoned, a viable new social pattern is yet to be developed."-Evenson (1966), pg 95.

Changes in government policy in neighborhood design, or infusion of design elements which would advocate and establish public interaction are necessary in Chandigarh. The high standards of hygiene and cleanliness established by chandigarh have been greatly acknowledged by people everywhere to be a great asset to the social set up. Chandigarh has set the standards for designs of new neighborhoods in India. This social homogeneity can be developed in Chandigarh by improving upon the architecture character of neighborhood unites and community places that serve them.

In the next section I shall talk about the architecture character of Chandigarh's and Shahjahanabad's neighborhood units.

(2) ARCHITECTURAL CHARACTER OF NEIGHBORHOOD UNITS IN CHANDIGARH AND SHAHJAHANABAD

The bylaws lend Chandigarh a controlled aesthetic and as a result the city bears a repetitive regulatory look. The architectural character calls for adherence to design bylaws that control aesthetic, space and function in both the private and public sector. Housing rows bear elevation treatment, building heights, material finish similar to other parts of the sector or town.

The control which limits use of any motifs, symbols, songs and images restricts the building aesthetic to just a bare elevation. Such elements are commonly seen in old towns and often people use a motif (a set of land prints, swastika or the "chakra" - the traditional wheel) as an identification mark for their property. This mark of individuality within the neighborhood helps create points of reference for the residents.

It is very easy to get lost in Chandigarh. Every street looks like the other. The town lacks landmarks; hence it is tough to orient oneself in accordance with build masses. Fortunately the shivalik mountains on the Northern end act as rough bearing points. The residents have to depend on signboards which read the sector numbers.

Le Corbusier worked on a dual system of spatial organization. First the city was conceived as an efficient organism of fast traffic, linking all monumental elements of the urban framework; and secondly the sector was developed on a more informal pattern to create a pedestrian oriented domestic environment.

"It is this creation of multiple scale - in recognition that a city is not all one thing - that the present plan of Chandigarh represents an advance over many previous urban plans of Le Corbusier in which a uniformly mechanized scale has been applied to an entire urban entity."-Evenson (1966) pg 39. However, the idea of a motorized town with speed as the navigator of design

did not seem to have worked in Chandigarh because the majority of the people do not have the capability to buy a car. People traverse the long wide sunswept corridors of roads with no shade on a bicycle often wondering about the intention of the designer for designing such large open roads. The city does not respond to the cultural and climatic aspects of India. It does not boast of having a simple narrow self shading inuring street, or a colorful Indian bazaar or landmarks with which people can orient themselves. No clock towers, no fair grounds, no planned informal markets, no motifs; instead all points to a very formal set up with little concern for the cultural background of the user. One tends to see some reflection of culture or the people's desire to be creative in the few unauthorized informal markets that have spring all over the city.

The city of Chandigarh "was made for the pedestrian . . . a lot of opportunity to walk in the pleasant surroundings" (Le Corbusier). However, about the same issue Charles Correa writes "In the middle of a scorchingly hot afternoon, you will see hapless Indians plodding along on foot or by-cycles down mercilessly long straight roads between brick walls to infinity."-Correa (1987), pg 74.

The government housing was strict design bylaws which allow it to be build in a certain fashion only. The private sector however has some flexibility allowed in creating a different aesthetic form one's neighborhood, but still maintaining a harmonious street elevation. These bylaws give an orderly

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aesthetic to Chandigarh and do not allow for any shabby, or uncontrolled construction in the city. This high sense of order is something that Chandigarh has boasted being an example of. Construction of townships in Talwara, and Nangal (North Indian Townships) have been based upon the gridiron pattern and basic bylaws as developed in Chandigarh. However the Chandigarh aesthetic needs flexibility, but within control. One does not want to destroy the sense of order that has been achieved by the designers. This order controls unauthorized construction in the city and prevents the neighborhoods from developing a haphazard aesthetic. The strict controls provide for clean city streets and improve the quality of life in the neighborhood.

The planning regulations adopted by the City of Chandigarh after the departure of Le Corbusier's team have not been changed at all, and all construction is still carried out on the lines Corbusier intended it to be. It is this belief that "the foreign hand is always there for guidance"-(Varma (1954), pg 11) has to change and the Indian planners have to take it upon themselves to modify Chandigarh to make it an Indian town.

The bazaar areas lack the festive and colorful environment of a traditional market place. The formal setting of shops and booths is very alien to the Indian culture and is not easily accepted into the system. There needs to be space for peddlers and hawkers who cannot afford to sell wares in big shops, and are much in demand in all old towns.

The architectural character of the streets in Chandigarh deserves special mention. The hierarchy of roads - separation of traffic types has been a conscious scientific attempt to create wholesome neighborhood units. The streets in the bazaar area need to be developed in a way that through traffic is reduced, thereby increasing pedestrian access to the area. The street width (too large for the V4's) does not create a self shading corridor of movement - a prerequisite for a market street.

All these above mentioned drawbacks in the neighborhood sector need to be improved upon, to create a design type that best serves the need of the people who use it.

Shahjahanabad has spaces laid out within the neighborhood unit that encourage social interaction. The Chaupars, chowks and mohallas act as a group to create an efficient and workable neighborhood unit. The street size and market area is scaled to the residents who use it, and thus is inviting and becomes a focal point of the community.

However, Shahjahanabad lacks proper hygiene and sanitation, something that modern technology can deliver today but was not available to the builders then.

The street elevations in Shahjahanabad generate interest and variety and possess a high degree of imageability. The street section allows for shady walkways, and creates cool passages of wind movement. Architectural motifs

and design elements such as carved brackets, overhangs, balconies, thresholds, ornamental doorways, all create interest and aesthetic besides being practical.

The idea of houses above shops, accessible from the main bazaar street encourages social interaction and makes the main street a pragmatic feature of design. In sector 22 in Chandigarh, houses above shops are approached from a street away from the main market street. This segregates movement for shoppers and shopkeepers, thereby decreasing public interaction.

CONCLUSIONS DRAWN FROM ANALYSIS OF ARCHITECTURE CHARACTER:

Chandigarh, though planned, fails to deliver architecture elements that enhance social interaction, when compared to the performance of the neighborhood unit in Shahjahanabad.

The streets in Chandigarh need to be re-examined so as to bring build masses closer to each other so that this space contained within them is to a human scale and becomes the focus of movement. Like the 'galli' in old towns, pedestrian walkways (self-shading) need to be laid about between housing units so that circulation is simple, aesthetic and a social experience. Collective spaces between houses can act as community spaces - green parks, oversized and treeless can often become barren and need constant maintenance.

Contained spaces on the other hand are perfect for social gatherings, events and daily communication. Also important is the need to design roads

that are not open to through traffic. Contained traffic, for movement of a certain part of the neighborhood only definitely decreases the chances of accidents and cuts down through movement. For this reason the cul-de-sac like dead end streets serving a particular group of houses only (as discussed in the analysis of Shahjahanabad) are ideal design solutions. They not only decrease motor traffic within the neighborhood, but also makes them secure as outsiders would seldom venture into areas without any reason at all. Another social advantage of cul-de-sac's is that they generate neighborhood utility, by acting as common movement systems for a certain group of residents to whose houses the roads lead.

As analyzed, we conclude that Chandigarh lacks the personal touch of the residents. Some sort of motifs or laments should be an inherent part of the design so as to increase imageablity of the neighborhood unit and also act as visual landmarks. In the analysis of Matthew Novicki's design ideas for Chandigarh, one sees the temple form as being a visual landmark at the neighborhood level. This is very important as it helps people orient themselves physically and mentally within their neighborhood units. In order to allow for all these changes and to adopt them within its system the bylaws of Chandigarh need to be made flexible and accommodating.

Changes in zoning would help achieve better neighborhoods (by working on street sizes, lot distribution and space contained within sectors) in new towns

like Chandigarh. Chandigarhs order and some regulations are worthy of praise and respect. It is within these regulations, that certain flexibility has to be introduced to make the environment more conducive to living . To recreate another Shahjahanabad would be a disastrous solution at this point of time. However, if regulatory changes were made within the bylaws, to allow for increase in atheistic quality, buildings, massing, material and texture readjustment, rearranging of ceratin street types or any other system that could be introduced without violating the strong sense of order, would help create a viable and liveable neighborhood unit.

(3)   **ANALYSIS OF CLIMATIC FEATURES OF CHANDIGARH AND SHAHJAHANABAD:**

Chandigarh boasts of having a modern landscape set up applied within its fabric to create parks, vistas and piazzas that no other city in India can compare to. However long avenues (as visualized by Le Corbusier to be similar to "Champs Elysees" in Paris) is something that Chandigarh does not need, unless they are protected by the harsh sun and do not allow the hot winds to blow through.

Jeanneret introduced the 'brise-soliel' or egg crate facade that was intended to cut the suns rays.

Fig. 93 Use of Egg-Crate sun breakers in Sector 16 Chandigarh

This has been a disastrous attempt to create climate control in a hot arid place like Chandigarh. The hugh 4' X 4' X 4' box like sections because breeding ground for dirt, pigeons and are an easy outdoor ladder system for thieves. Fixed louvers (as used by Le Corbusier in the Lake Club) offer a fixed perspective out, thereby limiting vision and air circulation.

Also the two types of window treatments used by Jeanneret:

(1) Long narrow slits -

Fig. 94(a) **Use of Slit Windows**

These fail to act as windows, but rather become vertical cracks that do not

allow air circulation; and

(2) Peppered Windows
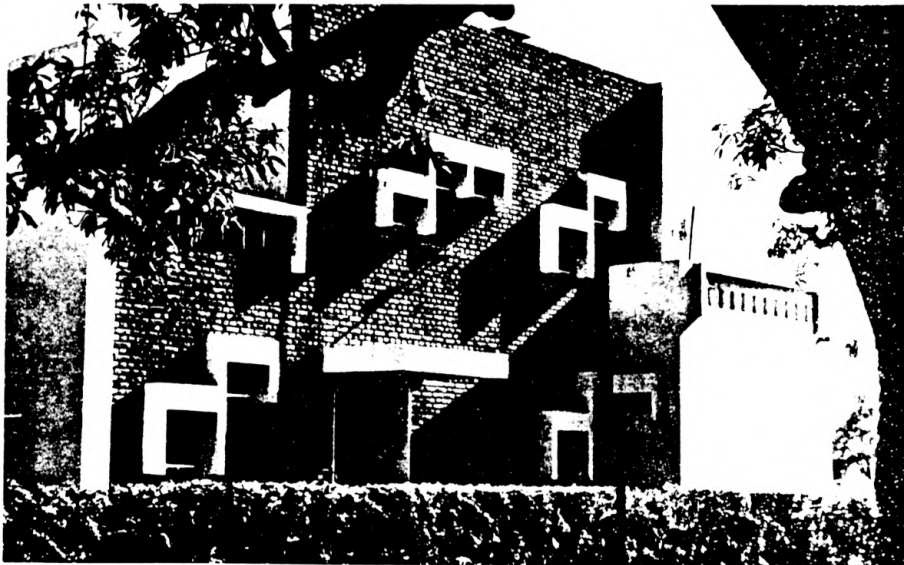
Fig. 94(b) **Use of Peppered Windows**

These are small and scattered all over the facade, thereby making them impossible to curtain. These are often suspected as "a feeble parody of the Le Corbusier - to create a poor mans RonChamp" -Evenson (1966), pg 53.

Fig. 95 Chatta-A strong design/climate control feature adding form and character to the street.

Lack of deep verandas, or cantilevers does not do a good job of cutting the sun off in summer. For this, one has to see the elements used in Shahjahanabad to achieve climate control. Large overhangs over windows do not allow the sun to penetrate into the household and keep the interior relatively cool. Fine lattice screened 'jallis' act as dust filters and allow air to freely circulate within the house. Shading devices used in Shahjahanabad included cloth awnings over narrow streets, which were kept damp to lower the ambient

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temperature, balconies, or jharokhas' on upper floors kept the street in shade, the chatta or the overhead building mass spanning the width of the street and the narrow width of the street that cut the angular sun, keeping the street surface mostly in shade.

Chandigarh has tree plantings on either side of the roads, but because of the excessive width of these circulation pathways, total shade is never achieved.

One important design element that is absent from the design vocabulary of Chandigarh is the internal courtyard. This acts as cooling tower within the house cooling it from inside to outside.

The internal court is an important design feature that should always be a part of neighborhood layouts. As it is climatically viable, consumes less space than front and back yards, induces privacy and forms a gathering space for the family. The courtyard is a time tested element in India over the centuries and is an inherent part of house design. Chandigarh however, lacks this element - it should be considered and applied to all new construction in the neighborhood units.

The large green spaces of Chandigarh are expensive to maintain and hence are often seen unkempt and untidy. Smaller, shady spaces should be created between houses so that they are easy to maintain and should be dotted all over the sector rather than being concentrated in the center as on big community green.

Le Corbusier once stated "A city made for speed is made for success"-Corbusier,(1929), pg 179. In response to this statement Norma Evenson says, "In India, it might be more appropriate to say that a city made for shade is made for success".- (1966), pg 92.

CONCLUSIONS OF CLIMATIC ANALYSIS:

The shading device used in Chandigarh do not perform the function they were originally intended to. Street widths (being too large) do not allow them to be completely shaded, even by continuous rows of trees. Window punctuation in the wall surface are not of ideal design and thus do not serve as climate controllers. Building materials like concrete and brick retain heat and dissipate it slowly at night.

Analyses of Shahjhananbad reveals the primary importance of the central courtyard which aids in passive cooling. Small window openings towards the main streets keep the sun and dust out. Use of traditional elements adds to the aesthetic beauty besides their practicality. And above all, the built masses cast shadows on each other creating shady walkways and virtually sun-free streets.

ANALYSIS OF COMMUNITY FACILITIES WITHIN THE

NEIGHBORHOOD UNIT - IN CHANDIGARH AND SHAHJHANABAD

Chandigarh's sectors were so laid out that the farthest house would be no more than 10 - 12 minutes walking time from the market place. This scientific approach towards neighborhood planning is one of the strong points of Le Corbusier's philosophy.
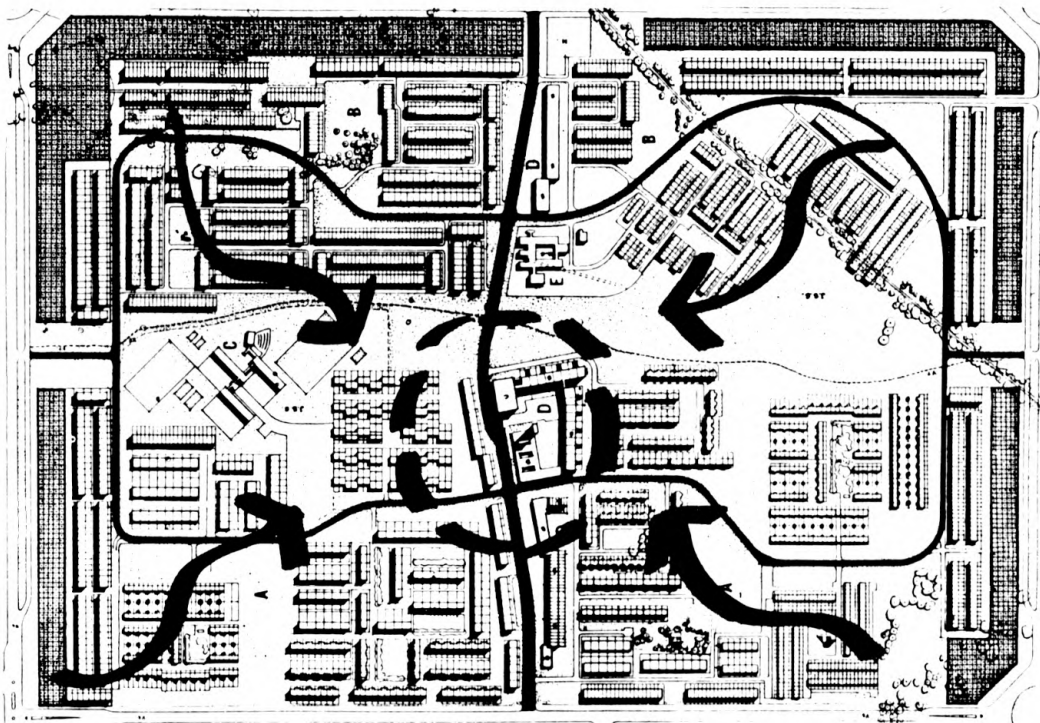
Fig. 96 **Community Facilities-Central feature of the Sector**

However, within itself, the market place in Chandigarh fails to deliver the architecture aesthetic and purpose of a traditional Indian bazaar.

COMMUNITY FACILITIES IN CHANDIGARH

Concept - Placed at the core of the sector design, the facilities were planned as the heart of all activity. All shops and other commercial activity is assigned to the zone on the V4, in the middle of the sector. Shops with a fixed bay size (17 '-3 X 108") or booths (12' X 12'0 are designed for all purposes of shopping activity. Each sector has about 25 -40 shops and about 10 - 15 booths. This formulates the "Indian bazaar" set up of Chandigarh.

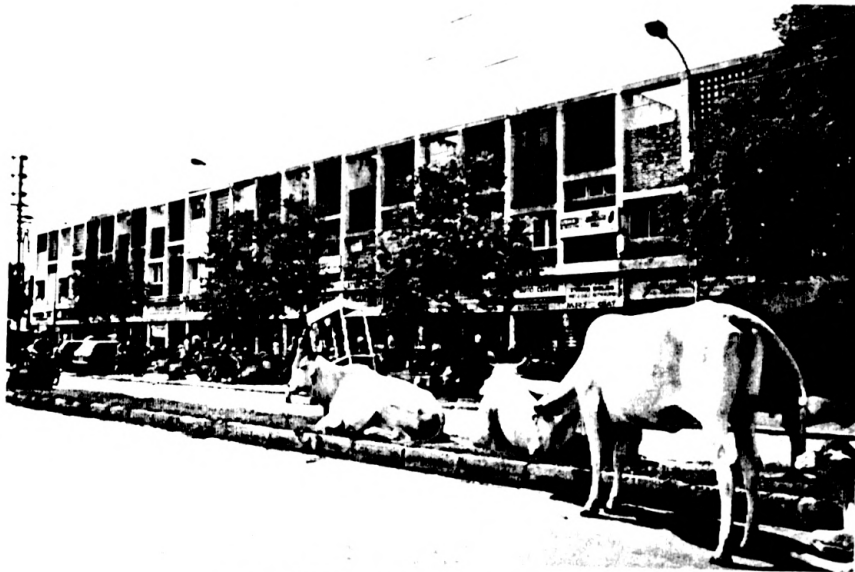

Fig. 97 **The Market Aesthetic.**

The shops can only be on the Southern side of the V4 - with houses on the Northern face. All shop windows are laid out on the south side of the V4 street, with their show-windows facing north so that the merchandise being sold (cloth, shoes, fruit, etc.) do not get direct sunlight on them. This design pattern is pretty much the same all over Chandigarh.

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Other community facilities located centrally in the sector are the public school (one in almost every 2-3 sectors and caters to 150 - 200 children). Local dispensary, cinema hall, and milk dairy. The shopping area lay at a max. distance of about 720m. from the farthest house in the sector. (15-20 minutes)

Informal markets, called rehri markets started as a design outburst to Corbusiers strict and formal market layout. They are sections in the market place where vendors get their wares (usually vegetables and fresh fruit) and sell them. These are the most popular market places in Chandigarh. These were developed and put into practice after Corbusier laid out at the sector markets. These Rehri markets are often 200' X 200' concrete surfaces where vendors sell their wares on small carts. Most sectors have these laid along side the shops in the Market Place.

Fig. 98 **The Rehri Market-a shady informal and traditional design element.**

The reason informal markets worked was because the concept that they are based on is traditional and something the local residents can relate to. They buy products in these markets having a wide selection at land in a small bazaar like environment vis a vis a formal shop in a new like design setup.

"The last thing one needs in a bazaar is excessively open space, or God forbid, grass. The atmosphere of the Chandigarh bazaar street as it has been developed, produces much of the antiseptic vacancy of an American suburban shopping center, lacking only the twenty acre parking lots to complete the illusion." Norma Evenson, "Chandigarh" (1966) pg 56 .

COMMUNITY FACILITIES IN SHAHJAHANABAD

Community facilities such as shops, markets were located within the mohalla design. Most shops housed the shopkeepers on the upper floors. This increased the architecture variety as the upper floors were directly accessible by a steep flight of steps rising up from the bazaar street.

In Shahjahanabad, the community facilities were not a separate function from the houses. The daily chores were performed around a small public square which was always crowded in the evenings by the residents of the mohalla. Widening of a street could form a place for a municipal tap or well where women would gather and exchange local gossip. These widening within the street would sometimes contain a large tree - a focal point of the community design under which the elderly sat and smoked their hookas (water pipe).

Community facilities usually kept the resident in a certain short radius of his house, and he seldom had to venture out into other shopping areas outside his neighborhood. This increased familiarity and generated social interaction among the people.

CONCLUSIONS OF ANALYSIS OF COMMUNITY FACILITIES

Chandigarh offers a formal setup of shopping arcades, new to Indian tradition which has a lot of public interaction carried out in small scaled spaces. The sector bazaars' are too linear to create spatial containment, and with shops only on one side, the idea of a typical bazaar is not achieved.

The spaces need to be made less formal by creating small informal spaces for vendors, street performers and fresh produce seller. The size and design of the sector market needs to adapt to vernacular theories, while continuing to deliver modern amenities such as sidewalks and parking. the shops need to be of various sizes to accommodate various types of items. The V4 road dissecting the market with heavy traffic (it is the main city bus route) needs to be shifted around so as to achieve contained spaces which are aesthetically suitable, functional and climatically viable to the context of North India. Scattered shops within residential areas would help create nodes of public interaction within the main neighborhood space.

Creation of intimate spaces within the market square would help humanize the bazaar areas. Open spaces with facilities to set up tents should be

provided for gatherings, marriage parties or religious ceremonies. This would help create focal points within the community facility areas and encourage social intercourse.

The hardness of the brick and concrete facades needs to be toned down by using straw awnings which would soften the market aesthetic, and also act as climate controllers.

CONCLUSIONS

Le Corbusier's Chandigarh, despite its shortcomings, emerges as a far superior model of architectural design compared to its modern counterparts. The neighborhood units though critized and often branded monotous follow a strict code of construction which prevents haphazard unwanted growth. However, even though the loss of Indian character in the design shall always haunt the essence of the city; the cleanliness, hierarchical road pattern and green spaces shall always be complemented. The neighborhood spaces would be incomprehensible in Chandigarh was devoid of all bylaws. The beauty of Chandigarh would be enhanced if one learnt from its scientific approach to design (as experimented by Corbusier) and applied to it, the traditional vernacular elements to produce neighborhood units that are laid out on the lines of the 21st century. The tradition of continuum along with constant improvement to meet the requirement of the day and age would help produce ideal environments in vernacular settings. Chandigarh has been and shall always continue to be a remarkable example of design to learn from and relate to for all architects and viewers alike.

However critizing alone would not much help the fate Chandigarh. Flexibility in bylaws and introduction of new polices within the regulations setup would be the first place to work on. The general public needs to be involved in giving suggestions to improve the quality of life in these

neighborhood units. The idea of "unity" needs to be understood. Mass repetition does not constitute as basis of unity; however, it does impose regulatory order in the built environment. A unity between the user and the design and unity within various designs themselves need to be achieved.

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