

STREETS AS SOCIAL SPACES IN THE RESIDENTIAL ENVIRONMENTS OF INDIA

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Abstract

Streets define the character of the city, making each city unique. Streets in residential environment, are the spaces that contribute to sociability and place attachment between the residents and the place. Streets have a significant effect on how people perceive and interact with their community. They are the medium of active public participation in the community, mobility and commercial exchange through ages in India. The quality of living environment is determined by the basic needs of the people living which includes the psychological, physical, social and perceptual needs. Increase in population, migration of people from rural to urban areas as well as from old city to newer developments, increased vehicular movement has made the residential streets to serve thoroughfare, on- street parking and conveying traffic effectively. Thus, the quality of living environment is becoming unhealthy and unpleasant. Contemporary living environment has not the same character for social interaction as in the traditional living environment. In Indian context, residential neighbourhoods, needs to be more socially active and streets are significant in achieving this character. The aim is to identify and analyse the streets spaces, assess the streets on the parameters selected, their contribution to sociability and quality life in a neighbourhood considering its physical, spatial and social features. The objectives of this study is to understand the organisation of low rise settlements in a residential neighbourhood, study the spatial and social characteristics of streets, and behavioural pattern of the users. Considering Lucknow, one of the cities in India, as a case study, the research aims to study two contemporary neighbourhoods and its street spaces, which are analysed and assessed for its physical, social and spatial attributes and quality of living environment. The visual survey assessed the spatial and social attributes of the streets and questionnaire helped to know the user perceptions.

Keywords: Streets, sociability, public participation, psychological, physical, social and perceptual needs, contemporary living environment, spatial and social characteristics

1. Introduction

"Cities are their streets" said Jacobs (1961). Whenever we talk about public realm, we majorly talk of streets (Jacobs, 1993). Streets provide not only vehicular movement but also provide a network for all social, economic, and physical activities that make cities liveable. It is the street network that makes each city unique. It helps to make a community liveable, bringing sociability in the living environments. Towns and cities have historically been around their streets; served three main purposes: mobility, commerce and social interaction. The traditional built environment consisted of a strong sense of attachment, identity, sense of security, belonging and enhanced social interactions as well. "There have been times when streets were a primary focus of city building—streets rather than individual buildings.

There was an array of reasons for creating the arcaded walks along the streets of Bologna. Over time they have become a hallmark of that city, much beloved and understood to add immensely to its liveability. On such streets the facades of most structures are hardly seen, so it is the street, not individual buildings, that prevails" explains Allan Jacobs (1961). In India, Streets have always served as open public spaces for people to gather and interact, and the social interactions occurring on the streets of urban areas impact the quality of life in a community. Increasing population, rapid urbanization and increased vehicular movement, has led to major demand of land, taking into consideration the development of open spaces. This has resulted in the changing urban form and organisation of spaces within the city, reducing the accessible public open spaces. The concept of Global City, giving less or no importance to the context or surroundings to make an ideal city, and, modernisation has brought a huge transformation in the development of urban public places within the city. Social, cultural and historical meaning attached to the public places are now lost while concerning more on the sociological and psychological aspects of human behaviour and behavioural pattern in the contemporary urban environment (Mandhan, 2014). The residents of contemporary neighbourhoods find it difficult to get spaces for meeting, interact with neighbours, safe places for children to play near by and hence, they lack sense of community. Largely available public open spaces in urban regions of India, are the streets. The contemporary streets have lost the tangible and intangible parameters of traditional streets that make those socially active.

1.1. Research Framework

Cities of India are considered for explaining the traditional as well as contemporary residential environments. Two contemporary residential societies of Lucknow is considered to study in detail their physical, social and spatial attributes and quality of living environment. Data were collected in two phases: 1) visual assessment survey 2) questionnaire survey. The visual survey assessed the spatial and social attributes of the streets and questionnaire helped to know the user perceptions. The comparative analysis of the cases were cross examined with the post occupancy survey analysis and the findings contribute to understanding of the street qualities and the quality of the living environment, giving possible design solutions for the same.

2. Streets and its Hierarchy

Streets are the open public spaces which forms the cities. They form the physical and social part of the living environment. Streets are used for vehicular movement as well as social activities. Streets are the linearly enclosed spaces formed by buildings and provides a differentiation between public and private spaces. Buildings are the tangible facilities that allow streets to be vibrant public spaces and streets are essential public spaces that connect diverse areas of the city, forming the urban fabric (Jacobs, 1961). Streets have hierarchy with respect to its connectivity and accessibility. It has been defined in various ways in the history of urban planning, but here the most suitable is in the terms of its connection forming patterns and networks to access. Urban and Rural Development Plans Formulation and Implementation (URDPFI) classifies the road into 6 types. Table 1 shows the classification of roads, the design speed and space standards according to the URDPFI Guidelines, 2014.

Table 1: Classification of Urban roads (Source: URDPFI Guidelines, 2014)

No.	Title	Speed (kmph)	Width (m)
1	Urban Expressway	80	50-60
2.	Arterial road	50	50-80

3.	Sub-Arterial road	50	30-50
4.	Distributor/Collector road	30	12-30
5.	Local Street	10-20	12-20
6.	Access Street	15	6-15

1) Urban Expressway: These are the highways for through traffic with grade separations at major crossroads. 2) Arterial road: These roads contains largest volumes of traffic. 3) Sub-arterial road: These roads contain lesser traffic lesser traffic than arterial roads, and “can act as arterials” As mentioned in URDPFI Guidelines (2014). 4) Distributor/ Collector Road: these are connector roads which distribute the traffic from access streets to arterial and sub-arterial roads and contains moderate traffic. 5) Local street: intended for neighbourhood use with reduced vehicular access to make pedestrian friendly streets. 6) Access Street: URDPFI Guidelines, (2014) defines the access streets as “These are used for access functions to adjoining properties and areas”.

2. History of City planning and Design of streets

Streets, whether narrow in organic cities or wide in planned cities have been the place of social meeting, trading and transportation movement. The streets formed an integral part of the social and commercial fabric of the settlements, shaping the urban form and structure by separating blocks and linking different places of interest within the city. (Pandey, 2013), in an article ‘Town Planning System of Indus Valley Civilization’ explained the street network of Indus Valley Civilization, the streets were straight and intersect at right angles and houses, located at the lower level while other buildings of the city, such as assembly halls and religious structures, located at the elevated level, promoted social interactions and commercial exchanges that made streets function as public spaces (Habitat, 2013). Streets in many Indian cities followed the flow of water and topography forming a pattern of network. Since the colonial times, there has been a transformation in the designing and planning of street networks- laying out geometric grids on the ground without considering existing natural conditions (Mandhan, 2014). The planned city form influenced the orderly development in the modern city. Thus, modern cities are, now implementation of rules and regulations to avoid haphazard development. Streets were the first element to transform the places, from a village to a town, a town to a city or from a commercial centre to a capital city. The transformation of street planning and design during the period of rapid urbanization and making a capital city was leading to growth in the cities. Emphasizing all over the country, on the models of Singapore, Tokyo, London and Paris to be developed in India, epitomizing them as ‘ideal’ has contributed to contemporary streets being less reflective of the earlier customs of the local context within which they are located. (Mandhan, 2014). The increasing problems of traffic congestion, rise in automobiles, lead the emphasis on designing streets for transportation efficiency. It was no longer pedestrian friendly environment and safety became a major issue. Jane Jacobs was an opponent to modern planning and development, and protested against urban renewal projects that destroyed the neighbourhood (Jacobs, 1961). As the movement of vehicular traffic dominated the street design, the living conditions in such environment became unhealthy as well as unpleasant to live in.

3. Role of Streets in Urban life

3.1. Streets as Public Spaces

Streets offer diverse uses, complex building types, textured material cultures, persistent high density, conflicting traffic/pedestrian encounters, cyclists, motorists, public transport users, people with disability and vendors. “Streets are more than public utilities” (Jacobs, 1993). Allan Jacobs says that

streets are for everyone and that they are major source of developing socially active environment in the cities. Jacobs (1993) further stated "If can develop and design streets so that they are wonderful, fulfilling places to be, community-building places, attractive public places for all the people of cities and neighbourhoods, then we will have successfully designed about one-third of the city directly and will have had an immense impact on the rest." Streets as public spaces provide visual access, social interaction, security, and sense of attachment. Streets, with only vehicular movement do not provide lively, safe and interactive streets for the people. Streets have symbols and meanings (social, political, ceremonial) that makes them memorable. One cannot make streets interesting, lively, and safe with just trafficked streets. "Best streets encourage participation" (Jacobs, 1993).

3.1.1. Social Aspect

Arjun Appadurai (1987) in *Street Culture* asserted that "Streets are many things: thoroughfares, bazaars, theatres, exhibitions, restaurants. They encompass a huge range of activities from worship and business, to political protests and funeral and marriage processions... On its streets, India eats, work, sleeps, moves, celebrate and worships." Communication is the major purpose of the streets (Jacobs, 1993).

3.1.2. Cultural Aspect

Arjun Appadurai (1987) says, "Streets, and their culture, lie at the heart of public life in contemporary India. Especially in those many cities where urban housing is crowded and uncomfortable, and where the weather is never too cold, streets are where much of life is lived." Women, traditionally, would gossip, interact with neighbours while washing clothes, children would play safely on the streets, and street vendors would pass by selling fruits and vegetables and other necessities of the residents. People perform various religious activities, political speeches and protests, all such activities make streets active. (Mandhan, 2014). Streets are, as said by Allan Jacobs (1993) "symbols of a community and of its history; they represent a public memory."

3.1.3. Physical Aspect

In any country, the circulation, street network patterns and infrastructure functions to make streets socially active and develop the place in a better way (Mandhan, 2018). It includes the quality, design and maintenance of the street. Streets, on changing the form and structure, varies the comfort level of the residents and their living environment (Jacobs, 1993). Their sizes and composition "afford or deny light and shade" says Allan Jacobs (1993).

3.1.4. Environmental Aspect

Streets are pleasant to walk on when they respond to the climate well enough, making living environment healthy, safe and physically comfortable (Jacobs, 1993). Trees on the streets regulate the micro-climate and reducing noise pollution as well, air quality is improved by reducing the vehicular movements, and helps manage storm water by incorporating green infrastructure.

3.1.5. Economical Aspect

Streets, since the ancient times, have been the source of economy generation in our life. The transportation of goods from one place to other, the movement, has been possible due to streets. The change in the form and structure, movement patterns of the street, affects the retail and office rents and land values.

4. Evaluating the Qualities of streets

Jacobs (1961), who believed that streets played a significant role in establishing a strong sense of community and social interactions, stated for basic principles for an active neighbourhood- Mixed use, short blocks, that is, street turns must be frequent, aging buildings, population density to retain economic diversity as well as safety on streets (Jacobs, 1961). Jacobs (1993), in his book, *Great Streets*, mentioned the criteria for the great streets. They are, physical comfort, walk with leisure, definition, visual engagement, transparency, complementarity, maintenance and quality construction and design (Jacobs, 1993). Bentley et al. (1985) explained the qualities to make place responsive are- permeability, variety, legibility, robustness, that is, places that can be used for different purposes and offers choices or people. For example, On street parking being provided for the residents, provides better play spaces when cars are absent; visual appropriateness, richness (sensory experiences- visual sense, smell, touch and hear), and lastly, personalisation which people consider as 'my place', brings sense of belonging. Clemente et al. and Ewing Handy (2009) developed a method for measuring urban design qualities for the built environment that depend on the physical features. They reflect the ways in which people perceive and interact with the environment. They are- imageability, enclosure, human scale, transparency and complexity. The study done by Sachin Trivedi on Residential Site Planning For Row Houses in Ahmedabad concluded the factors affecting the built environment are the psychological needs of safety, privacy and territoriality; visual pleasure and climatic comfort, accessibility and social needs of interaction with people in the community they live in.

Combined with the criteria and parameters stated above by Allan B. Jacobs, Jane Jacobs, Clemente, Ian Bentley and Sachin Trivedi, I conclude the following requirements for a residential street to be socially active in the context of India:

1. Psychological needs- People like to live in the environment where they feel safe, their visual and interactions are controlled, that is, privacy is achieved in their known territory which gives a sense of belonging. Psychological needs are depend on a) Privacy b) Safety c) Territoriality: One feels the need to know his area, giving identity to the place, an important role to bring sense of ownership and belonging.
2. Perceptual Needs- How one perceive the built environment by different visual experiences, create visual pleasure and pleasing environment.
3. Physical Needs- Climatic comfort and ease of accessibility is important to attain the quality of living environment. Street spaces in a neighbourhood must be convenient to use. There must be variety of building use, physical maintenance and quality construction and design.

The social life on the streets of a neighbourhood are evaluated on the parameters, which includes:

- 1) Spatial organization 2) Built mass and Streetscape 3) Organisation of the movement 4) Mass and Space 5) Spatial enclosure

4.1. Traditional Living Environment

4.1.1. Pol Houses, Ahmedabad

The Moti Hamam Pol: Ahmedabad, a walled city, is known for its most famous neighbourhood settlements of pols. Figure1 shows the layout of Moti Hamam Pol off Ahmedabad. Pols are enclosed residential clusters having entrance through a main gateway, a primary street, and secondary streets, a quadrangle, with a temple/mosque and well. The Moti Hamam pol is occupied by the Patel community, having a homogeneous occupational pattern. There is a clear pattern of hierarchy of streets, from the wider, busier public road, to the central area of the Pol, to the connecting dead end streets, along which the houses adjoin.

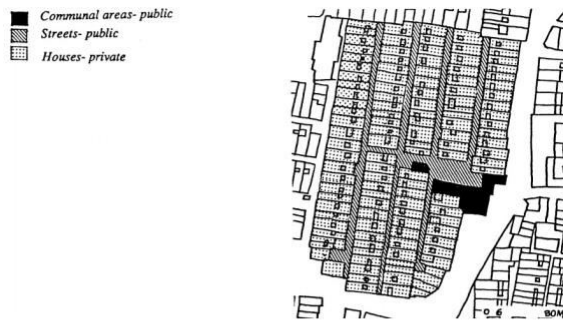


Figure 1: Layout of Moti Hamam Pol (Source: Sejjal, 1987)



Figure 2: Different uses of Otlā in an Ahmedabad Pol (Source: Vernacular as a Model for Contemporary design, 2018)

There is a clear pattern of hierarchy of streets, from the wider, busier public road, to the central area of the Pol, to the connecting dead end streets, along which the houses adjoin. Pol houses are rectangular blocks with minimal frontage on the street, which means more number of people are offsetted to the streets which in turn promotes interaction.

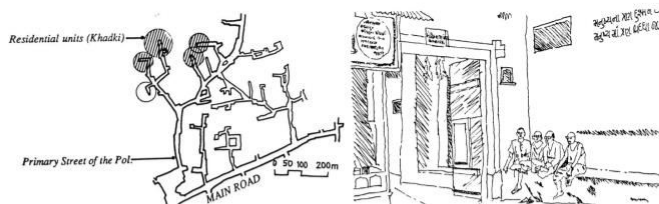


Figure 3: Entrance gateway provides setting for social interaction and hierarchy of streets in the Pols (Source: Sejjal, 1987)

Pols are characterized by the network of small streets. Most of the houses extending their activities onto the streets, the washing place of each house is located on the street, where the residents wash their clothes and utensils. Children play on the street adjoining the houses, so that the parents can watch them. The street also serves for parking of bicycles and scooters.

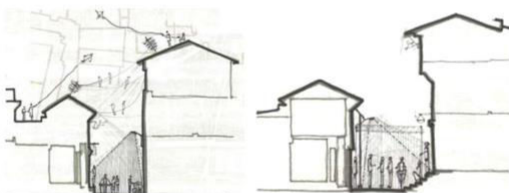


Figure 4: Street Enclosure, showing human scale and activities on the street (Source: Vernacular as a Model for Contemporary design, 2018)

The street also serves for parking of bicycles and scooters Safe, attractive and economically vibrant streets .Short blocks, narrow small streets .Public participation. Climate Responsive streets. Design elements like sittings at entrance, street light that brings legibility and permeability .On-street parking .Complexity in the facades. Enclosure of 1:3, giving feeling of compactness .Hierarchy of spaces generates activities occurring on the streets.

4.2. Contemporary Living Environment

4.2.1. Residential Streets of Gurugram, New Delhi

Until 1980, Gurgaon was a patch of green field, forests and crops. Whereas, from the mid-1980s it has been witnessed a huge growth: high rise offices, malls, use of steel, concrete and glass. The city has grown haphazardly with unplanned streets, neither navigable nor named. This city, so developing, is the result of real estate developers who built affluent gated colonies and office complexes; cars and pigs share the same, unlit streets having depressions as well.



Figure 5: Residential Gated Colonies of Gurgaon (Source: Retrieved from <https://settlersindia.com/properties-rent/apartment-rent-dlf-beverly-park-dlf-phase-2-gurgaon>)

Gurugram, fast developing city in New Delhi, has come up with “vibrant residential and commercial hub” says (Ani, 2013) in an article ‘New Gurugram: a vibrant residential hub’. The land use is mostly residential which is now turning to mixed use. The colonies are now developed with high rise building structures due to reduced land resources thus taking people away from the ground, reducing their social life. The people are limited to their flats except for the gatherings for the festivals or occasions. Throughout the day, streets are inactive with no or less pedestrianisation as vehicular movement is prominent within the colonies. The buildings are far apart forming a weak enclosure, which gives a feel of openness. Linear building edges limit the social interaction to the parks and balconies of the houses. Intersecting nodes are hardly active. Children play only in the parks as streets are wide enough to carry fast moving vehicles more rather than activities for them. This creates an unsafe and unpleasant environment. The streets of Gurugram lack social life and sense of community. The qualities that contributes to make street a social space are absent in the developing communities of the city hence security, sense of attachment cannot be seen in the residents of the city.

5. Visual Survey- Spatial Analysis of the Cases

5.1. Selection and Analysis of the Cases

Each street is different from the other in its setting, physical elements, due to which people respond and use it in different ways. This analysis is conducted to study how people make some streets so lively and some are disliked to walk on. Two cases of Lucknow are considered for the study, contemporary settlements- Indira Nagar and Sahara States. Selection criteria of all the three cases are: Indira Nagar – The sectorial development of Indira Nagar is based on grid planning. The area selected is a gate community with independent houses. Indira Nagar is one of the most habited areas of Lucknow developed in mid 20th century. Sahara States – Developed in 21st century, on the concept of integral development, consisting of independent houses as well as low rise apartments. The cases selected are analysed in detail which includes the background of the localities followed by location maps, plans, sections and photographs. The factors affecting the comfort of the people that contribute to the socialness of the streets are qualitatively assessed. A comparative analysis and post occupancy survey gives the result of the analysis and presented in a table where criteria is ranked from 0 to 10 depending upon the interviews and visual analysis.

5.2. Case Study 1: A- block Indira Nagar, Lucknow

Based on neighbourhood planning, the colony is planned in sectors. It was constructed in the year 1979. A gated community of A-block with 88 units is selected for the study which is connected to the Meena market, shopping area and convention centre. Figure 10 shows the location map of the selected area of Indira Nagar, Lucknow.



Figure 6: Location Map of selected community in Indira Naga A block, near Meena Market (Image Source: Google Earth, Delineated the areas chosen for study)

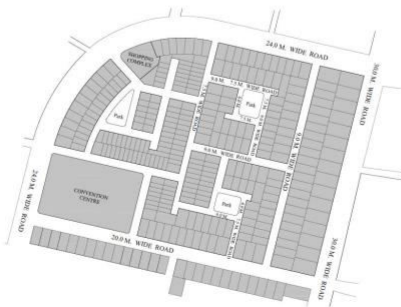


Figure 7: Site Plan of A-block Indira Nagar, Lucknow (Source: Primary survey)

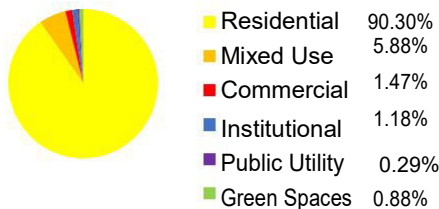


Figure 8: Building use percentage and its plan (Source: Primary survey)

The area is almost residential where all the basic daily needs of the people are fulfilled by the facilities provided in the surroundings. The area has 29% built and 71% open spaces. Variety in building use enhance social interaction, ease of daily provisions and increases safety on the streets. The variety of building use in this area, makes it a complete neighbourhood unit structure.

Table 2: Land Allocation of Indira Nagar (Source: Primary Survey)

No.	Title	Area (sq.m.)	(%) of Site area (69481.44 sq.m.)
1.	Site Area	16817.66	24.20%
2.	Type-A dwellings Type-B dwellings	3600.00 6156.00	5.18% 8.86%
3.	Community open space	572.81	0.82%
4.	Streets	6519.66	9.38%

5.2.1. Spatial Organisation

The units are arranged parallel to the site boundaries .Linear organisation of units following grid pattern. There are four rows that face the park. Other units form face to face dwellings, a linear cluster with street acting as a cluster open space between them. Front private open spaces in of the houses, acts as a transition space and promote interaction with people. Lack of group territoriality on the street spaces as streets are actively used for vehicular movement by nearby communities. The units are arranged adjacent to each other forming linear rows. The houses are bounded by two other units on its longitudinal sides.The end units of the rows get more private open spaces on three sides. The linear rows formed with narrow frontages of the houses maximize the use of street length as number of houses are arranged in a row.



Figure 9: Linear organisation of units following the grid pattern and forming streets as cluster spaces (Source: Primary Survey)



Figure 10: Open Public space surrounded by the dwellings (Source: Primary Survey)

The houses have narrow frontages, reducing street utilization and creating short blocks and opportunities to turn corners is frequent .All the dwellings get direct success from street. The front yard acting as transitional zone between the street and the dwelling, separates the streets from the houses with high boundary walls and raised plinth.



Figure 11: Front yard as transitional space (Source: Primary Survey)

5.2.2. Built mass and Streetscape



Figure 12: Repetitive form and size of the units (Source: Primary Survey)

The locality has more of residential building use (98%) and mixed use buildings (2%).The units form straight linear pattern of arrangement, with repetitive form and size. Low rise built mass gives a feeling of openness where the dwellings face the park. Whereas, it creates enclosed street spaces formed by the

rows of houses on either side of the street .The changing roof line due to varying building height, projected balconies in some dwelling units, provide individual identity to each unit. The building height varies from single storey (G) to four storeys (G+3). Figure 13 shows the building height plan and its percentage.

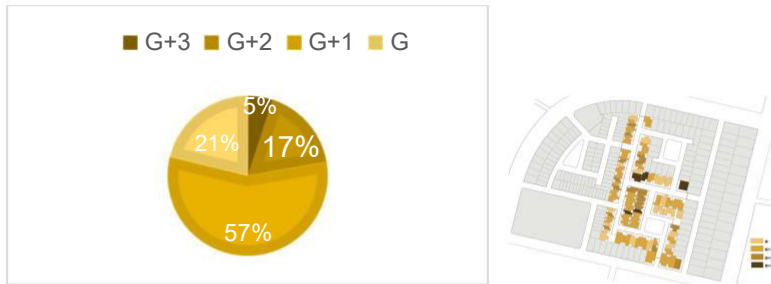


Figure 13: Varying building heights of the dwelling units (Source: Primary Survey)



Figure 14: Street with varying facade treatments of the houses, act as cluster spaces, formed by built structures on its either side (Source: Primary Survey)

The dwellings facing the park, increasing the distance between the houses, giving a feeling of openness and visual pleasure. Different wall cladding on some of the houses give personalisation and individuality to the dwelling unit. Figure 14 shows the various materials on the facades of the houses.

5.2.3. Organisation of movement

The hierarchy of streets convey vehicular movement and diverges the thorough movement on the streets. The entrance to the community is gated from all the sides, except one side .There is no immediate turn while entering the community so it provides continuous flow of movement. Entrance gate is 5m wide which allows two cars to pass simultaneously. Table 3 shows the street measurements. The community is guarded by the security guard from 11p.m. at night till 5a.m. in the morning .There is easy accessibility to the houses from all the roads. All the streets are connected to the tertiary roads, forming thoroughfare movement of vehicles. Long length of the streets accelerate the speed of vehicles but dwellings on either side of the street reduces the speed of vehicles .The streets 6m wide have 3m clear movement of vehicles where 1.5m is pathway occupied by cars owned by the residents.

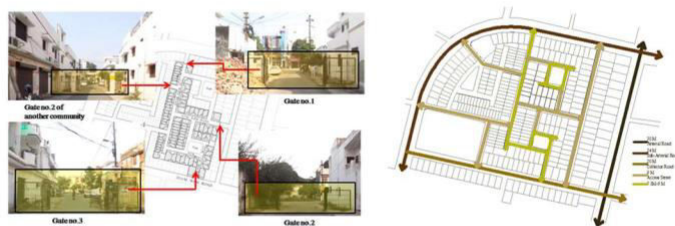


Figure 15: Accessibility to the community and hierarchy of road (Source: Primary survey)

Table 3: Street Measurements (Source: Primary Survey)

	Length (m)	Area (sq.m.)	(%) of total plot area (16817.66 sq.m.)
Streets	500m	3949.40	23.48%

Streets form a thoroughfare movement. On- street parking reduces the walk ability on the pathways, which arises the need of pedestrians to walk on the street .Walking on the streets do not make the pedestrians feel safe on the streets due to continuous fast moving vehicles throughout the day. Conflict

between the pedestrian movement and vehicular movement occurs usually at the junctions in the evening time which reduces the ease of movement of pedestrians. Parking occurs in private frontyard and on streets.

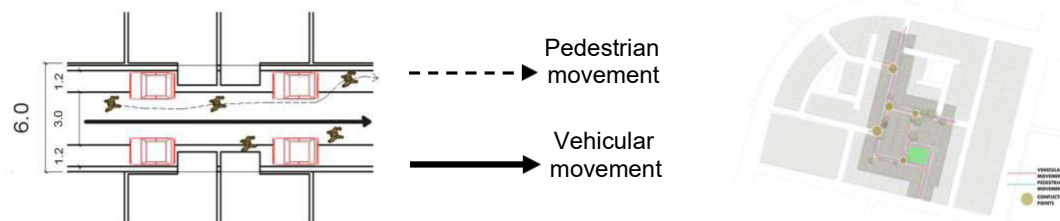


Figure 16: Pedestrian and vehicular movement on the street (Source: Primary Survey)

Parking occurring on the streets reduces the utilization of the street spaces by the pedestrians. People living in face to face dwellings want their children to play in front of their houses to keep a watch on them. But, children living there are not able to use the pathway or street to play due to the vehicles parked on the sidewalks and continuous movement of vehicles on this road makes it unsafe for children to play.



Figure 17: On-Street parking (Source: Primary Survey)

5.2.4. Mass and Space

The built-open space structure explains the spatial organisation of the built structure, hierarchy of spaces changing from public to semi- public and private spaces and hierarchy of streets. The built is 42% and open space in 58% It shows the linear arrangement of the houses, face to face dwelling units forming street as a cluster space. The gradation of spaces can be seen- street spaces (public), personalised sidewalks (semi-public) and front yards and backyards (private).

5.2.5. Spatial Enclosure

The space between the buildings creates a feeling of safety and security as well as personalised and defensible spaces. It depends upon the degree of enclosure- strong, partial, or little sense of enclosure .Entering the community, a partial enclosure is formed of 1:0.75, with paths leading to other spaces

.The dwellings located facing the park increase the spaciousness. The space is well defined by the linear building edges and low boundary wall of the park, relating to human scale .When moving towards face to face dwelling street spaces, a tight enclosure is formed by the built structure and the street width.

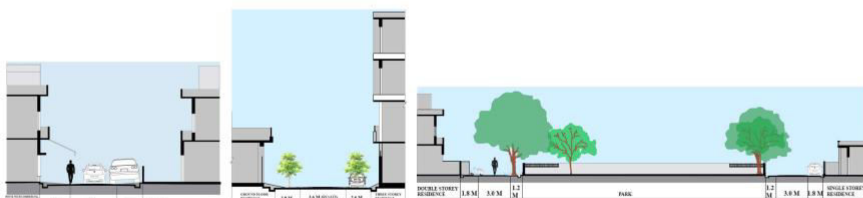


Figure 18: Enclosed street spaces between dwellings facing the park and facing each other (Source: Primary Survey)

5.3. Case Study 2: Sahara States, Jankipuram, Lucknow

Sahara States is one of the newly developed neighbourhoods in Jankipuram in the year 2006. It consists of eight type of dwelling units, having different names. The locality has around 1770 dwelling units of eight different types which vary in plot sizes. It consists of independent houses and three storey flats. Figure 19 shows the location map of Sahara States in Lucknow. It is accessible from 24m wide road. It is bounded from all the sides and is surrounded from all the other sides by the dwellings of other colony. Figure 20 shows the site plan of Sahara States. The residents are of High Income Group, Medium Income Group as well as Low Income Group, who belong various caste and religion. Facilities of parks, club and welfare centre, school, shopping complex, maintenance staff, 24x7 security system is provided.



Figure 19: Location map of Sahara State, Jankipuram, Lucknow (Image Source: Google Earth, Delineated the areas chosen for study)

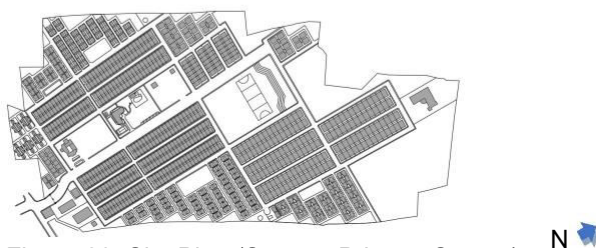


Figure 20: Site Plan (Source: Primary Survey)

The residential units cover 35.35% of the site area whereas the open spaces cover 65.27% of the area and other amenities cover 3.61% of the site area. Streets share 28% of the total area of the site which shows the streets cover the major part of the open spaces on the site. Figure 20 shows the building use plan and Table 4 shows the land allocation chart of the area.



Figure 21: Building use Plan (Source: Primary Survey)

Table 4: Land Allocation of Sahara States (Source: Primary Survey)

No.	Title	Area (sq.m.)	(%) of Site area
1.	Site Area	344,711.23	100%

2.	Type-A: Independent Units	80,244.20	23.29%
	Type-1 (Yaman)	(29,640)	(8.6%)
	Type-2 (Bahar)	(45,140)	(13.10%)
	Type-3 (Exclusive Bahar)	(5,464.20)	(1.59%)
	Type-B: Flats	27,720	8.04%
	Type-1 (Malhar)	(9,300)	(2.70%)
	Type-2 (New Malhar)	(7,560)	(2.19%)
	Type-3 (Gandhar)	(3,080)	(0.90%)
	Type-4 (Deepak)	(5,980)	(1.73%)
	Type-5 (Vrindavani)	(1,800)	(0.52%)
	Total		35.35%
3.	Community open space	41,490	12.04%
	playgrounds	(40,770)	(11.83%)
	club and welfare centre	(720)	(0.21%)
4.	School	9670.63	2.80%
5.	Commercial (Shopping Complex)	2,068.27	0.60%
6.	Other Spaces	86,970.64	25.23%
7.	Streets	95,519.14	28.00%

5.3.1. Spatial Organisation

The apartment clusters are arranged in staggered form creating positive open spaces to interact. The independent units form linear straight rows, creating linear building edges, reducing the activity in the surroundings. All the clusters of the dwelling units follow a grid pattern where linear organisation of units form well organised planning structure of the neighbourhood. The dwellings face the playground, welfare club and the school increasing the distance between the dwellings and reducing the interactions between the dwellers of those units. Whereas, the dwellings facing each other form streets as cluster spaces to walk, play and perform other social activities.

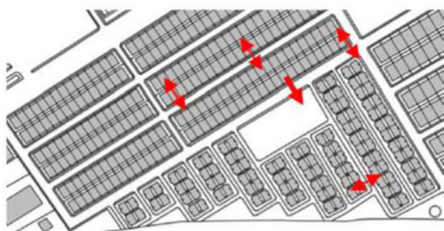


Figure 22: Arrangement of dwelling units with respect to each other (Source: Primary Survey)

In independent houses, units are arranged adjacent to each other, bounded by two units on its longitudinal sides. Private front open spaces act as transition spaces and promote interaction. Figure 22 shows the formation of linear rows of the independent houses and the dwelling units of apartments. The units in apartments are arranged in a cluster of four units on each floor which are two storey high, arranged in rows. They form staggered clusters, maintaining social interaction as well as privacy of units. Group territoriality can be seen on the streets in face to face dwellings whereas, it lacks in cluster formed by the apartments as the people on the first and second floors are attached less to the street spaces. The independent houses have frontyards and backyards. All the dwellings get direct access from the street. The frontyards act as transition spaces between the houses and the streets. The shorter side of the plots face the streets, reducing the street utilization, therefore, long linear rows of the houses direct access from the street.



Independent dwellings get direct access from the streets

Figure 23: Frontyard acting as transition spaces and houses getting direct access from the street (Source: Primary Survey)



Access to the dwellings



Transition spaces between the dwellings of apartments and the street, providing direct access to the dwellings as well as from the narrow lanes



Figure 24: Arrangement of dwelling units with respect to street (Source: Primary Survey)

Figure 23 and 24 shows the transition spaces and arrangement of the dwellings of the apartments. In case of apartments, few people, according to their needs, have provision for direct access from the street whereas dwellings of few apartments get access from of 3m wide lane between the buildings. The frontyards act as transition spaces, separating the private from the public spaces.

5.3.2. Built mass and Streetscape

The area is characterised by residential, mixed and commercial, institutional public utility, showing diversity in building use; with different heights creating visual comfort in the surroundings. In case of independent houses, projecting balconies, different heights of the units, variations in the height and materials of the boundary walls, different roof structures, gives individual identity to the houses. More number of blocks in a row creates a monotonous feel while walking along the streets. The green spaces around the clusters, personalised as per the needs, and other elements like jalies, grills, glasses on the facades brings differentiation to apartment units.



Figure 25: The personalized areas of the dwellings create identity of the houses (Source: Primary Survey)

Figure 26 shows the building height plan of Sahara States which depicts that most of the independent houses are single storey structure and vary upto three storey. Whereas, the apartments are G+2

structures. Face to face dwellings create partial enclosures whereas the dwellings facing the amenities on the main road form weak enclosures. The apartments create strong enclosures.



Figure 26: Varying building heights and façade treatments give individuality to the houses (Source: Primary Survey)

Different materials of wall claddings, plantations on the boundary walls, signage's in the shopping complex creates complexity and gives identity to every unit.

5.3.3. Organisation of Movement

Accessibility means ease of access from streets to houses and convenience of public transport. The hierarchy of streets can be seen very clearly here. The main road acts as a trunk from where branches diverge. This hierarchy helps in conveying vehicular movement easily with no chaos on the streets thus maintaining streets safe for children to play or walk. There is only one entry to the society thus restricting thoroughfare in the area which can be seen in Indira Nagar. There is an immediate turn while entering the society which restricts continuous flow of movement. All the houses are easily accessible from the roads. All the streets are well connected at their ends forming continuous loops throughout.

On street parking is dominant feature in this society as the dwellings were not proposed with parking spaces. which reduces pedestrianisation on the streets. Parking on 12 m wide street does not create that much chaos as on the street spaces formed by the apartments on either side of the streets 3- 4.5 m wide. Less or no conflict between the pedestrian and the vehicular movement on the street can be seen here. Streets are safe to walk on.



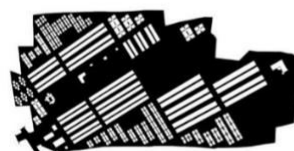
Figure 28: On street parking in front of individual houses (Source: Primary Survey)

5.3.4. Mass and Space

The built-open space structure here shows more open spaces, hierarchy of streets, transition of public and private spaces.



■ Built 38.61%
□ Open 61.39%



■ Built 38.61%
□ Open 61.39%

Figure 29: Figure ground analysis Source: Primary Survey)

5.3.5. Spatial Enclosure

The enclosed building spaces creates a feeling of safety, security, closeness, defensible spaces and sense of community. The enclosure changes from weak enclosures while entering the society, to partial enclosure while walking through the streets of individual areas, to strong enclosures and in cluster of

apartments and face to face dwellings of individual units. Figure 3.49, 3.50 and 3.51 shows the enclosing spaces between the dwellings and the streets.

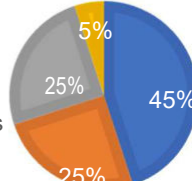
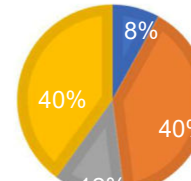
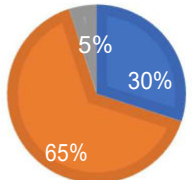
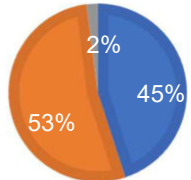
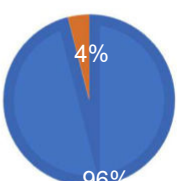
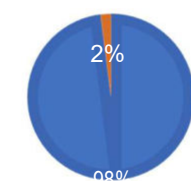


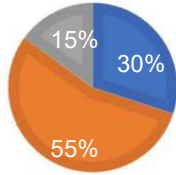
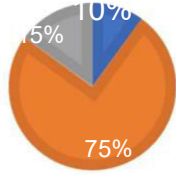
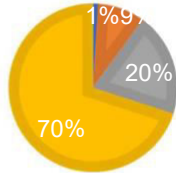
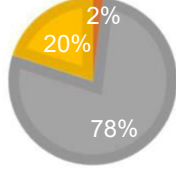
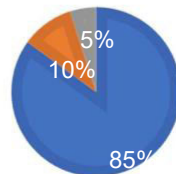
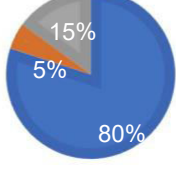
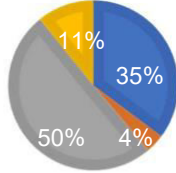
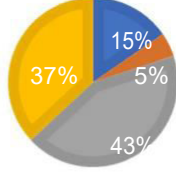
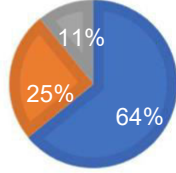
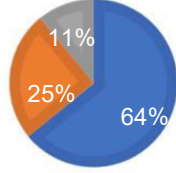
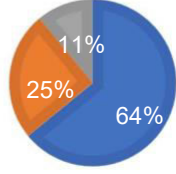
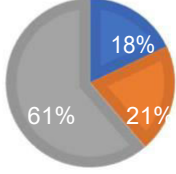
Figure 30: Various street enclosures between the apartments and the independent houses (Source: Primary Survey)

6. Results

6.1. Post Occupancy Validity Survey

Table 5. Post Occupancy results (Source: Primary Survey)

Indira Nagar	Sahara States
<p> ■ Gate to Gate ■ Through Common ■ Boundary Walls Through Balconies ■ On Street </p>  <p>Interaction with neighbours</p>	<p> ■ Gate to Gate ■ Through Common ■ Boundary Walls Through Balconies ■ On Street </p> 
<p> ■ Two Wheeler ■ Four Wheeler ■ None </p>  <p>Vehicle ownership</p>	<p> ■ Two Wheeler ■ Four Wheeler ■ None </p> 
<p> ■ Formal Shops ■ Informal Shops ■ None </p>  <p>Space for generating economic activities</p>	<p> ■ Formal Shops ■ Informal Shops ■ None </p> 

<p> ■ Community Hall ■ Park ■ Street </p> 	<p> ■ Community Hall ■ Park ■ Street </p> 
Space for generating economic activities	
<p> ■ Morning ■ Afternoon ■ Evening ■ Night </p> 	<p> ■ Morning ■ Afternoon ■ Evening ■ Night </p> 
When accidents occur	
<p> ■ 10 per year ■ 25 per year ■ None </p> 	<p> ■ 10 per year ■ 25 per year ■ None </p> 
Number of accidents occurring	
<p> ■ Morning ■ Afternoon ■ Evening ■ Night </p> 	<p> ■ Morning ■ Afternoon ■ Evening ■ Night </p> 
Preferable time for coming out	
<p> ■ Less vehicles ■ Weather ■ Social group </p> 	<p> ■ Less vehicles ■ Weather ■ Social group </p> 
Why you prefer this time for coming out	
<p> ■ Upto Boundary wall ■ Upto Side walk ■ Upto Streets </p> 	<p> ■ Upto Boundary wall ■ Upto Side walk ■ Upto Streets </p> 
Area belongs to you	

6.1.1. Post Occupancy Validity inferences

The interactions among the people of Indira Nagar is majorly through the balconies and are limited to their boundary walls whereas these interaction among the people were more on the streets and parks of Sahara States. Which shows that streets are more utilized for activities and interactions in Sahara States than in Indira Nagar (Figure 1 and 2).

Car ownership in Sahara states is more than in Indira Nagar, which require more parking space. The residents although needed separate parking spaces for people having more than one car as the sidewalks are utilized by the cars instead of walking (Figure3 and 4).

Majorly the shopping complex and restaurants create economic activities in both the areas and these spaces act as meeting point for people and make the areas active throughout the day. Residential land use is getting converted to mixed use. This shows that there should be diversity of building use (Figure 5 and 6).

Spaces for community activities majorly used in both the areas are the parks. It is due the lack of community hall in Indira Nagar and in Sahara States parks are so well developed that people like to use these spaces more than any other space (Figure 7 and 8).

Most of the accidents in Indira Nagar takes place during night due to heavy vehicular movement with high speed. The colony has entry from all sides so the vehicle move to and fro and make the environment unsafe (Figure 9 and 10).

Streets of Sahara States are more safe and secure than that of Indira nagar as number of accidents taken place in the former one are less as compared to Indira Nagar and 24hours security is available in Sahara whereas security for only night hours is available in the Indira nagar (Figure 11 and 12).

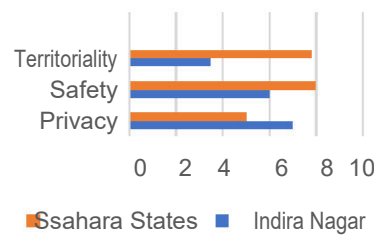
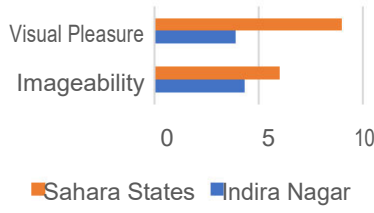
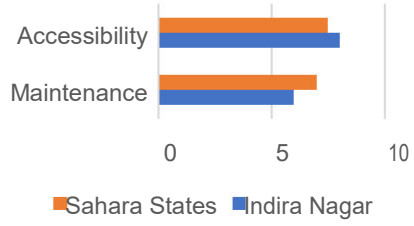
People in Indira Nagar preferred to come out of the house in the evening hours due to climatic comfort. The 11% people prefer night time as they return from their work place and are at home by that time. Whereas in Sahara States, the people preferred evening and night hours more due to climatic comfort, their groups formed in the society and less vehicular movement (Figure 13.14.15 and 16).

Sense of cluster among the residents of Indira Nagar was less as compared to that of Sahara States as former ones were limited to the boundary walls of their houses and whereas the residents of Sahara States had a sense of belongingness and group territoriality as they used street spaces and had a sense that this area belongs to them.

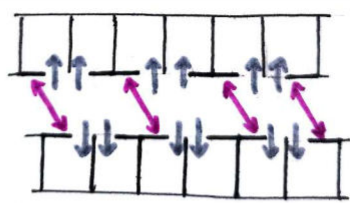
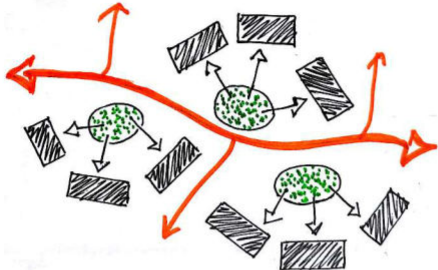
6.1.2. Post Occupancy Validity Findings

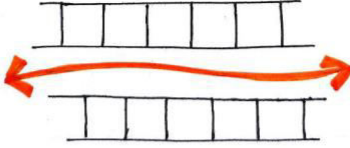
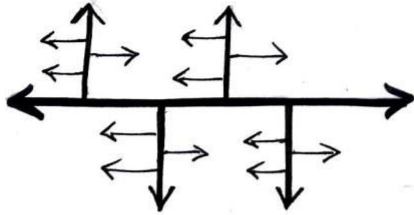

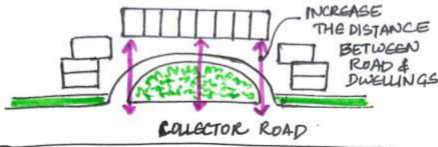

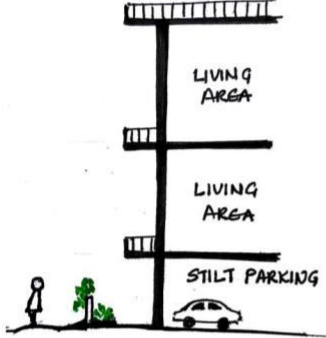
Table 4.3 Post Occupancy findings (Source: Primary Survey)

S.No	Requirements	Inferences	Comparative chart

1.	Psychological needs	The residents of area of Sahara States feel more safe, and privacy is well maintained through plantation and jalis. Though, low boundary walls here reduces the privacy of the residents. Whereas in Indira nagar, the area lacks in group territoriality, less safer streets and more privacy.	 <table><caption>Psychological Needs Comparison</caption><thead><tr><th>Category</th><th>Sahara States</th><th>Indira Nagar</th></tr></thead><tbody><tr><td>Territoriality</td><td>7</td><td>4</td></tr><tr><td>Safety</td><td>7</td><td>5</td></tr><tr><td>Privacy</td><td>5</td><td>6</td></tr></tbody></table>	Category	Sahara States	Indira Nagar	Territoriality	7	4	Safety	7	5	Privacy	5	6
Category	Sahara States	Indira Nagar													
Territoriality	7	4													
Safety	7	5													
Privacy	5	6													
2.	Perceptual needs	Both the settlements have good imageability but can be seen more in Sahara States due to variation in housing types, organization of the dwellings. Whereas in Indira Nagar it is less due to repetitive form and shape of the housings. Visually comfortable paces in Sahara States as compared to Indira nagar.	 <table><caption>Perceptual Needs Comparison</caption><thead><tr><th>Category</th><th>Sahara States</th><th>Indira Nagar</th></tr></thead><tbody><tr><td>Visual Pleasure</td><td>8</td><td>4</td></tr><tr><td>Imageability</td><td>6</td><td>4</td></tr></tbody></table>	Category	Sahara States	Indira Nagar	Visual Pleasure	8	4	Imageability	6	4			
Category	Sahara States	Indira Nagar													
Visual Pleasure	8	4													
Imageability	6	4													
3.	Physical needs	Both the areas are easily accessible and well maintained. Sense of belonging can be seen more in Sahara States so they are maintained more.	 <table><caption>Physical Needs Comparison</caption><thead><tr><th>Category</th><th>Sahara States</th><th>Indira Nagar</th></tr></thead><tbody><tr><td>Accessibility</td><td>7</td><td>7</td></tr><tr><td>Maintenance</td><td>6</td><td>5</td></tr></tbody></table>	Category	Sahara States	Indira Nagar	Accessibility	7	7	Maintenance	6	5			
Category	Sahara States	Indira Nagar													
Accessibility	7	7													
Maintenance	6	5													

6.2. Recommendations

 <p>The arrangement of dwellings should be such that streets acts as cluster spaces, forming the rows. The dwellings do not face each other directly so that privacy is achieved.</p>	 <p>Multiple clusters with 10-15 dwellings should be provided.</p>
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 <p>Linear rows with narrow frontage should be formed to utilise the street length.</p>	 <p>Hierarchy of streets should be provided to control the flow of vehicular movement to ensure safety and privacy in the neighbourhood.</p>
 <p>Frequent turns should be given to reduce the speed of vehicles in residential areas.</p>	<p>Loop street network should be provided to avoid accidents and maintain the flow of vehicles. Dead end patterns create group territoriality over the street spaces enhancing the sense of belonging and sense of attachment.</p>
 <p>Location of houses on the main road reduces the privacy so there can be an option to provide access street parallel to main road, separated by landscaping, to increase privacy and act as social spaces.</p>	 <p>Locating the rows perpendicular to the collector road should be considered as only end units are exposed to the main road which increases the privacy of the dwellers.</p>
<p>Basement parking under the park for social activities in the lawn or community halls should be given to reduce on street parking.</p>	 <p>Still floor should be given in the dwellings to provide parking in the houses and reduce on street parking.</p>
<p>The basic facilities to be given should be equally accessible to all the residents so facilities should be located at equal distances from the dwellings and such that it is accessible to the residents as well as to the outsiders.</p>	<p>Street furnitures and acycling track should be given on the outer periphery of th playgrounds so that small children can play as well as cycle safely.</p>

7. CONCLUSION

The research conducted aimed to identify aspects of residential planning and to what extent it affects the people's choice and expectations to make a socially active street in residential environments. After the detailed analysis, results and findings, it can be seen that physical and spatial attributes of the streets influence the social needs of the people in residential planning. To improve the quality of residential areas, there is a need to understand the needs of the people that make them live in that area and how they are interrelated to the physical and spatial aspects of designing the neighbourhood.

The spatial analysis of the cases and post occupancy survey shows the interrelationship between the basic requirements of people to live in the society and the design parameters of the residential environment. The spatial organization of the dwellings affect the privacy, safety, and group territoriality which influence the social interactions among the people. Safety on the streets and easy access to the houses is controlled by the circulation network forms on the streets. The built mass brings visual comfort and permeability on the streets, gives identity to the dwellings. The enclosure between the buildings and the streets formed gives the feeling of community, safety, visual comfort to the eyes.

The street spaces in the residential neighbourhood can be socially active only when the basic requirements of people to live there is fulfilled. The results indicated that the current scenario does not fulfil the social needs of the people, making inactive street spaces. The urban planners, government must work together for planning effort to be put into this matter to improve the quality of the built environment.

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