USERS' PERCEPTION OF SELECTED DESIGN ELEMENTS IN A MULTI- FAMILY APARTMENT BUILDING IN VISKHAPATNAM, INDIA

BY

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ABSTRACT

A post occupancy evaluation method was employed to investigate users' perception of, and satisfaction with, the common circulation spaces and the narrow open-to-the sky spaces between adjacent flats in a multi-family apartment complex, the Navdeep Apartments in Visakhapatnam, India, for which the researcher served as a designer. The intent of the research was to study the user responses to selected design elements.

The study has the following broad objectives:

1. To understand the users' responses to the open-to-the sky spaces between adjacent flats.
2. To evaluate the acceptability of the well-ventilated common circulation spaces which have living room windows opening into them with regard to thermal comfort and to privacy.
3. To explore the residents' use of the living rooms adjoining the common circulation spaces as well as the use of the spaces between the flats.
4. To investigate whether residents living at different floor levels and distances from the main staircase and elevator display different responses to issues 1,2 and 3 above.

The study assessed the behavioral impacts these design elements had on residents and compared them to the assumptions of the designer. Structured interviews and observations of the behavior of the residents were conducted during a four-week period in late 2001/ early 2002. The author hopes that the findings of this thesis may help architects understand the preferences and

behavioral responses of residents to particular physical features in their residential environment and thereby strengthen the programming/ design process for future projects.

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INTRODUCTION

Housing makes up a major share of the construction industry worldwide and responds to one of the most basic human needs, that of shelter. The forms of shelter have undergone tremendous change in their construction techniques, levels of comfort, and permanence, since the most rudimentary forms used by our ancestors in the prehistoric times. The changing form of society also changed the scale of human settlements relative to size, complexity, and location. Settlements in many parts of the world are changing from rural to urban areas. This transformation has been accelerated by the industrial revolution, which itself has been subjected to unprecedented acceleration in the twentieth century. Many people have moved from living in traditional houses, often in rural settings, to living in urban centers.

This shift has set a challenging proposition for developers of apartment housing and, for that matter any building type. In the race for constructing more buildings, many builders tend to do one project after another, trying to maximize the profit without much care and knowledge of the quality of the environment that they create. Under these circumstances, it is the architect's responsibility to create satisfactory environments for all. But, is the architect as a designer prepared to deal with the vital issues of shaping adequate environments in a world of rapid change and ever-growing complexity? Do designers know enough about human nature to be able to predict and make sound assumptions of what their needs will be in the future? Answers to these

questions will enable the designers to project and design for long-range goals and build strategies for directing future environments.

The physical environment has an immense influence not only on human health but, also on their behavior. It has been seen time and again that the physical environment can contribute to dissatisfaction with life and social unrest due to sensory deprivation, lack of privacy, and frustrations. Today, there is a lack of coherence and meaning in the social life, the environment conditions and the individual. Architecture, therefore, bears responsibility in providing a frame that may be conducive to the creation of new activities and stronger community ties. Therefore, investigations into these areas are necessary in order to get a better understanding of how people respond to their physical environment.

It is appalling to note that architects today often do not know the people for whom they are designing, neither do they know the users' needs. They have few ways to determine the needs of their anonymous clients and often design on the basis of information from a third party, or based on their guess about the future users' and their past experiences (Zeisel, 75, pg 15).

On the other hand historically, in the distant past when individual families built their own houses, they relied on a developed heritage, their current needs and available technologies, to determine what they built. Later on, the local builder built houses for the neighbors. In such cases, builder could design for the needs of the users because, coming from the same community and culture, the builder understood the living habits and social requirements of the users. Besides, the form, design, and relationship to nearby houses were often dictated by tradition (Zeisel, 75, pg 15). Still later,

architects came into the picture. They were asked to build individual homes for people they initially did not know. This meant dealing, on most occasions, with one client who paid for, criticized, and eventually lived in the building. The architect would negotiate with the client, ask what was wanted, interpret and analyze the information based on past experiences in similar circumstances, discuss objectives and finally reach with a design solution. In these cases communication problems were less critical because, the architect was from the same stratum of society as the clients hence, the dialogue was easy and based on common experiences and shared assumptions (Zeisel, 75, pg 15, 16). In all these situations, design would be a success in terms of the users' behavior.

But still later on, with the advent of Industrial Revolution, large buildings like apartment buildings, schools, factories, dormitories, and hospitals were constructed to house large masses of people. In these cases, it was difficult for the architect to have a rapport with the users' and hence, understand their specific needs. The architect would be familiar only in a general sense with the social group of people who will eventually use the buildings. Moreover, the architect now had to deal with not one, but two different clients at the same time: the client who pays for the built environment and the client who would actually use the built environment (Zeisel, 75, pg 16). In most cases, the architect always had predominant, if not all the discussions, with the paying client alone, be it an individual, a corporation, or a government agency. On the one hand, the client very seldom had a knowledge of the users' needs, while on the other hand, the architect might come from or acquire the design in a social and cultural setting quite different from that of the users and hence,

not understand intuitively the users needs. In the end, most decisions would be based on constraints of resources and time, rather than on the needs of future users. A gap would be formed in between the architect and the users. This gap, illustrated in figure 1, between the architect and the users of the building ultimately causes the failure of the building in terms of the residents' behavior towards the physical environment (Zeisel, 75, pg 16).

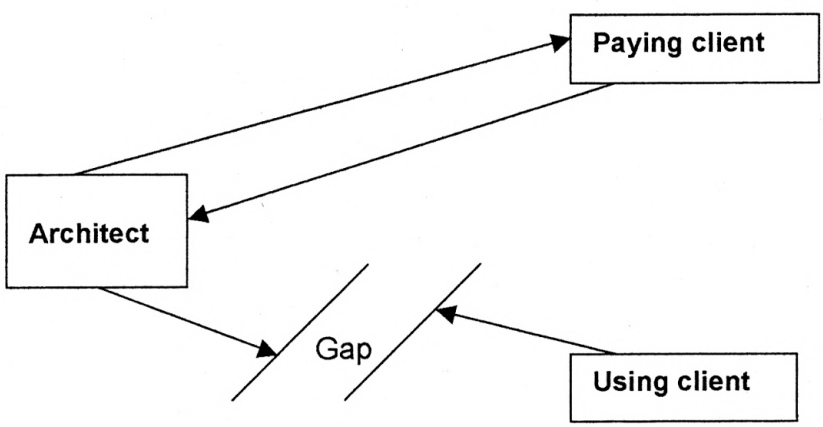


Figure 1 Relationship between architect, client and the user
Source Zeisel, J. *Sociology and Architectural Design*

Architects try to bridge this gap by designing based on principles of functional design, which Zeisel explains, is "limited to manifest function- the conscious reason behind an activity or a place- and fails to take into account more subtle latent functions" (Zeisel, 75, pg 16). Zeisel illustrates that an architect might design a small kitchen as a way to discourage groups of people relaxing together in the kitchen. Similarly, the architect might design steps in front of the school entrance so that several students can get into the building at the same time, but cannot stop the students from using it for other

purposes like talking, playing, having food, and so on. Further, Zeisel illustrates this notion by an example where an architect might invariably design the entry leading into the living room based on his/ her idea of a living room being the place to entertain guests, to relax and to play with children. On the contrary, some users' may feel that the living room entry is an invasion of privacy- because they might want to use the living room for a sacred purpose or only for some special guests, and use some other portion of the house for relaxing and to play with children. Thus Zeisel says, architects in most cases are unable to intuit the latent functional needs of a group with which they are unfamiliar with, or are inadequately trained to understand such needs. Hence, architects tend to impose their ideas on the users (Zeisel, 75, pg 16).

The crucial criteria for a successful physical environment is for designers to understand enough about users to be able to predict and make sound assumptions of their needs. In order to do that, one not only has to understand the physical, cultural, and social environment in context (because these shape the human attitude and behavior), but also to have a fair knowledge of the more subtle underlying functions of the users. Investigations into these parameters need to inform the design process.

Existing dwelling environments in use provide the best simulation models to understand the complex needs of strangers for whom the physical environment is built. Too little use is being made of these invaluable sources of information. Usually, the designers, who were involved in the programming, design, and construction phase, terminate the services in all respects once the building is constructed and ready for occupying. There is no practice of systematically

evaluating or monitoring the final product. Hence, there is no opportunity for the architect to learn whether or not the residents accept the final design. In architecture today, evaluation is the missing link in the design process.

Zeisel says, the design process should include five clinically repeated steps as shown in the design cycle in figure 2 (Zeisel, 75, pg 19).

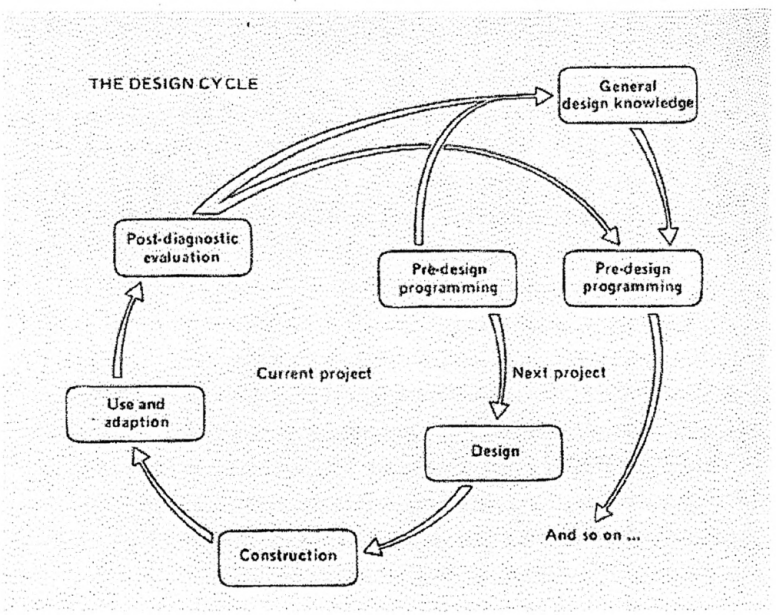


Figure 2 The design cycle
Source Zeisel, J. *Sociology and Architectural Design*

The five steps in an ideal design cycle are,

1. *Programming:* Identifying design objectives, constraints and criteria
2. *Design:* Making design decisions which satisfy criteria.
3. *Construction:* Building the project and modifying plans under changing constraints.
4. *Use:* Moving in and adapting the environment.

5. *Evaluation:* Investigating the final product in terms of the designer's original objectives and the actual use. The results found should ideally be used for future design criteria.

Ideally, if each individual were able to manipulate his/ her own environment according to one's personal needs and desires, then that would lead to the most desired designs by the residents. Analyzing user groups which will inhabit the eventual buildings, and also analyzing existing environments would be useful in leading to programming of new designs. Therefore, post occupancy evaluation (POE) is required to understand the variables of human behavior which when applied to new designs could indicate desirable or indifferent aspects of the design.

Criteria and standards for the design of new environments should be based upon the evaluation of existing ones. However, the crucial point in every evaluation will be the problem of what to look for, the question of what are the things that matter and concern the users. An environment evaluation with regard to the users should be administered in such a way as to detect priorities, the degree of satisfaction, the levels of performance of various features and the degree of importance of certain features of the environment over others. In other words, a good POE is required to assess the physical environment in relation to the human behavior.

Researcher's Experiences

As an architect who practiced in India for nearly 4 years, I have noticed a change in the design of apartment buildings. Not long ago, apartments served only as a source of providing alternate housing for the growing population. However, with the growing demands of the people and competition from others, architects and builders focused on providing better facilities including good ventilation, comfortable room dimensions, privacy to the occupants and outdoor spaces for interaction. But, as mentioned earlier, most architects have not made a practice of visiting their projects after completion and user occupation- at least not in a systematic way. In many cases it would so happen that the architect alone, and in some cases along with the builder, would complete a design assuming a particular kind of response from the future residents. Therefore, a physical environment would be created with expectations for a specific kind of usage and behavioral response from the users while in reality the response could be contradictory to what has been assumed.

The intent of this study is to do a POE of a multi-family apartment building and to discover if the users responded to the selected design elements, the way the architect had anticipated. This would be done by assessing the quality of the physical environment and its impact on the behavioral issues of concern by looking at how residents use, perceive, and feel about their physical setting. This study focuses on the effectiveness of selected design elements from the users' point of view and relies primarily on case study conducted on a specific environmental type: that of a multifamily apartment building in the Indian cultural context. The measurement of the

users' point of view would suggest the degree of acceptance, rejection, or indifference towards the spaces that would be investigated.

BACKGROUND

Shelter is a fundamental human need. It is a form of protection from the hazardous elements of nature, a means through which to express individual and cultural values, and a way to produce, consume and accumulate capital. It has undergone several transformations through the ages. Historically, the principle of intuitive and experience-based design decisions in accordance with a slowly evolving building technology have served as satisfactory tools in the process of creating the physical environment. But in this world of rapid change, outsiders like governmental or other institutional support now meet many social and psychological needs that used to be met by arrangements within a society, such as the family and community. As a result, there seems to be no cohesive understanding of social needs, ranging from basic shelter to providing sensitive environment design, between the users and those who provide the physical environment (Preiser, Vischer, White, 1991, pg 1).

In the 1960s and '70s, social movements, environmental crisis, and the apparent failure of technology to solve human/environmental problems caused people to challenge basic values concerning our environment. Research efforts mounted to improve the quality of built environments (Heffron, 1982). These developments precipitated action to correct apparent failures in the built environment, namely through the systematic study of environment/ behavior relationships. New directions emerged in the fields of environmental design, architecture, and planning. In response to failures of 'universal architecture' as propagated by Bauhaus movement, theorists encouraged differentiation, not uniformity, in designing the built environment.

To be effective in responding to social problems, such differentiation had to go beyond architectural style and to recognize that there are different building users, each with special requirements concerning the built environment. Further, time also has become a critical factor in the success of a place in terms of social change, as needs of different user groups and subcultures change with time. The complex and lengthy building delivery process means that buildings planned for specific uses may become nonfunctional by the time they are completed and put to use. Design research was needed to define the relationship between architecture and social change. Identification of problems in the built environment and qualitative assessments of users' needs are typical of current research (Preiser, Vischer, White, 1991, pg 2).

Sociologists have long studied how the physical environment relates to human beings. But, until recently, not much study has been done in the sociology of the built environment. When social research was applied to decision-making about physical environment, architectural problems were often overlooked, working instead at a larger scale on planning problems. The trends are now changing with several social scientists trying to bridge the gap between social research and architectural design.

The client's immediacy and close contact with the designer and builder, who were very well acquainted with context, situation and parameters of their task, helped in making appropriate choices in design decisions. However, the situation has drastically changed over time. With more design variables and competition in the building industry now, new approaches to design are needed. This is not to discard the merits of intuitive design, but its limitations can be compensated (Zeisel, 1975, pg 3).

Process-centered rather than product-oriented design concepts are needed in the present day context. Amos Rapoport defines process-centered design as the way in which the environment in question is created, while product-orientation describes what the environment is—its nature, qualities, and attributes. Product-oriented design includes specific models, plan forms, presence of specific formal qualities, use of specific materials, effectiveness in response to climate, efficiency in use of resources, complexity due to variations over time. The characteristic features of process-centered design are intentions of designers, reliance on a model with variations, congruence of the choice model with ideals of users, degree of congruence between environment, tradition and culture (Rapoport, 1976). This means that a post occupancy evaluation study is required and this will be discussed further in the next part of this study.

Post Occupancy Evaluation

An important part of process oriented design concepts is the post occupancy evaluation (POE). POE is a method that assesses buildings systematically and rigorously after they are occupied to find out the user response. It is a practical activity concerned mainly with the performance of existing environments in use. Its aim is primarily that of providing information, which can be applied to improve unsatisfactory environments.

POE is recognized and valued as a process that can improve and help explain, the performance of the built environment. During the past 25 years it has emerged as a distinct area of research, scholarly activity, and application. Work in the field has rapidly expanded and it now encompasses significant activity beyond that found in the standard environment- behavior literature (Prieser, 89, pg 9).

POE evaluation has progressed through three distinct periods over the past quarter century. These periods could be classified as those in which POE became successively 'useful', 'usable', and 'used'. POE, first found to be a useful area of research, was later found to have benefits for not only users and owners of buildings, but also for architects designing similar buildings.

Systematic processes and research methods to conduct building evaluations were then developed, which were reliable, replicable, and could be used by other evaluations. It evolved from basic to applied research and thus was accessible to use by a larger audience. The benefits of POE became valued. The POE process became widely known, and it became widely used. It has become a commercially accepted and valued enterprise, though basic and applied research continues (Prieser, 89, pg 9,10).

There are several different models developed over the last 25 years. The POE process model developed by Preiser, Rabinowitz, and White (1988), is one such mode. The good thing about this model is that it can be applied to any type or scale of building. It has been developed over a period of five years and reflects the author's cumulative experience in having conducted numerous POEs', both in the academic realm and as commercial architectural research consultants (Preiser, Rabinowitz, and White, 1988).

Zimring states that "the quality of POE research can be assessed based on two general categories: utility and validity. These are interrelated but separable (Zimring, 1988, p.276)". In order to conduct POEs' effectively and to increase their quality, researchers explored various methods and strategies. For example, White (1989) studied concerns, questions, problems, and opportunities of POEs' from the client's point of view. Since serving the client is becoming more important in POE, White believed that the planning of POE should not only satisfy professional criteria such as reliability and integrity, but also should be sensitive to the client's personal, organizational and political context.

However, theory, conceptual frameworks, tradition, culture, and general philosophical perspectives are also important for evaluators interested in using information to plan and design new satisfactory environments. As Canter and Kenny (1982) have noted, an empirical work is a function of the theoretical formulations on which it is based:

> Unless there is an understanding of the role that the physical environment plays in people's lives it is extremely difficult to know which aspects of that environment to measure and how to argue for the significance of any relationships which are found between the environment and human actions or experience." (p.147)

Prieser suggests a performance-based framework for systematic POEs'. The concept proposes that POEs' should be built into design and construction programs from the beginning as an integral part of the building delivery process (Prieser, 1989, pg. 1). The performance concept is based on the assumption that a building is designed and built to support, and enhance, the activities and goals of its occupants. It relates client goals and performance criteria to the actual, objectively and subjectively measurable building performance (Prieser, 1989, pg. 2).

Prieser explains, that the elements of performance that are measured, evaluated, and used in POEs include three major categories, namely, technical, functional, and behavioral. He says, that there are other categories like location and economics that affect the owners, but are of less important then the above mentioned three categories (Prieser, 1989, pg. 2). For the purposes of this study only two categories, functional and behavioral, would be investigated.

Further, based on the depth and breadth of the investigation, Prieser characterizes POEs into three levels as follows:

1. Indicative. Major strengths and weaknesses of a particular building's performance are found. Involves walk- through and selected interviews.
2. Investigative. Goes into more depth whereby objective evaluation criteria are explicitly stated.
3. Diagnostic. Utilizes sophisticated measurement techniques to correlate physical environmental measures with subjective occupant response

measures, and hence provides a higher degree of credibility for the results (Prieser, 1989, pg. 5).

In this research the investigative level of POE would be employed. To summarize, designing a building to meet the performance requirements, and then comparing the actual performance of the building with that of the initially stated one in the building program, is the basis of the performance concept used in POEs, which also is the intent of this study.

Resident Satisfaction

Throughout their entire life people need a place to live. In choosing the appropriate residence, they make two joint choices: a choice of a certain type of housing and a choice of a certain residential environment. The two choices are based on several characteristics like size, quality, price, and tenure. The choice made by a particular household depends on needs or preferences and is restricted by income (Aragones, Francescao, and Garling, 2002, pg., 35).

People basically perceive housing as a means of satisfying their needs. Some needs are closely linked with survival, such as protection against weather conditions. There are many other physiological, social, and psychological needs that people look for in a house to call it a home. (Aragones, Francescao, and Garling, 2002, pg., 62). Aragones explains, that the psychological distinctions between house and home is that while the house is a physical place, home is the unique subjective perception that individuals have of a house as a result of their interaction with it (Aragones, Francescao, and Garling, 2002, pg., 163). A dwelling becomes home when inhabitants imprint on it a meaning, content, familiarity, and order creating a living space with which they identify.

To study the factors that make people feel at home in the place where they live is a complex task that should be of interest not only to those responsible for designing spaces--architects, planners, town planners--but also to those who study the interaction between individuals and their sociophysical space. The three basic elements that come into play in this discussion are individuals, their residential environments, and the satisfaction or dissatisfaction derived as a result of the interaction between the first two.

The following figure shows the relation between these elements (Aragones, Francescao, and Garling, 2002, pg., 81).

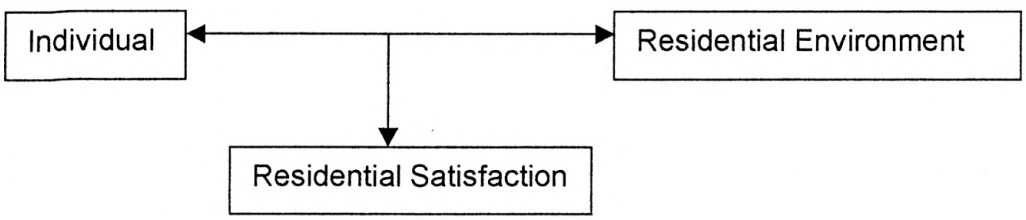


Figure 3. Relation between architect, resident and residential environment
Source Aragones, Francescao, and Garling, T. *Residential Environments: Choice, Satisfaction, and Behavior*

Designing for people who have a different socio-cultural status from that of the designer poses a big challenge. Residents' perceptions of the residential environment vary with their social status. The problem is that planners and architects often do not take these variations into account and hence the designs fail. One of the best examples of such a failure is the Pruitt-Igoe development in St. Louis. This development was awarded a prize for public housing design; and yet, twenty years later, it was declared uninhabitable and was demolished (Aragones, Francescao, and Garling, 2002, pg., 84). Reasons for the failure included residential dissatisfaction caused due to, amongst others, vandalizing behavior, which was caused by lack of social control over the space promoted by the design of the building. What then is *residents' satisfaction*?

Residential satisfaction, defined from the attitudinal perspective, is the subject's attitude toward his or her residential environment. Rosenberg and Hovland (1960) say that the different components of attitude are affective, and

cognitive. Based on one of these components, authors have given varying definitions of *resident's satisfaction*. But, all the definitions lead in the same direction: the concept of attitude. Considering residential satisfaction as an affective result, an emotional response or a positive consequence results from making comparisons between ideal residential environment and the subject's actual situation (Aragones, Francescao, and Garling, 2002, pg., 86).

Maria Amerigo proposes that residential satisfaction is a function of the pleasure derived from encounters with the dwelling, the neighborhood, and the neighbors. In her view, satisfaction is the outcome of a cognitive process entailing comparisons of the current condition with some ideal or aspiration level (Aragones, Francescao, and Garling, 2002, pg., 9).

Weidemann and Anderson (1985) offer a definition of residential satisfaction in purely affective terms: "It is in this way that we conceive of residents' satisfaction with where they live. It is the emotional response to the dwelling, the positive or negative feeling that the occupants have for where they live. As such, it is a global representation of the affective response of people to the social-physical environment in which they live" (p.56) (Aragones, Francescao, and Garling, 2002, pg., 24).

Many researchers have tried to measure satisfaction by means of scales or by using a single item that asks subjects directly their degree of residential satisfaction on one of its components- neighborhood, house, or neighbors. Aragones says, these measures explain only small percentages of the variance in satisfaction (between 30 percent and 50 percent), that indicates how difficult it is to measure this construct. Thus, the commonly used method of asking individuals directly how satisfied they are with a given

situation does not seem as the appropriate method. Several cognitive factors modulate the subjects' responses to such measures, making them tend to be positive (Aragones, Francescao, and Garling, 2002, pg., 93). It is important to consider certain psychological aspects to understand the residents' satisfaction levels. Field surveys of existing environments should be conducted to observe the behavior of the residents', which the residents' might not record in their minds and hence, not record. Users' perception of residential environment can be very different from those of the architect's because residential satisfaction is a very subjective term that can be governed by very different indicators, depending on one's sociocultural and economic status (Aragones, Francescao, and Garling, 2002, pg., 96).

This study focuses primarily on the concept of resident satisfaction defined as an evaluation criterion. A well- known conceptual definition of satisfaction is offered by Canter and Rees, who interpret satisfaction as a reflection of "the degree to which [people] feel [the residential environment] is helping them to achieve their goals" (p. 185) (Aragones, Francescao, and Garling, 2002, pg., 23). The nature and meaning of the concept of satisfaction has been given several different definitions. For instance, Canter and Rees interpret residential satisfaction as a reflection of "the degree to which (the inhabitants) feel (that their housing) is helping them to achieve their goals (Canter and Rees, 1982, p.185).

Here residential satisfaction has been defined as an index of answers to the following questions.

- How satisfied are you with living here?
- How long would you prefer to live in this multi-family housing?

- If you move again, would you like to live in another place like this?
- Would you recommend this building to one of your friends if they were looking for an apartment to live?

Resident satisfaction stresses the point of view of the inhabitants themselves. Resident satisfaction can be observed in spontaneous settlements, where the occupants make purposeful changes to the physical environment through a series of choices among the alternatives available. Spontaneous settlements have a design quality that often remarkably responds to the traditional, cultural and aesthetic needs of the inhabitants and hence, are more successful and acceptable to the residents than professionally designed environments. User designed or modified places often communicate meaning more effectively in terms of identity, and appropriate behavior. To design support environments one needs to know the relevant group, describe and analyze its important characteristics, and understand how these interact with the various elements of the built environment (Patton, 1988).

One of the important aspects of this study would be to perceive and analyze the several ways in which the residents may have altered the designed environment to suit their socio- cultural and other personal needs. Resident satisfaction would be analyzed on an overall perspective consisting of physical comfort, privacy level and social interaction.

Privacy and Social Interaction

Altman has conceptualized privacy as a bridge between personal space, territoriality, and other realms of social behavior. He says, privacy is conceived as an interpersonal boundary process by which a person or group regulates interaction with others (Altman 1975, p.10). Privacy can be divided into two types, desired privacy and achieved privacy. Desired privacy tells how much or how little interaction is desired at some moment in time in a given physical environment. Achieved privacy is the actual amount of interaction that exists in the environment. According to Altman an optimum level of privacy exists if desired privacy equals achieved privacy (Altman 1975, p.27). Privacy involves various social units like the individual, families, mixed or heterogeneous sex groups and so on. The desired privacy level for each unit varies in the same physical environment. Likewise, different cultural groups exhibit different levels of privacy. Privacy factors differ from one socio-economic group to another. Based on the criteria and context, authors have given different definitions for privacy. The definition of privacy that is going to be followed in this study is the one given by Altman, which is "the selective control of access to the self or to ones group" (Altman 1975, p. 18).

Every dwelling unit has its own level of importance, which offers the opportunity for comfort, privacy, retreat and so on. Places can either be shared or private. Shared places are kind of social places where one can meet and interact with others while private places are spaces for the individuals alone (Jay & Min, 1978). In the private place, people are shielded from others intrusions, from there sound, sight and presence. Thus the three levels of privacy are acoustical, visual and physical privacy. As mentioned

earlier, the privacy levels differ in different cultures and religions. At the same time in any culture and religion the various social groups desire different privacy levels.

Privacy in the Indian Cultural Context

In the Indian culture, due to its diverse population, there are groups of people from different religious background and social settings. In general, in all the groups the privacy factor is high compared to the western societies. The privacy levels are also gender based. Males usually tolerate less privacy, but the females of all age groups need more privacy than their male counterparts. Traditionally, there has been a 'purdah' system where the women partly cover their faces with a mask when in public spaces. However, this system is followed mostly in rural areas and is near non-existent in the urban areas due to the increasing change towards a western lifestyle.

The need for privacy changes from one building type to another. In a multi-family apartment complex, which is the type considered for the study, dealing with the issues of privacy and social interaction can be very complex. Privacy can be divided into 2 broad categories. One, inside each individual apartment unit within the family members based on the relationship with one room to another, while the second category would be in between the residents of the building complex based on the relationship of different units, and the common circulation spaces.

As mentioned earlier, the privacy level is gender based; the women in India are associated with private spaces and men with public spaces. If a stranger has to be entertained, the male would preferably do it. Women are

mostly housewives and have their own closed circle for social interaction. In the evenings after the children come back from school the mothers would accompany them to the playgrounds or to the corridors and tot lot areas at the ground level of apartment buildings, where they get opportunities for interaction. The teenagers too enjoy very little privacy. Normally, they have a small group of friends with whom they spend time. When teenage girls tend to meet indoors. On the other hand, male teenagers have the liberty to meet outdoors too.

Within the family the children are usually more open with their mother, than father. Interaction amongst family members takes place during lunch and dining hours because culturally the Indian families have their meals together. Most of the interaction occurs in the living room. The living room is a multifunctional community use room where everyday family activities take place. It is a room where the family gathers and receives guest. Even meals are sometimes taken in the living room while watching television or chatting with other members of the family.

Indian Social Structure and Traditional House

Over the ages, the Indian social structure and cultural patterns have been known for its unity in diversity. In India, as in most developing countries, the advancement of technology had a tremendous effect on the life style of the people. The industrial revolution has brought people from the rural to the urban centers. People whose primary occupation was agriculture now shifted to the urban centers for higher wages and better opportunities. The life style had to change to deal with the several needs of living in an urban society. The family structure and lifestyle in the urban areas is different from that of the rural areas, there being more number of nuclear families in urban areas. But, traditionally, the Indian society as a whole has functioned as an extended family, within its various caste diversions. People of similar castes often resided in close proximity of each other (Shah 1994), but now, its very different with people from all castes and religious background staying together.

India traditionally has had a joint family structure, where the entire family including all the blood relations would stay under one roof. But, that has changed drastically in the more urban apartment unit where only the parents and the children stay together.

The social fabric has been very well incorporated into the Indian traditional architecture. Traditional architecture has been a reflection of its people, culture, and traditional values which made living more enjoyable. The rural houses still exhibit some of the traditional design qualities. Regarding the traditional house, Ellahi says, "The main features of traditional house design include lack of theoretical or aesthetic pretensions; working with the site and

the micro- climate; and respect for other houses and folks in the neighborhood (Ellahi, 1999)". But most contemporary designers in India rely mainly on modernization and in the process, defy regional and cultural values.
In contemporary housing, the forms and designs are borrowed from alien places and transplanted with total insensitivity towards social, cultural, climatic and other needs of a place, resulting in the appearance of buildings that are unrelated with the native environment (Ellahi, 1999).

Traditional architecture has been a direct result of physical, climatic and socio-cultural aspects. The central courtyard around which all the other rooms were designed played a very crucial role both socio-culturally and climatically (Figure 4). It was a place full of privacy within the realm of the house where many activities took place. All the other rooms in the house looked into this space making it an optimal place for family interaction. Further, in traditional housing, the central courtyard and the verandah--a porch running around in front of the house--kept the interiors cool in summer. The verandah spaces provide an extension to the rooms and make an enjoyable and useful transitory space between indoors and outdoors. It is hypothesized in this study that the common circulation spaces, investigated in the research, create similar spatial experiences and also help in social interaction.

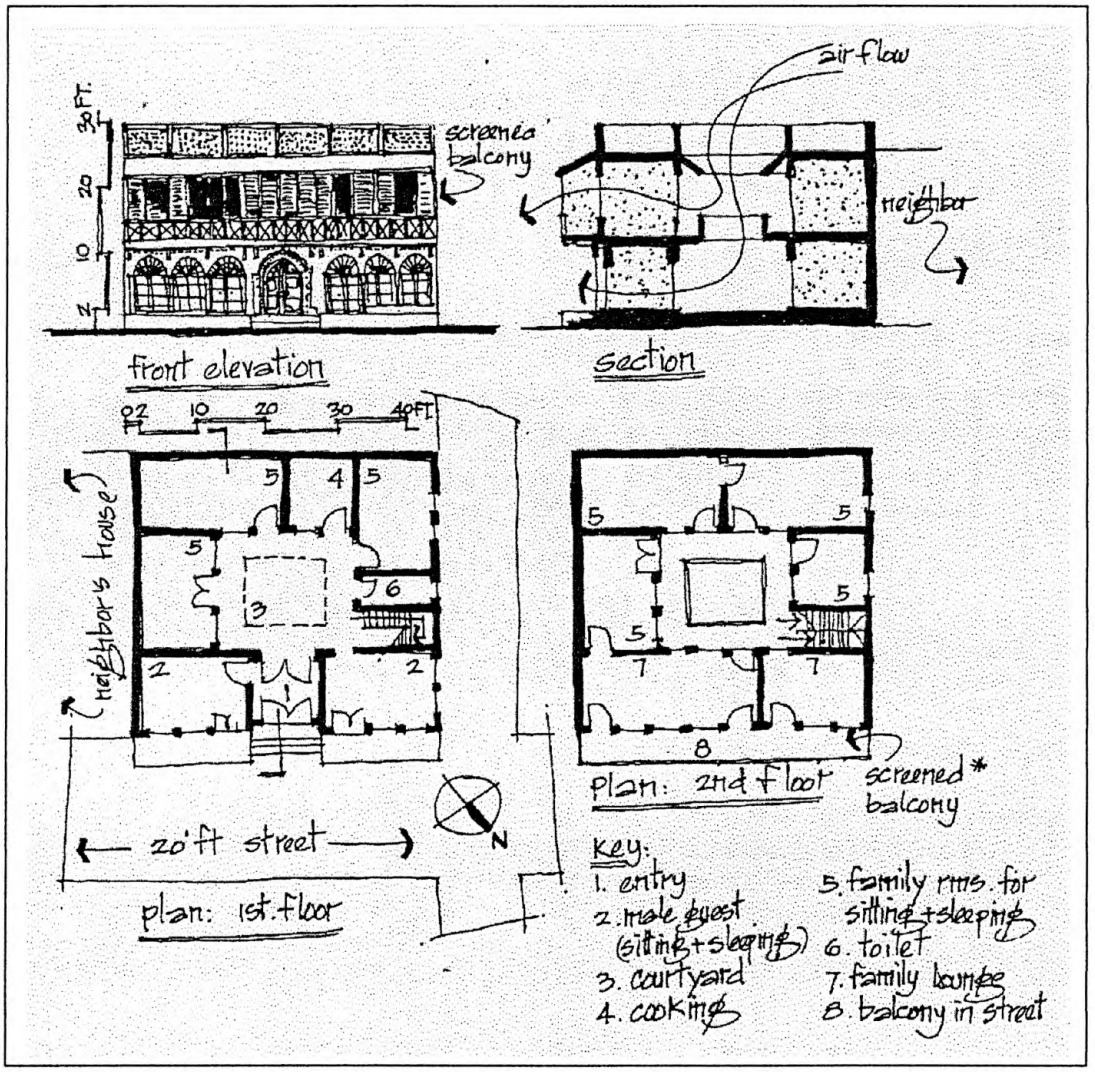


Figure 4 Traditional Indian house
Source Ellahi, M. *Contemporary House Design: A Lesson From Lahori Traditional Architecture.*

The above image (Figure 4) shows the plans, section, and an elevation of a typical Indian traditional house. The open-to-the-sky space in the center of the house, not only permits outdoor activities within the realm of the house, but also creates a low pressure one that sucks the wind movement into the space, thereby causing cross ventilation.

Exterior walls were either shared or faced narrow alleyways. Doing this reduced the exposure to inclement weather conditions, and the alleyways also acted as wind tunnels, as shown in the figure 8. It is anticipated, that the open-to-the-sky space between adjacent flats, would functionally and aesthetically resemble the alleyways, from certain locations in the building, of a traditional dwelling community.

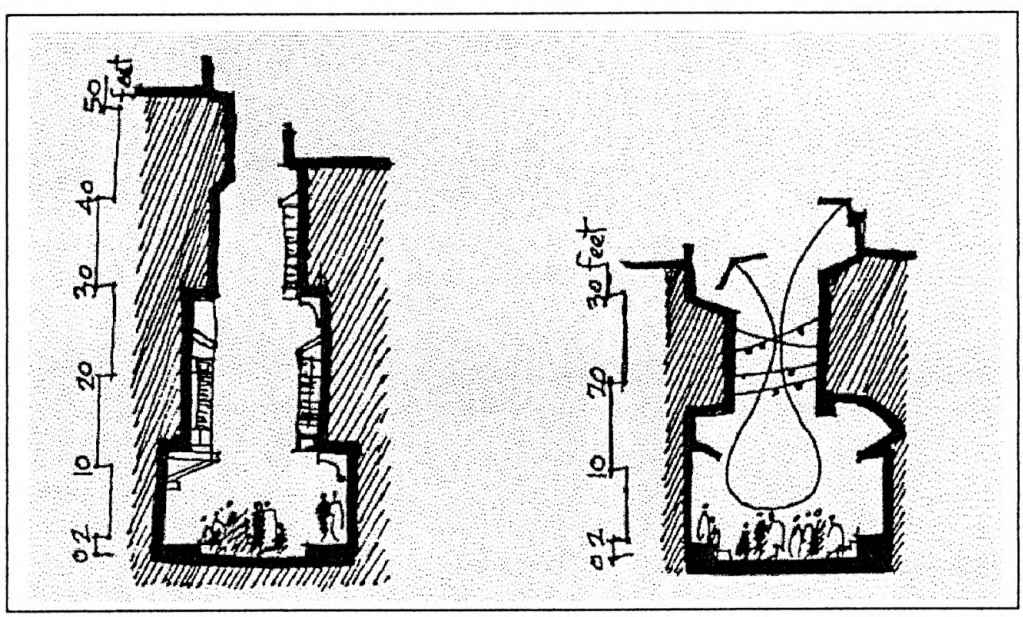


Figure 5 Traditional streets with overhanging balconies
Source Ellahi, M. *Contemporary House Design: A Lesson From Lahori Traditional Architecture.*

The modern apartment designers do not try to incorporate the traditional design qualities. The changes in the modem apartment are a result of residents trying to live a modern way of life. Socializing with the family and friends generally occur indoors. The extent of separation between residents and guests is reduced. Most of the socializing amongst family members and with guests occurs in the living room, which would require a larger space and more flexible furniture layout. The isolated kitchen in a traditional house has

moved inside and become an integral part of the apartment tucked in the rear or side of the house crowded with storage cabinets, refrigerator and other kitchen appliances (Ellahi, 1999).

Ellahi writes that there is nothing wrong in modernization, but it is the total negligence to the relationship between architecture, traditional value, and the climatic considerations that cause a problem. Forms and designs borrowed from foreign environments and transplanted with total disregard towards social, cultural, and climatic needs of a place result in failed environments (Ellahi, 1999). Apartment housing in India suffers from such practice.

Apartment housing originated in the west is a good solution to the housing requirements in India too. In the west, due to the severe temperatures, the culture and easily affordable mechanical ventilation systems, interiors are totally enclosed. However, in the Indian context, it is necessary to make innovations in the design to suit the cultural, climatic, traditional and economic conditions of the region. Indian families are traditionally known to live in a community setting, and carry out many day-to-day activities outdoors, where the climatic conditions permit. Charles Correa one of the pioneers of modern architecture in India says that in a tropical country like India at least three quarters of the essential activities, cooking, sleeping and entertaining, can take place in open-to-the-sky space, the private courtyard, for seventy percent of the year (Frampton, pg. 11, 1999). But, on the contrary, in the process of merely copying western style, designers avoid the climatic approach to design and build closed units. Moreover, mechanical systems of energy are very expensive and many

middle-income groups of people cannot afford air-conditioning and other artificial means of ventilation. But, these design considerations have been totally ignored in most apartment designs today and end up in total failures. In the design of Navdeep Apartments, which is the focus of this study, the good virtues of a traditional house have been incorporated. In this study the author does a post occupancy evaluation to see if the users of the Navdeep Apartments are satisfied with the incorporated design elements that reflect the traditional qualities of an Indian house.

APARTMENTS

The Industrial Revolution, which brought the rural population to the urban center, has also made it possible for different shelter forms. One such shelter form is the multi-storey, multi-family apartment building. They are residential building types that are essentially vertical developments (figure 6).

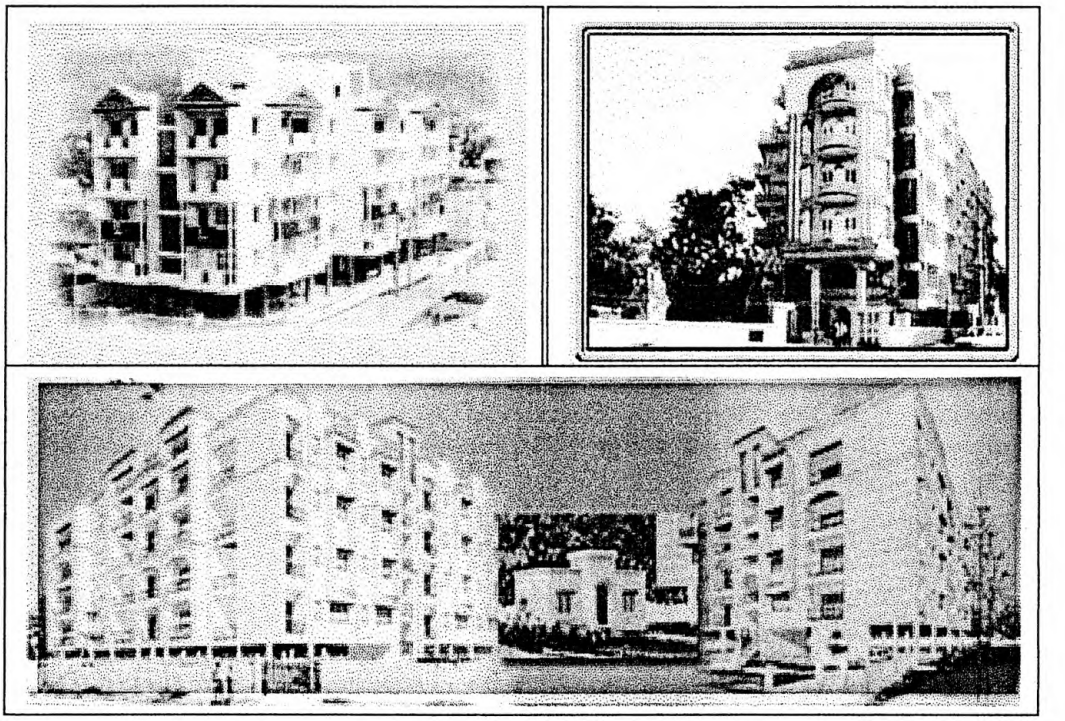


Figure 6 Views of some apartment buildings in Visakhapatnam
Source Vizagcityonline.com

They are primarily urban forms of shelters developed to provide more housing units in a given piece of land. Better economic opportunities have brought an influx of population from the rural to the urban regions and increased the need for high-rise condominium residential flats. Apartment housing was a solution, society had for housing huge population and the ever-

increasing land value. At present, they constitute a major share of housing stock in India. The increasing demand for more apartments has led to a competition amongst the developers leading to design innovations to stay alive in the market.

In India, and particularly in Visakhapatnam, where this study was based, apartments are build-up of ground plus five floors. The ground floor is always left open to accommodate the parking requirements. The watchman's cabin is also situated on this floor. A staircase and an elevator also start at this level and connect all the upper levels. The maximum height of the building is restricted to 18 meters due to fire safety regulations. There are several other building bylaws like the actual plinth area versus the common circulation areas, the open-to-the-sky spaces, the tot lots, and balcony areas (See Appendix C). These laws are set by the local corporation and are based on the permitted FSI (floor space index). However, the builders always make minor violations. The materials used for construction are reinforced cement concrete for columns, beams, and slabs. The exterior and interior partition walls are made of brick masonry, plastered with cement mortar and finished with paint.

Reasons for choosing Apartment Housing

Apartments can be divided according to the affordability of the people, like the higher income level, the middle-income level and the lower-income level. The main occupants of apartment housing are the middle-income group of people, who do not have enough resources to build an independent house. But, gradually, higher income groups of people are also shifting to apartment

dwelling. Some of the reasons for this shift could be lack of time, and also to avoid the several hassles involved in the construction of an independent house. Further, sharing a common dwelling place with a group people would not only give abundant opportunities for social interaction but, also a sense of security to the family members. Further, advantages of living at a height above the ground level like, better view of the surroundings, unobstructed ventilation, fresh air, and less noise disturbances, are some of the other reasons why apartment housing is gaining popularity amongst higher income group.

The increasing popularity of apartment housing has brought some changes in the design. A few decades ago, it was just considered as providing accommodation to the new population surge to cities. But with the change in time, users' and their needs, competition amongst developers, and advancement of technology, the design has undergone a radical change. The designers looked for more innovative, luxurious, and challenging designs, taking into consideration the needs of the residents, their behavior and well being.

Rooms in an Apartment Unit and their Purposes

The rooms in apartment housing have slightly different purposes then in an independent house. The living room in an apartment unit is a multifunctional community use room where many everyday family activities take place. It is the room where the family gathers and receives visitors. It is typically the most used room in the house. The entrance into the apartment unit leads into this room. This is also used for relax. At times meals are taken

here while watching television or chatting with the family members. It is typically the largest room in the apartment unit to accommodate the family and visitors. Most of the interaction within the family members and with outsiders happens in this room.

The bedroom essentially is a place of rest, away from noise, and public parts of the house. The bedrooms vary a great deal in use, depending on whose bedroom it is: the parents' bedroom or the children's. Typically, the parent's bedroom is the bigger in size then the childbed but is mostly unused except for sleeping purposes. On the other hand, from a functional viewpoint, the children's bedroom is a multifunctional room. It is used for study, listening to music or relaxing, entertain friends, and so on. It is basically a flat within a flat.

The kitchen is used in one of two ways. In some houses, it is purely functional room associated with cooking tasks; and in others it is also a room where the family eats if the room is large enough. Breakfast is normally eaten in the kitchen. The religious room that used to be a separate enclosed room in a traditional house is now housed in a corner of the kitchen.

Rooms Use Based on Familial Roles, Time, and Seasons

Members of the family unit make different use of the house according to gender and the time of day. There are clear differences in the use of the dwelling unit based on the person's role within the family. Normally, women are associated with private spaces and men with public spaces. The husband uses the living more than other members of the family, whereas the wife

divides her time mainly between the living room and the kitchen. The children use the living room and their bedroom with almost equal frequency.

Children carry out greatest number of different activities in the home, while the wife divides her time between household tasks and leisure. Husband's time, the little that he spends in the house, is almost exclusively devoted to leisure in the home. There is a difference in use on a normal weekday and on a holiday like a weekend or a summer/ winter vacation. On such days all the family members spend most of the time in the living.

Patterns of use depend on the time of the day. In the morning, there are two distinct periods, the first consisting of use by the family and the second of use by the woman alone. After working in the kitchen in the first half in the morning, the woman stays at home on her own through out the entire second half and does household cores in all the rooms or socializes with the neighbors. In the afternoon, the activities change, such as leisure and relaxation come to the fore. Leisure is sometimes in the home and sometimes outside it if the physical environment around suits. Evening and nighttime is for relaxing, and for the family members to get together. They get together in the living room to chat or to watch television.

Meal times have their own characteristics within the family household. Midday meals, on holidays, and evening meals are taken together while performing other activities like chatting, watching television, and gathering together with the family. Breakfast, on the other hand, is eaten alone and quickly in the kitchen or living, in contrast to the family gatherings at lunch and dinnertime in the dining or living room. Typically, mealtime is one of the occasions when the whole family gets together.

On weekends, residents' activities differ from weekdays. Children take part in household tasks. Most notable aspect of behavior on weekend is a relaxation of timetables. Everyone goes to bed late and wakes up late. The weekday routine gives way to leisure in and out of the house, and interaction within family and with neighbors increases.

Conventional apartment design versus the one under study

Shown below are the plans of two different apartment buildings in Visakhapatnam, India, where the research would be conducted. Here, as in most other parts of the country, the maximum height of the apartment buildings is six stories. If a building were higher than six floors or 18 meters then separate permission from the fire department and airport authorities would have to be taken. The apartments are built on a reinforced cement concrete frame with the super structure made with bricks and finished with cement plaster. The ground floor is usually on stilts and is used for parking facilities and a watchman's cabin. The local municipality inspects the construction and sees to it that all the building byelaws are followed.

The 2 Plans and Their Characteristic Features

Figure 7 shows the typical floor plan of a conventional apartment design in Visakhapatnam. It has four two-bedroom units occupied by a common circulation space, with the staircase on the west and the elevator located on the east. It has shared common walls in between adjacent flats with hardly any ventilation and light in the common circulation spaces. Each apartment has only one or at the most two external walls thereby reducing the

chances of cross ventilation. The common circulation spaces are narrow and dark and hence, not inviting the residents' to spend time and interact in the space. The only physical and visual access between the living room, the most public room in the apartment unit, and the common circulation space is the living room door, which is closed the entire time except for the brief moment when used for entry into the apartment unit. The units have a lot of privacy from the neighbors but do not create enough opportunities for interaction.

Figure 8, on the other hand, is the plan of the Navdeep Apartments, the building that would be studied in this research. It incorporates the design elements that are being explored in this thesis, namely, the open-to-the-sky spaces between adjacent flats, which means more external walls and an opportunity for cross ventilation. The wide and well ventilated common circulation spaces that provide good views of the cityscape and attract residents' to spend time in the space, thereby opening up avenues for social interaction. Further, the living rooms windows open into the common circulation spaces, which help in cross ventilation and also to provide a visual access between indoors and outdoors, again increasing chances for social interaction. The units have less privacy from the neighbors compared to the conventional design.

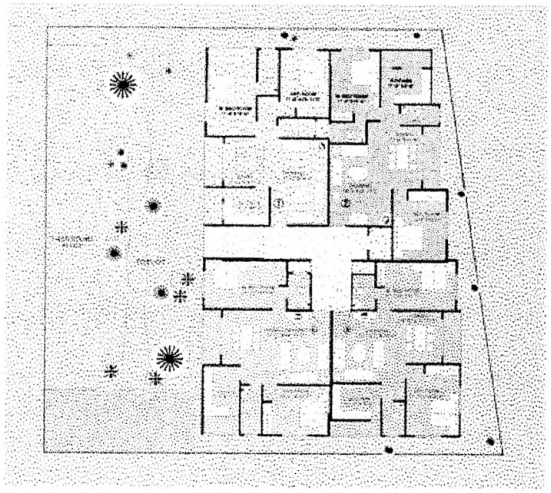


Figure 7 Plan- Conventional Design
Source Vizagcityonline.com

- No open-to-the sky spaces in between adjacent flats
- Less ventilation and natural light in the living rooms and common circulation spaces

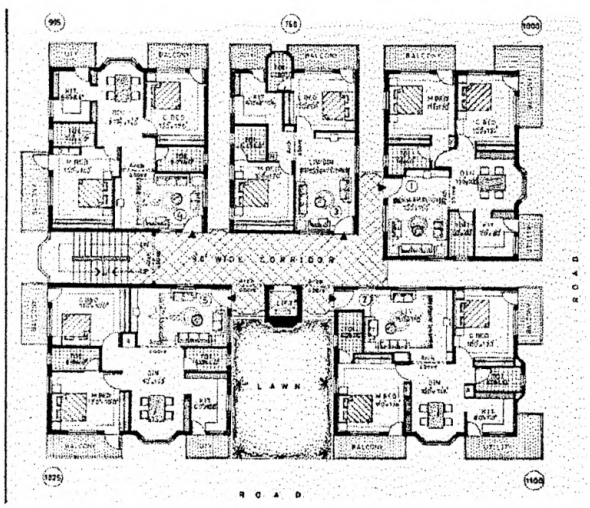


Figure 8 Plan- Navdeep Apartments
Source Author

- Incorporates the design elements that are being investigated in this research namely the open-to-sky spaces in between adjacent flats and the well ventilated, naturally lighted corridors.

Visakhapatnam

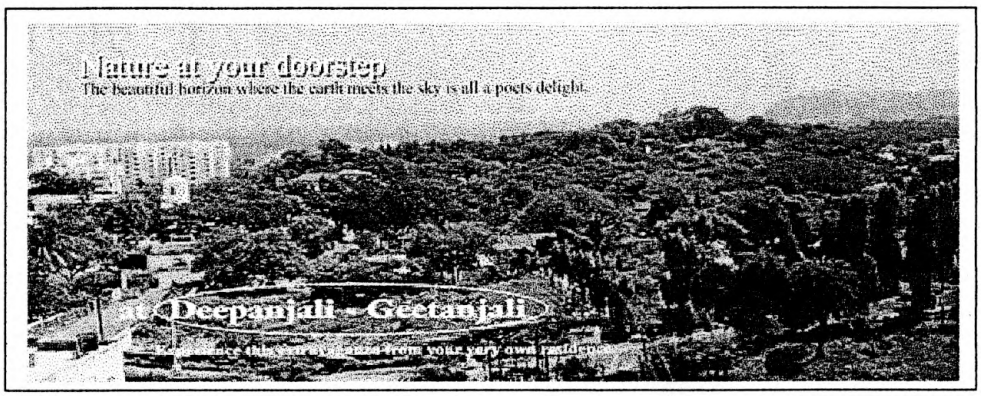


Figure 9 A view of the city. Apartments in the background and possible site for an upcoming apartment complex.
Source Vizagcityonline.com

The study was conducted in a city named Visakhapatnam. It is situated on the East Coast of India on 17 42' N latitude and 82 02' E longitude. It is the second major city in the state of Andhra Pradesh, India. Andhra Pradesh, one of the twenty-five states in the country, is situated on the southeast part of India, along the Bay of Bengal. Visakhapatnam, is one of the cities on the coast, and is the second largest and second most populated city in the state after Hyderabad, the capital city of Andhra Pradesh.

Named after the god of valor, Visakha, whose image was once installed here by a Hindu King in the 11th century A.D., the city presents a hybrid character today. Based on topographical conditions, it can be divided into four zones. They are hilly region, upland tracks, rolling plains and plains. Unlike the other cities in the state, the climatic conditions are not very extreme, but being situated on the seacoast the humidity level gets extremely high. The average mean temperature is around 93 F, but the scorching sun

get the temperatures above 100 F. The average annual rainfall is about 95 centimeters. But, in relatively short periods of time, monsoons can bring very heavy rains in the months of June through August. During this period the humidity gets very high.

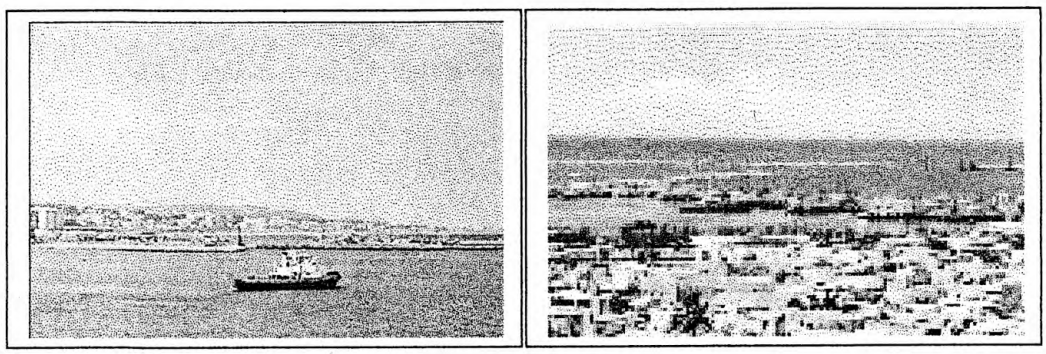


Figure 10 Inner and outer harbor
Source Vizagcityonline.com

Visakhapatnam is an old historic city with a population of roughly 2 million people. It is one of the fastest developing cities in India, and has a large potential for growth. The city has many industries and is one of the major tourists attracting cities in India. It is a very cosmopolitan, and is endowed with a variety of cultures. It was originally a small fishing village that developed into a major port city and has undergone rapid industrialization, which caused tremendous amount of migration of population from the surrounding rural areas.

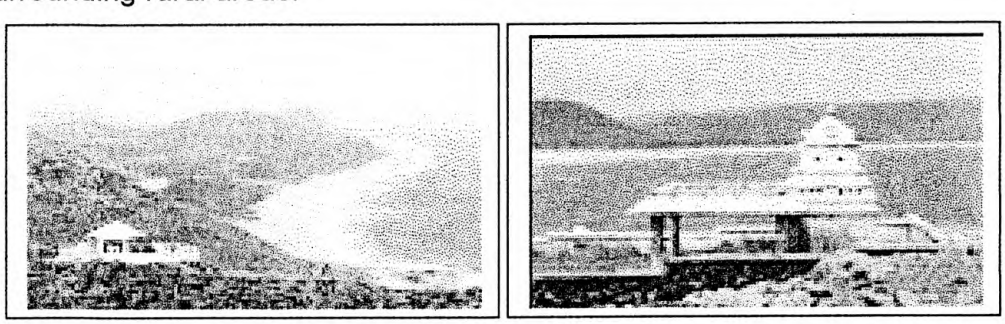


Figure 11 Scenic views of the city
Source Vizagcityonline.com

While its massive industrial conglomerates and a modern port, the finest in India, speak of its modernity and pace, its uncluttered beaches, fishing communities, and tiny villages inhabited by tribal people, transport one to times when the quality of life was measured by the number of festivals, and the unhurried days between one harvest and another.

Lower-income groups form the highest percentage of the city residents. The city boosts of an attractive amalgamation of ancient architecture with some very modern buildings.

RESEARCH METHODOLOGY

The intent of this thesis was to investigate users' perception of the selected design elements incorporated by the designer who in this case is the author himself. The design elements analyzed are the common circulation spaces, open-to–the-sky spaces between adjacent flats, and the living rooms, in a multi-family apartment complex, the Navdeep apartments in Visakhapatnam, India.

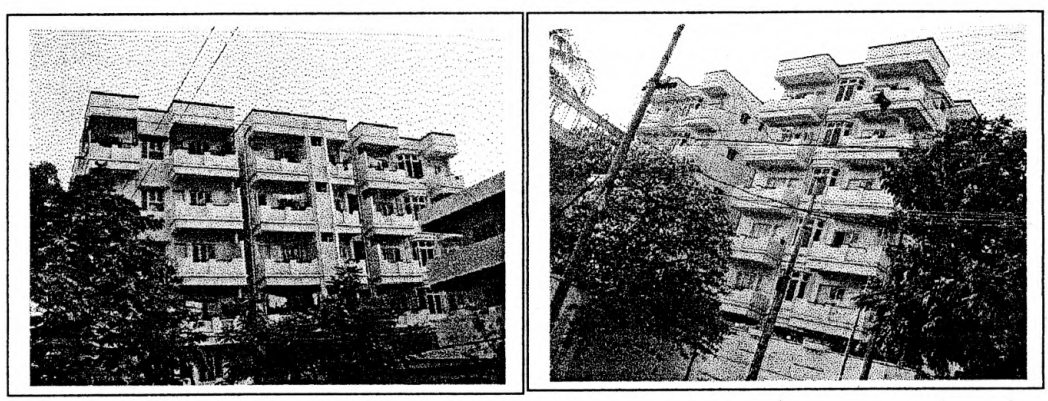


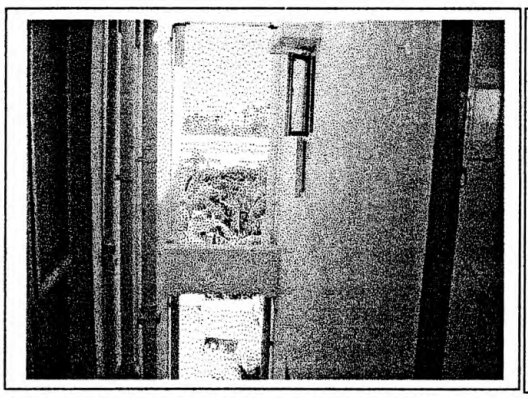
Figure 12 Exterior Views of the Navdeep Apartments
Source Author

Figure 15 (page 49) shows the typical floor plan of the Navdeep apartments. The design elements to be studied are indicated by arrows. As shown in the plan, which is identical on all the levels, there are five two-bedroom apartment units on each floor level, a total of 25 apartment units in the whole building. Based on the units' layout with respect to the two adjoining roads, each unit has different square feet of build-up area, indicated in the circle next to the flat in figure 15. Units facing the road are preferred by the buyers and hence the build up area of these units is typically more than the other units

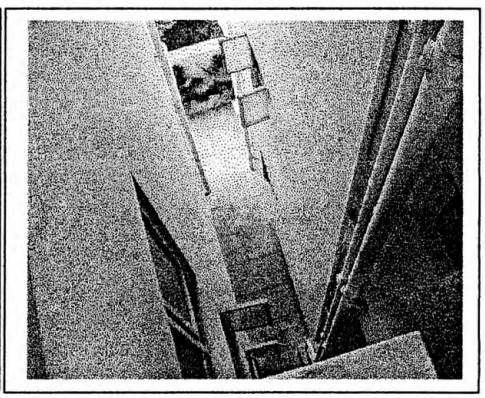
A post occupancy evaluation was conducted to study the following objectives:

1. To understand the users' response to the open-to-the sky spaces between flats. The residents were questioned whether these spaces served as sources of better ventilation, light and provide a sense of living in an independent house— as the designer has assumed, or whether these spaces diminish the residents' privacy level, thereby undesired by the users'.

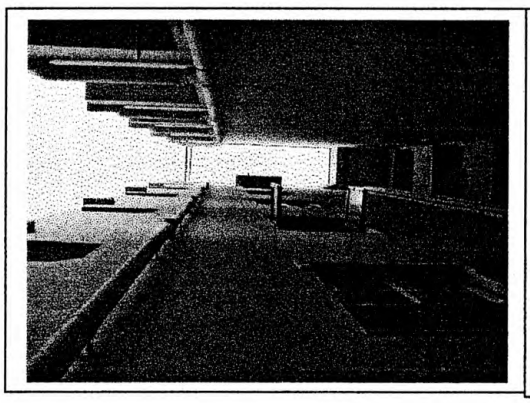
   Figure 13, shows images of the open-to-the-sky spaces



View from the common circulation space



Looking down from the terrace



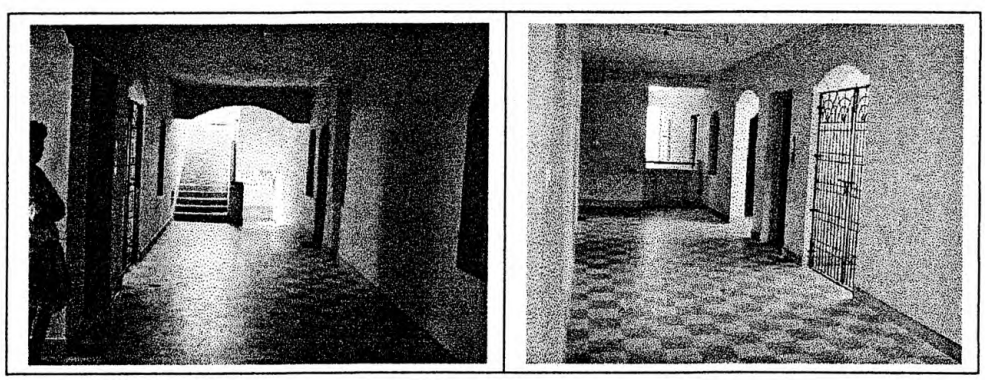
From the basement up

Open-to-the-sky spaces in elevation

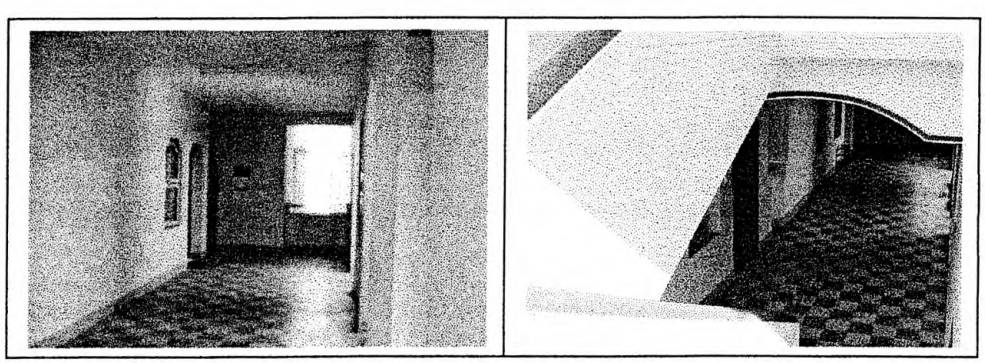
Figure 13 Various Images of the open-to-the-spaces
Source Author

2. To evaluate whether the well ventilated common circulation spaces- the corridor, with living room door and windows opening into them is used as a source to increase thermal comfort and provide an opportunity to increase social interaction between residents, or whether it is viewed more as a design element that decreases the level of privacy and increases the noise levels inside the flats and hence causes discomfort to the residents.

Figure 14, shows the various images of the common circulation spaces



Towards the west | Towards the east



Towards the east | Down from the mid landing

Figure 14 Views in different directions of the common circulation spaces
Source Author

3. To explore the residents' use of the living rooms adjoining the common circulation spaces and the spaces between the flats, and see whether the residents' are use these spaces as the designer had intended and if not, find out the reasons for the change.

4. To explore whether residents living at different floor levels and distances from the main staircase and elevator display different responses to the issues 1,2 and 3 above.

Hypothesis

The study was based on the hypothesis that the residents' behavior and attitude would be positively inclined towards the above mentioned design elements and hence the design would be a success. Residents would prefer the above design elements, which make the apartments look like independent units with most, if not all the outer walls, exposed to the exterior space. This would bring more ventilation, daylight, and give a sense of independent house, rather than a multi-family apartment unit that, typically have at least two shared common walls.

Further, it was anticipated that the above design elements would create an environment that resembles some of the characteristic features of the traditional Indian dwelling discussed in the previous chapter. Even though these design elements reduce the privacy, both visual and acoustical, yet it was hoped that the residents' would prefer these design innovations. The wide, well-ventilated common circulation spaces with the windows of the living room--the most public room in the unit--opening into it would encourage casual social interaction among the residents. At the same time, the main entrance to the individual apartments, not facing one another would provide the desired privacy and enhance the sense of an independent house.

The research intends to firmly establish the success of the design elements being studied. The success here refers to the residents' preference to the positive qualities of the design elements over the negative aspects. It was anticipated that the residents will choose to lose or at least prefer the option of being able to control the level of privacy, both visual and acoustical, for better ventilation, natural light, comfort, social interaction and a sense of

independent house. Some residents may manipulate the physical environment in ways that can be temporarily adjusted as per their requirements.

Another belief was that there would be variations in the levels of satisfaction between residents living in the upper floors as compared to the ones living below, and again, between residents staying closer to the staircase and elevator than those staying further away. Residents living on the upper floors would be more pleased with the higher ventilation opportunities from the open-to-the sky spaces in between flats and less noise disturbances from the parking lot at the ground level. It was anticipated that residents' living further away from the elevators on the upper floors will get more chances for casual social interaction while those living on the first floor will get more interaction opportunities if they are at a further distance from the staircase because, more often then not, residents on third and higher floors use the elevator while residents on the first two floors use the staircase.

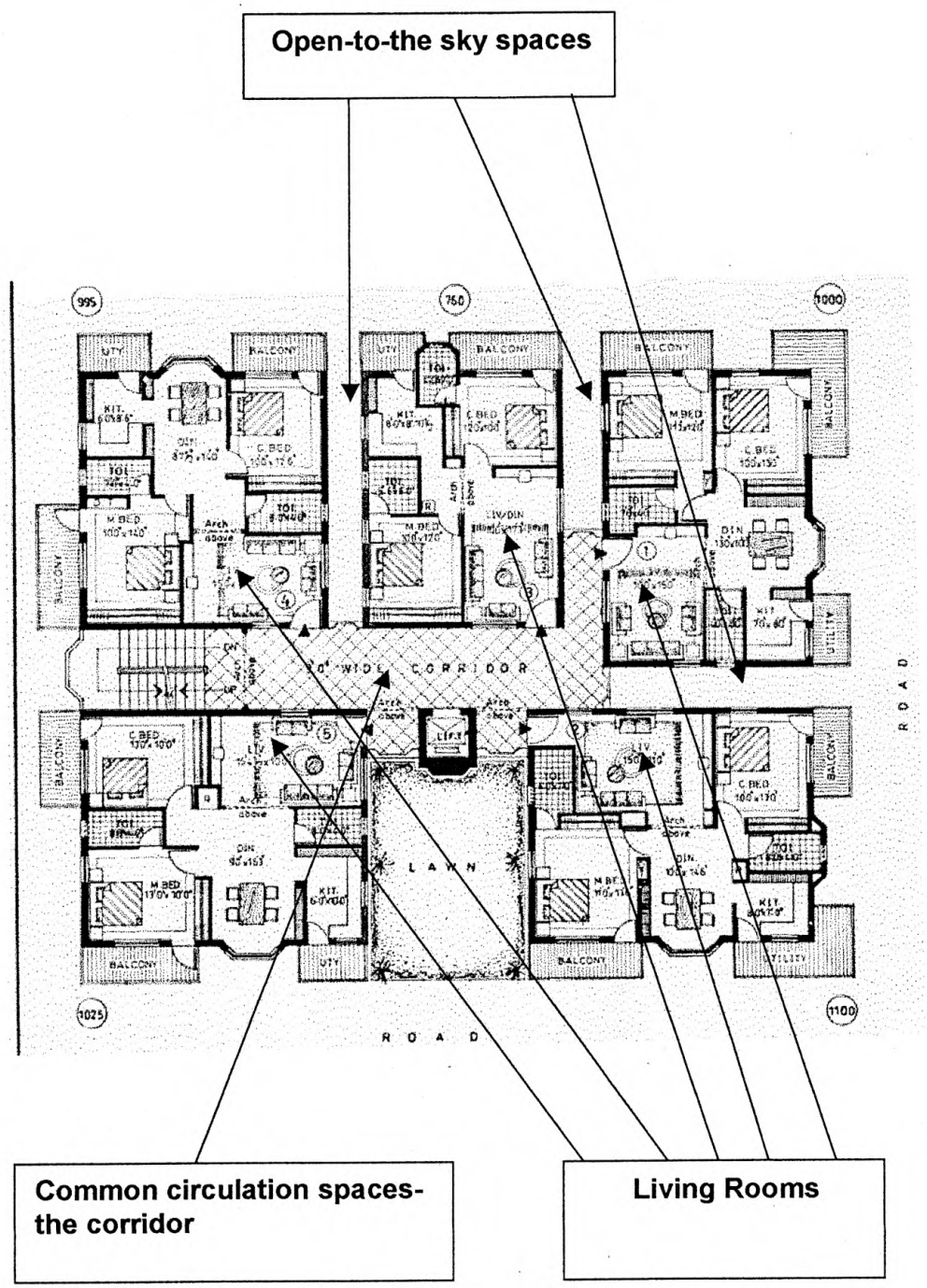
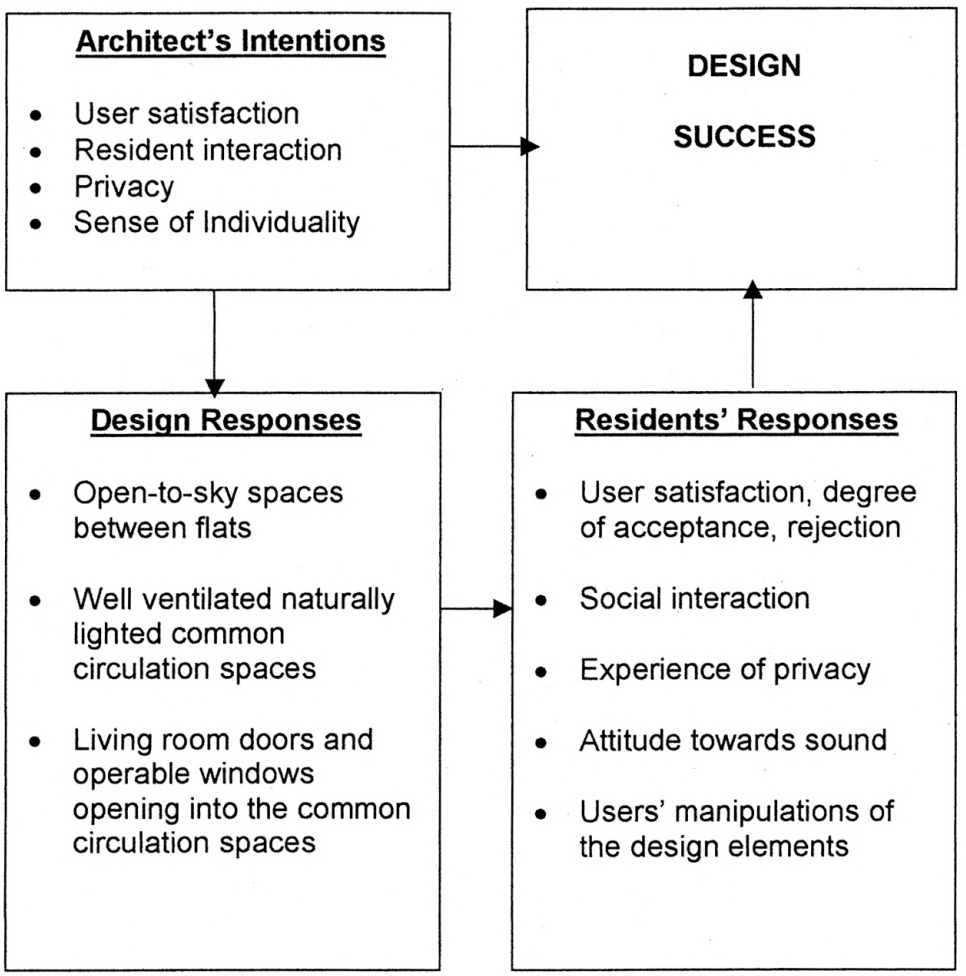


Figure 15 Typical floor plan of the Navdeep Apartments
Source Author

Research Diagram

The research diagram shown below indicates the variables involved, the aim and scope of the research project.



Questionnaires and Interviews

Having formed the objectives of the research and done the related background study and formed the methodology, the next step was to go on to the actual physical environment and test the hypothesis. The best tools for the purpose are questionnaire surveys and interviews. Before doing the field study, it was very useful to look into the issues of theory related with questionnaires and interviews. Several classifications, objectives and characteristics of questionnaire surveys and interviews that are helpful in order to conduct a good survey are discussed in this chapter.

Zeisel defines questionnaires as a tool to unearth regularities among groups of people by asking them to respond to the same set of questions. Precise understanding of the study in focus would be achieved by the use of well-organized questionnaires followed by the analysis of the data (Zeisel 1981, pg 157). Zeisel, further says, "Used together with observation methods and focused interviewing, standardized questionnaires are particularly useful to gather information about such topics as peoples perceptions, their attitudes, their values, and the meaning the environment holds for them" (Zeisel 1981, pg 177).

It is important to not only organize a questionnaire well, but also to administer it a good manner. The interviewer should have control over the questionnaire in terms of how it begins, the structure and how it ends. This way a lot of information can be got in a relatively short period of time (Zeisel 1981, pg 159).

Zeisel further explains, that respondents may interpret questions in other ways than the researcher anticipates. In such cases the answers can get very distorted. Based on that concern, the questions should be formed and pretested.

Pretest is a crucial part of a good questionnaire. Zeisel defines pretest as a "small, self conscious pilot study, a microcosm of the actual project carried out to identify if possible, unintended side effects (Galtung, 1967: 138), (Zeisel 1981, pg 160)." Pretests alert the researcher to any unforeseen problems in other dimensions of the research approach. In order to pretest, the questionnaire is given to people like the expected respondents and ask them to answer the questions before it is actually used for the survey. This helps in finding any unclear or confusing question, and whether the questions convey the same meaning as the researcher intended. Finally, when a questionnaire is completed, a quantitative analysis of the questionnaire data gives a precise result of the study that can be used to convince others.

Organizing a questionnaire is also equally crucial. A questionnaire should be carefully structured so that it does not get boring, confusing, and tedious or antagonize the respondents. The researcher should introduce oneself and explain the purpose of the interview clearly and without sounding threatening to the respondent. By doing that the researcher develops a rapport with the respondent. Better still would be to ask the respondents for their advise which would not only give importance and make them feel a part of the study but generate more interest in them (Zeisel 1981, pg 161).

It is a good idea to start the questionnaires with general information and then move into more specific issues. If, on the other hand, the first few

questions give the impression that the whole idea of the study is to find what is wrong with the environment under study, then the respondents might get influenced with the notion and start answering negatively to the later questions (Zeisel 1981, pg 162).

Lastly, care should be taken the questions are grouped together based on the issue they deal with so that the respondents stay focused on the issue. It also becomes easy for the respondents to forecast what to expect and does not make them guess the issue the questions deal with each time they respond. A clear layout of questions with necessary relevant instructions to keep the interview flowing and avoiding confusions that might arise with irrelevant questions make a good questionnaire (Zeisel 1981, pg 162).

Coding and Pre-coding

Open-ended questions, where the respondent is given a choice of giving his/ her personal opinions about the issue, rather than choosing from a given list, can become very difficult to analyze. Each respondent might interpret the terminology used in the questions differently and end up having a different view of the issue. This can be avoided by predetermining the possible answers and also by clustering several questions dealing with the same issue into a group. Doing this not only helps the respondent to understand the question clearly but also helps the researcher to easily analyze and find the results of the study. This process of deciding how to partition responses into groups is called 'coding.'

After the survey, it becomes very tedious to code open-ended questions. It would be a good idea to pre-code the questions, in other words,

group the responses into reasonable categories. Zeisel says, "It might be useful to pre-code responses to questions asking respondents to rank a group of items relative to one another on a single attribute: importance, beauty, usefulness, worthwhile (Zeisel 1981, pg 169).

Visual response is another important feature of the questionnaire. Zeisel describes that some cognitive, expressive, and perceptual information about respondents' physical environment can be better expressed visually rather than verbally. Non-pre-coded techniques such as free-hand area maps, base map additions, drawings, photographs taken by respondents, and games (Zeisel 1981, pg. 170).

Issues of theory related to Focused Interviews

Many agree that focused interviews are an important tool for an environment behavior researcher. They form the best way to find out what people think, feel, know, believe, and expect. One should first analyze the structure of the situation, using theory and observational research methods. This would help in guiding the discussion. A good interviewer finds a link between the analysis done and the respondents' mental picture of the situation (Zeisel 1981, pg 137). The interviewer should make his/her preparations before going on to the field. But, at the same time should be prepared to modify the original plans, to correspond to the respondent's answers (Zeisel, pg. 138).

Probe is one of the major focused- interview tool, which should be skillfully used to make adjustments in the topics, elements, patterns, and relationships that the interviewer tentatively planned to cover, based on the

interviewee's response. "Probes are primarily questions that interviewers interpose to get a respondent to clarify a point, to explain further what she meant, to continue talking, or to shift the topic" (Zeisel 1981, pg. 140). This helps in finding how the respondent's definition of the issue differs from the one hypothesized by the interviewer. Hence, in focused interviews a good interviewer makes necessary modifications while interviewing unlike in good questionnaire surveys, where it is good idea to stick to the original text of the questionnaire even on the field.

Objectives of Focused Interviews

Zeisel forms 3 main objectives of a focused interview namely, *definition of the situation, strength of respondents' feelings* and *intentions*. The researcher should first understand what the respondent understands of the given situation or in other words the *definition the respondent gives to the situation*, because it influences the responses (Zeisel 1981, pg. 138). The researcher can find out whether a particular action of the respondent is intentional or not better, if he first understands respondent's definition of the situation. The researcher should also know the *strength of respondents' feelings* to better control the side effects of their decisions. Zeisel says that observation can at times misinform the researcher about the actual intended activities of the people. It is only by asking the players what their actual intentions were, can suggest the difference between conscious intent from unintentional side effects (Zeisel 1981, pg. 139).

According to Zeisel, the four basic characteristics of focused interviewing can be summarized as follows:

1. Respondents, who form a *particular concrete situation* having actually experienced the environment that is under investigation.
2. Researcher, who does a *situation analysis* study to identify hypothetically significant elements, patterns, and processes of the situation.
3. The researcher then develops an *interview guide* based on the above analysis to set forth major areas of inquiry and hypotheses.
4. The interview about the subjective experience of persons to find their *definitions of the situation* (Zeisel 1981, pg. 139).

Next Zeisel describes the characteristics of group interviews. When a group of people are interviewed at the same time it is called as a group interview. Group interviews can be useful to identify a range of definitions for a given situation or to find out whether a particular opinion is held at all, and also to save time (Zeisel 1981, pg. 138). At times somebody in the group can make the interviewer's job easy, as Zeisel writes "...for example, an emotional statement by one person incites others to express their feelings more openly" (Zeisel 1981, pg. 154). Group interviews may have certain advantages but they also pose a few problems. It might so happen that one or two persons from a group speak the most and are more dominant than the others. Such people can easily take the upper hand in the interview, divert it from its focus, and inhibit others from talking. In such cases the interviewer should very nicely inform the person that even though his/ her views are good, yet the others should be given a chance to talk.

At the end of the discussion, if the outcome of the interview is still very unclear, the researcher can get a vote on the issue (Zeisel 1981, pg. 155). Zeisel, concludes his description of focused interviews by explaining that one cannot find out how people look at the world around and what they feel about it unless one asks them and they tell it themselves. He says that focused interviews are uniquely suited to discover a respondent's personal definition of complex environment- behavior situations.

Data Collection

Data collection in the research involved literature review and precedence studies. The critical elements of processes already used in those previous studies were used to establish common measures that would improve the chances of success. Such data was obtained from books, journals, periodicals, and articles in the various libraries. Since the researcher is the designer, getting information regarding the concepts behind the incorporation of the earlier mentioned design elements and the related drawings, was easy.

Having studied the theoretical issues associated with questionnaires, a questionnaire was developed to determine what environmental systems and characteristics were judged to be satisfactory by users, and to establish satisfaction ratings for the features of the environment. The questionnaire was divided into 4 short sections, three dealing respectively with common circulation spaces, open-to-the-sky spaces in between adjacent flats, and interaction between the common circulation spaces and living room. Each of these sections dealt with a set of criteria related to the respondent's reaction to noise, social interaction between the family members and other residents', experience with ventilation, and privacy, and their past experiences. The fourth section dealt with overall rating, satisfaction and asked whether they would refer this, or similarly designed apartment, to a friend.

The questionnaire, attached as an appendix (See Appendix A) with this report, was handed out to the residents and collected in person after about a week. The residents were primarily questioned on how they discern and use the design elements selected for this research. The family structure of each

household was analyzed and their use of the specific spaces at different times of the day was found. How do each family deal with entertaining the guests at home and the various roles played by the males and females of the families was noted. The researcher also had some informal conversation with the residents to find out in person some aspects of the study. Observant participation methods were used like still photography, sketches, visual observations and notes. Photographs and small notes were taken on the site to help record some of the activities. The developer of the apartment building was also interviewed to find out if the residents ever came up with any comments on the design. The developer was asked if he thought the design innovations turned out to be a good idea from an economical perspective.

Items of study also included such objective measures as the overall size and the density of the complex, the presence or absence of amenities, the level of maintenance of buildings, and the extent to which the inhabitants may have modified the original physical quality of the building. Occupants' of all age groups, sex, income, educational attainment, as well as the length of time the respondent has lived in the current complex was found. The degree of choice among alternative housing complex available to the respondent and the length of time the respondent lived in the prior home, and the size of the town in which the respondent grew up would influence the respondent's views. Hence, these issues were explored.

Pretest

In order to assure the clarity of the data collection methods, a pretest was conducted at the KSU (Kansas State University). A total of 10 students

at KSU, who had earlier experiences of living in apartment housing back in India, were requested to participate in a survey. The respondents completed the questionnaire and provided feedback on questions that were unclear or presented difficulties in responses. Upon completion of the pretest, slight modifications in the wording of some questions were made.

Field Work

The actual case study was done during a 5-week period in the winter break of 2001-2002 where the data from the interviews, photographs (Figure 16,17 and 18) and information from observations were collected. In order to obtain a good response from the residents, a presentation of the study was made at a social gathering where many of the residents were in attendance. Participation was on a voluntary basis. Prior to all interviews, formal consent to participate was obtained from each person agreeing to be interviewed (see Appendix B for consent forms). During the interviews many residents voiced problems other than the ones included in the study. It was a challenge to get their focus on the issues that were related to the research.

To the 25 apartment units, a total of 60 questionnaires were handed out with at least, two per each unit. Although the total purposive sample size was 60, the sample size that resulted was 42 (see Table 1). Among the 42 residents that responded, 23 were male and 19 were female. Responses were obtained from all floor levels.

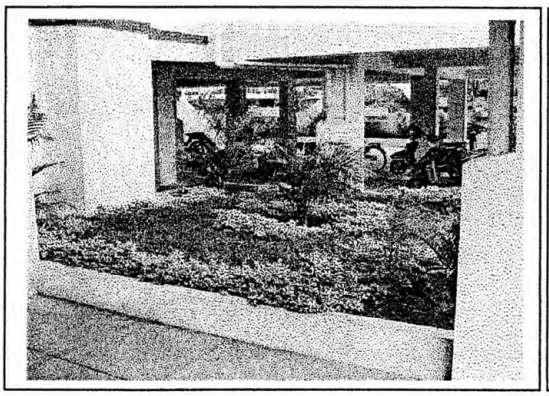
Table: 1 Number of Respondents

Sex	Number of Residents	Percent %
Female	19	45.2%
Male	23	54.8%
Total	42	100%

From the first floor level 10 users responded, while 8 from the second, 6 from third, 8 each from the fourth and fifth floor levels responded. This shows an even distribution of the respondents in terms of the gender as well as the floor level that they resided.

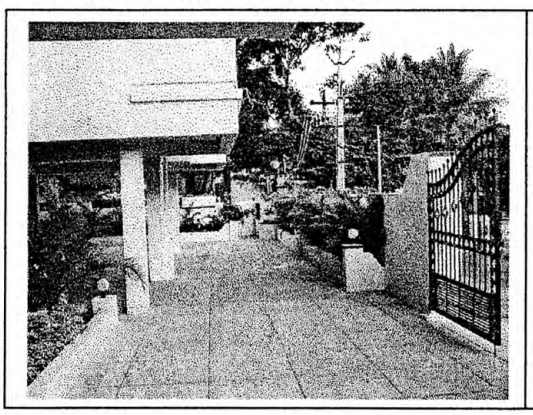
The responses from these residents' and other observations from the survey were then put on a ranking scale to determine the relative importance given to the selected design features by the residents. Digital pictures of the immediate setting were taken (See figures 16,17, and 18) to get an idea of the physical environment at the ground level, around the vicinity of the building, views of the building and views from the building. Comparison and analysis of all data obtained from the various sources and methods of information, discussed in the next chapter, helped in understanding the interaction patterns of behavior, relevant variables and lead to the identification of issues of concern, fit or misfit within the building.

Pictures of the Immediate Setting

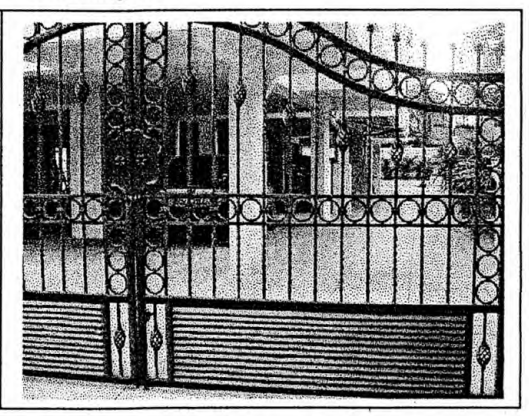


Lawn near the south entrance

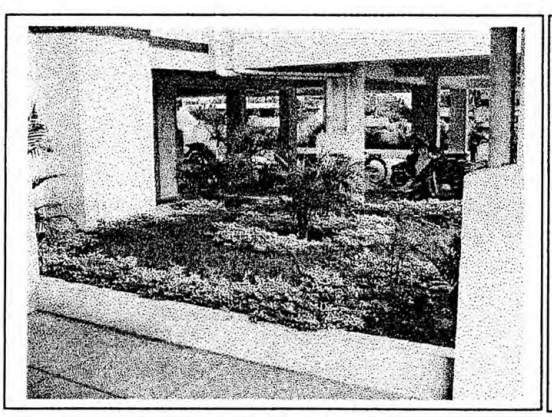
Parking lot



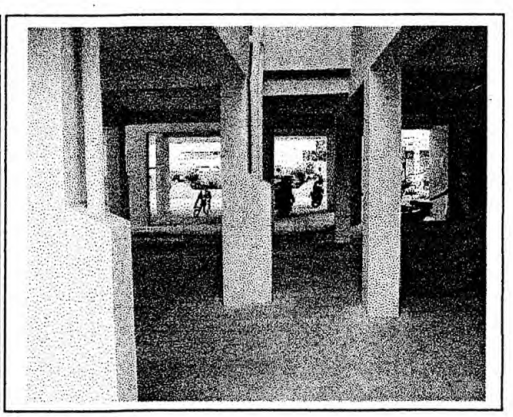
Site setback on the south



Entrance Gate on the east



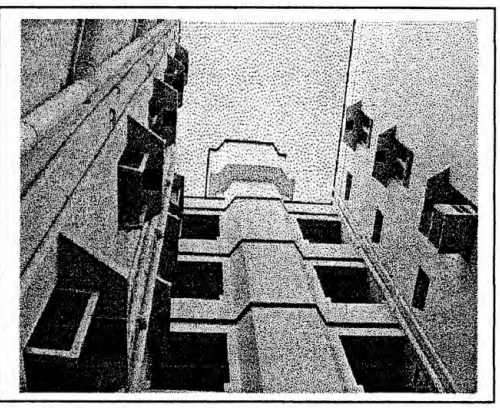
Another view of the lawn



Parking lot

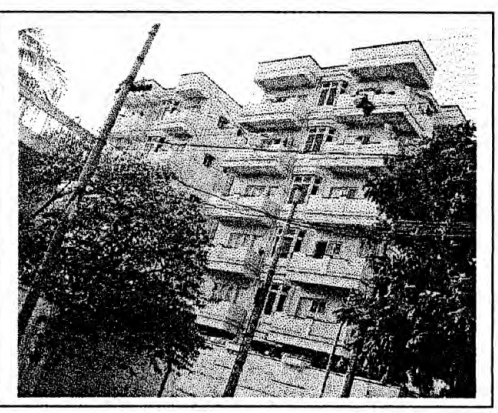
Figure 16 Views of the Ground Level
Source Author

North elevation



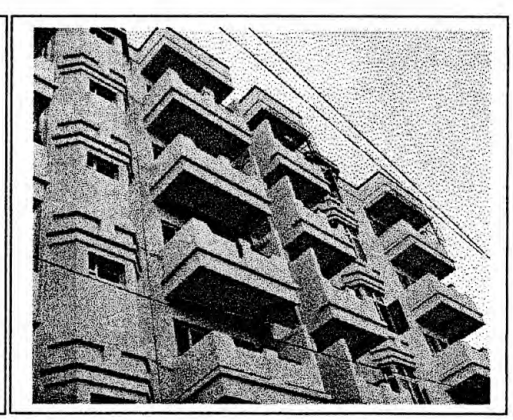
View of the elevator tower

View from the south-west corner



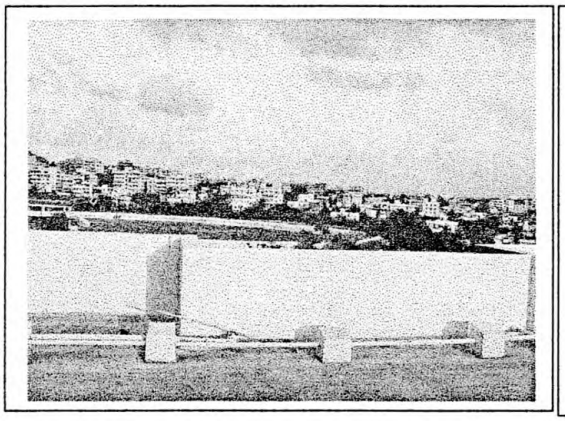
South-east corner

Another view from south-west

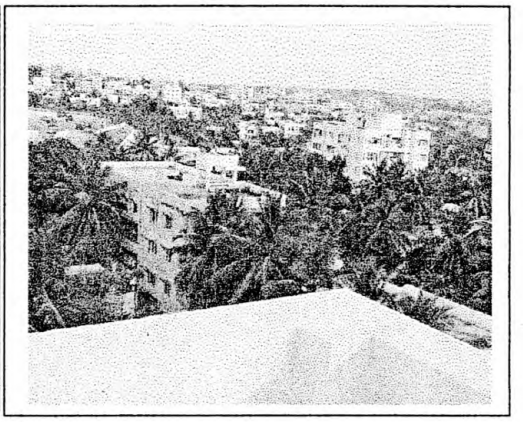


Close up of the North facade

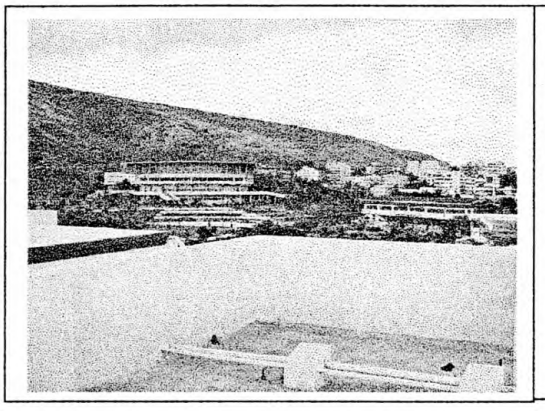
Figure 17 Views of the Naveep Apartments
Source Author



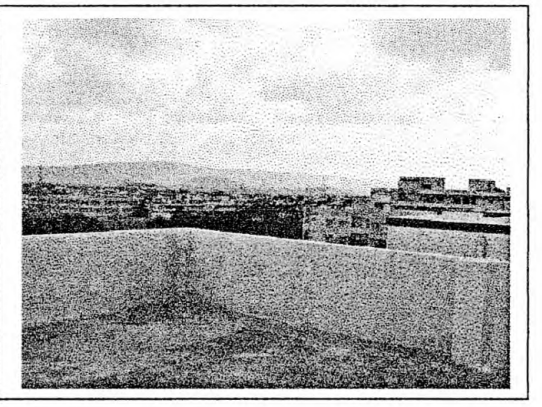
Towards the east



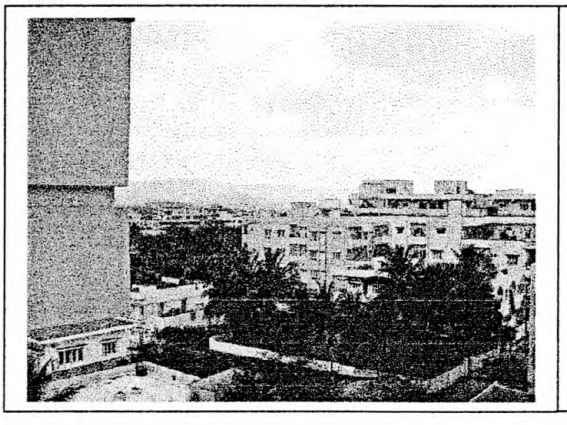
Towards the south-east corner



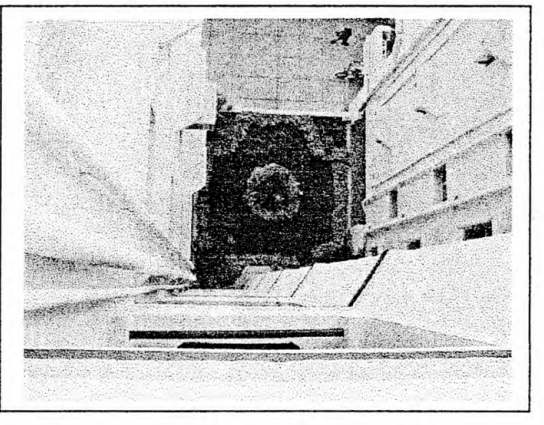
Towards the north-east corner



Towards the north-west corner



Towards the south



View of the lawn below

Figure 18 Views from the Building
Source Author

ANALYSIS

As mentioned, the main objective of the study were,

1. To identify the perceived value of the physical environmental dimensions: day lighting, cross ventilation with respect to noise, privacy, and the physical comfort space, for different respondents.
2. To identify possible differences attributable to user groups or settings.
3. To determine what environmental characteristics residents rated as most important. Comparing the mean percentage values of the responses to the satisfaction question on common circulation spaces, open-to-the-sky spaces, and the living room questions, would indicate the residents' preferences. Further, for each of these three physical environment characteristics a comparison was made to find out what environmental dimension was most preferred in each case.
4. To determine if residents living in different floor levels, or in different age groups, different income levels, gender, placed varying or relatively similar importance on the same characteristic and also to determine if like user groups varied in their preferences from question to question.

The data obtained was statistically analyzed and compared in several ways by using software called EPI Info 2000. Mean percentage frequency for individual responses was found, mean percentage rating for each user group based on gender, age, floor levels were compared, differences between percentage scores between users group within settings were then computed.

Residents were divided into categories based on age. Based on the general observation, understanding of issues and the day-to-day activities

four broad categories were formed. They are 10-20 years, 21-35 years, 35-50 years and 51 years and above. In order to take into account the resident's past dwelling experience that was anticipated to have an impact on the residents' response to the given spaces, they were asked to provide information about the nature of their previous dwelling unit (see Table 2).

Table: 2 Previous type of dwelling unit.

Dwelling Unit	Number of Residents	Percent
Apartment	15	48%
Independent house	13	42%
NTPC- Family quarters	3	10%

As the table shows, among the respondents, 48% had lived in an apartment building, 42% in an independent house and the remaining 10% stayed in family quarters, which is similar in concept to the apartment housing. Hence it was assumed that 58% of the respondents had some experience of living in apartment housing. Since the majority had experiences of apartment housing, their responses reflected a comparative analysis of the design elements under study. Moreover, the analysis showed that 83% stayed in this same apartment for more than 2 years, which is a good time to form an opinion of the design elements in question. Many of the residents felt that design of the apartment is the second most important criteria for buying after location. The answer "budget" scored lower down which indicates that users' are willing to buy better-designed apartments than cheaper ones.

The following results were found regarding the common circulation spaces, the open-to-the-sky spaces and the living room's relationship with the common circulation spaces.

Common Circulation Spaces

Table 3 shows that an overwhelming majority of the residents were satisfied with the common circulation spaces.

Table: 3 Reaction to the common circulation spaces

Common Circulation Spaces	Number of Residents	Percentage
Dissatisfied	3	7%
Mixed Reaction	5	12%
Satisfied	34	81%

Only 3 residents responded negatively while 81% reported they were satisfied. Among the satisfied residents, there was an even distribution of the preferred environment dimension factor. Thirteen liked it for socializing with neighbors, 10 for ventilation, and 13 for viewing the nature outside (see Table 4). This shows that for a design to be successful all the three design factors are equally important. It was also found that except for the first floor level, where only a little over half of the respondents said they were satisfied, on all the other floors more than 80% were satisfied. Every respondent on the fifth floor level reported favorably. The author thinks that this finding may be due to the fact that the fifth floor level has the best vantage point to view the cityscape. It is also the best ventilated and since none of the residents

staying below come up on a regular basis, residents on the fifth floor level enjoy additional privacy level.

Table: 4 Use of the common circulation spaces

Common Circulation Spaces- Other Use	Number of Residents	Percentage
Socializing with neighbors	13	31%
Ventilation	10	23.8%
Viewing the nature outside	13	31%

Since all the three categories of income levels were "very satisfied," it can be concluded that the economic levels did not affect this design element. Within the age category, residents in 51 years and above were all satisfied while only 2 of the 11 respondents in the category 36-50 were dissatisfied. This could be due to the fact that of those in the category, 51 years and above, many stay at home the entire day and they are the group that most use the common circulation spaces as an outdoor interactive space, as a place for fresh air, or as a vantage point. Also, many in this age group would have experienced living in a tradition house at some time and hence are able to associate more with explored spaces. Residents in the 21-35 age category were also satisfied in high numbers, while 40% respondents in the category 10-20 years had mixed reaction. This finding may be due to the reason that the 21-35 year old are usually the head of the family and need to interact with the other residents in the apartment more often than the others and feel the need for the provided space that helps in their activities.

On the other hand, those in the 10-20 years old category, in the Indian social conditions, typically, do not get the freedom to socialize freely with others of their age. They are most of the time indoors and do not use the space as much as the others and hence do not feel the need of the provided space. The results also show that close to 90% of the males responded satisfactorily to these spaces as opposed to a little over 70% female respondents.

Table: 5 Reaction of age groups to the common circulation space

Corridorspace satisfaction:Age Group	Dissatisfied		Mixed Reaction		Satisfied		Total	
	No.	%	No.	%	No.	%	No.	%
10-20 years	0	0	4	40	6	60	10	100
21-35 years	1	8	0	0	11	92	12	100
36-50 years	2	18	1	9	8	73	11	100
51 and above	0	0	0	0	7	100	7	100

This variation in the percentage of males versus the percentage of female population could be a reflection of the privacy factor in the Indian communities. Males are more open to social interaction and out-of-door activities, and less to physical privacy than their female counterparts, and hence are more satisfied with the space. But the variation is very less suggesting that the gap is narrowing down.

Open-to-the-Sky Spaces

Twenty-eight of 42 respondents were satisfied with the open-to-the-sky spaces. Eleven respondents had mixed reaction and just one was disappointed. This response indicates that the open-to-the-sky spaces are successful. In order to know specifically why the residents' liked the space, they were questioned on whether they thought these spaces increased the noise levels, decreased the privacy factor or acted as a source of ventilation. An overwhelming number of 39 residents said the space helped in increasing ventilation while only 2 felt the noise levels increased (see Table 6).

It was not surprising to find that these 2 residents stayed on the first floor level where a lot of noise can come from the ground floor below, most of which is used for parking and kids play area, both sources of noise. Further, when asked how the residents reacted to these spaces it was interesting to find that 57% of the residents had no reaction, while 26% said they pulled the curtain and 7% closed the windows.

Table: 6 Residents opinion to the open-to-the-sky spaces

Common Circulation Spaces	Number of Residents	Percentage
Increase the noise level	2	5%
Decrease the privacy	0	0%
Source of ventilation	39	95%

This finding may be due to the reason that the usual practice in the Indian tradition is to keep the windows open. They are closed only when required to do so due to any disturbance. Since the majority of the residents were satisfied with the spaces and used them as a source of good ventilation, they had no reaction, which effectively means that the windows are left open (see Table 7).

Table: 7 Reaction to the open-to-the-sky spaces

Reactions	Number of Residents	Percentage
Close the doors and windows	12	28%
Get disturbed	10	24%
No response	20	48%

Forty five percent of the residents who had mixed opinions belonged to the age category 36-50 years. The one person dissatisfied was from the age category 10-20 years while all the residents in the age group 51 years and above were satisfied (see Table 8).

Table: 8 Reaction of age groups to the open-to-the-sky spaces

Age Groups	Dissatisfied	Mixed Reaction	Satisfied
10-20	1	3	6
21-35	0	3	9
36-50	0	5	6
51 and above	0	0	7

This result shows that the old people care more for fresh breeze and hence prefer cross ventilation over privacy. On the other hand the 36-50 year category may be spending a lot of the time on work and hence do not spend enough time at house to appreciate the given spaces. They would also be concerned about the privacy of their teenage kids, which is reduced due to the openness and hence the variation in the responses. Again comparing the males' responses to the females on the same question, it was noticed that the males were more satisfied than the females by a margin of 15%. Even though the difference is not a lot, yet it implies that the female population desires more privacy than the males.

Satisfied with Living Room Relationship with the Common Circulation Spaces

To the question on satisfaction with the living room and its relationship with the common circulation spaces nearly three quarter of the residents responded favorably. From the other quarter nearly 92% said they had mixed reaction and only 8% were dissatisfied. This finding shows that as in traditional architecture residents prefer social interaction and natural ventilation even if they have to sacrifice privacy to a certain extent. More than half the residents appreciated the fact that they could open these windows and get more natural light and ventilation (see table 9).

The intriguing fact is that of the 50% of the residents who had mixed reaction to the question are from the highest income category, that is Rs. 10,000 and above. This reflects the fact that the higher income population

does not depend on fresh ventilation as much as the other classes because they can easily afford artificial ventilation, or have a superiority complex that makes them anti-social.

Table: 9 Response to the living room windows

Satisfied with living rooms window opening into the common circulation spaces?

Living Room	Number of Respondents	Percentage
Dissatisfied	1	2%
Mixed reaction	12	29%
Satisfied	29	69%

Since there would be a good pedestrian traffic and groups interacting or viewing the nature from this space privacy was thought of as a major concern and this is reflected in the responses. Among the residents who were dissatisfied with the explored design element, privacy was the major concern. Above 25% of the residents said they would close the windows for privacy.

Table: 10 Reaction to the living room windows

Reaction to the living room windows opening into the common circulation spaces?

Reaction to Living Room Windows	Number of Residents	Percentage
Close the windows for privacy	3	7%
Open the windows for more ventilation and natural light	0	0%
See it as an opportunity for increased social interaction	39	93%

The study shows that noise is not the top priority as far as the residents are concerned. They are willing to trade it for more ventilation, social interaction, and views of the nature around. The different age groups had different views of the design in question. Residents' in 51years and above category unanimously supported the design. Again 35-50 year category was the least satisfied. 21-35 year age category accepted the design with 9 out of 11 saying they were satisfied, two having mixed reaction and one being dissatisfied. Similar differences were found in the responses by the males and the females. 19 out of 23 males were satisfied while 11 of the 19 female respondents were satisfied. This reflects the fact that in the Indian context females desire more privacy than the males, which is reflected in the analysis of the design element (see table 11).

Table: 11 Gender reaction to the living room windows

Satisfied with living room windows opening into the common circulation spaces?

Sex	Dissatisfied	Mixed reaction	Satisfied
Female	0	8	11
Male	1	4	18

CONCLUSION

The study provides evidence in support of the hypothesis. The residents' behavior and attitude was positively inclined towards the analyzed design elements. They expressed varying levels of satisfaction with each of the explored design elements. As anticipated, the age group and gender of the residents' had an impact on the satisfaction levels. The analysis showed that some age groups were more satisfied than others. It was interesting to observe that all the residents' in the oldest age-group expressed satisfaction without a single exception. The researcher concludes that this is due to the fact that they lived in the age when traditional architecture was prevalent and hence, associated themselves well with the explored design elements of the Navdeep Apartments, which had many traditional qualities.

As expected, the floor levels had an influence on the satisfaction levels of the residents'. The upper levels, 4^{th} and 5^{th}, had more ventilation, better views, and were less liable to invasion of privacy and thus were preferred more by the residents. Even though by a small percentage difference, males preferred the investigated spaces to the females. This reflects the likely fact that females desire more privacy than the males. But, within the female population itself, a majority voted for better ventilation, daylight and sense of an independent house even if they had to compromise on the privacy factor.

Another analysis showed that the residents of the Navdeep Apartments were satisfied with the given common circulation spaces. Residents' liked the views from these spaces. They preferred the opportunity it gave them to interact with neighbors while enjoying the views of the cityscape. The living room windows opening into the common circulation spaces not only served as

sources for cross ventilation, but also increased opportunities for casual interaction. The residents' liked the daylight from the open-to-the-sky spaces that illuminated the wide common circulation spaces thereby creating a comfortable transitory space between indoors and outdoors. The researcher believes that the common circulation spaces are reminiscent of traditional verandahs and arcades around the house that kept the interiors cool in summer and provided an extension to the inner rooms.

The researcher concludes that all the explored design elements were successful from the residents' point of view because they had the virtues of a traditional house and, as in traditional dwellings, these spaces satisfied the social, cultural, and psychological needs of the residents'. These needs are unique subjective perceptions that individuals have of a dwelling as a result of their interaction with it reflecting traditional qualities. This complex task was comfortably achieved in traditional architecture where the architect, builder, and user, were either the same individual, or belonged to the same community group based on kinship and traditions. Therefore the developed physical environment imprints on it a meaning, content, familiarity and order with which the residents' could identify. Today, there is a big difference between the architect, builder and the users in understanding the needs of the users that contributes to many unsatisfactory environments.

In the most fundamental sense, the architect today is responsible for design only. Even though he/she may be rarely required to participate in pre and post design works like programming, cost estimation, post occupancy evaluation (POE) is only as a consulting basis and carries no legal or moral responsibility. To a large extent other professions and businesses control the

formation of the physical environment. Finance and construction is in the hands of the builder and there is considerable influence of the builder on the design aspect as well. Unfortunately, the builder is not trained to understand design issues, and is more interested in the financial success of the project and apparently cares less for the user needs. There is a conflict between the design and the financial part of construction. On most occasions, the architect's design decisions are secondary to financial ones, to technological ones, and even to the design-decisions made by others. Hence the outcome is based on impersonal needs, so users are forced to adapt to the house. On the other hand, the researcher argues that if decisions are made in unison, rather than in competition, that the results can benefit both the user and the builder as well. The design of the Navdeep Apartment was an experiment where the researcher convinced the builder to implement the design elements that were studied in this research. The builder had to invest more than the norm in the project, but at the same time he was able to market his investment for a higher price than the prevailing price. As the findings of this study demonstrates, residents' are willing to pay more if they get a better quality environment that also satisfies their social and psychological needs as well.

Another factor contributing to the alienation of people from their environment today is the social and cultural differentiation between users and decision- makers, including architects. The difference in roles between designer and user is accentuated by different lifestyles, incomes, and values, which characterize the variety of sub-cultures in the society. For the designed environment to sensitively respond and adequately provide for the needs of

the user/client groups, it is imperative that the designer develop a thorough understanding of the full range of socio-cultural influences which affect the design process and produced environment. As Burgess says, "it is not the personal meanings espoused by the architect which become the essence of the architectural product, but rather the meanings which evolve from the interactions of the human participants with the built environment over time (Burgess, 1983, pg, 11)."

There is a tendency to separate those who make decisions about the physical environment from those who live in it. Conversely, the core concept in shaping the physical environment should be to involve those people most affected by design decisions, the users. By doing this, two things would be achieved. First, respect for local context and values are automatically built in to the design with a richness and authenticity unavailable to the architect if working alone. Secondly, users who are often left out by the system or bullied by it, are re-enfranchised as citizens by giving them a voice in, and discretion over the design of their environment. Architecture would then be an integrated process as in traditional ages.

The findings of this thesis reestablish the fact that traditional architecture offers much more than the commonly-held concept of decoration superficially reproduced to make the new blend with the traditional. It is an inherent complex and dynamic process of problem solving, a total response to the challenges of climate and topography; and an adaptation to set cultural values (Ellahi, 1999, pg., 89).

The researcher believes that contemporary designers should understand and try to incorporate the merits of traditional architecture and the

merits of modem mechanical systems to devise a composite array of design principles which are not only energy conscious, but also achieve architecture which is identifiable with its users' and the physical context. One should try to substantiate the relationship between current needs and many of these time-honored principles so that the usefulness of such principles in meeting today's requirements is not ignored.

Sadly, today, there is more and more inclination towards design based on artificial means of living rather than on environment-friendly approach as in traditional architecture. Charles Correa, one of the pioneers of modern architecture in India, expresses his views on the subject in these words: "In a third world and tropical country like India we can't afford to squander the kind of energy required to construct- and air condition- a glass tower. It means that the building must in itself, through its very form, create the "controls" which the user needs (Frampton, 1990)."

In the design of the Navdeep Apartments, the researcher incorporated this idea and, as anticipated, it is well received by the residents'. From the positive findings of this thesis, it can be concluded that, even though there is an increasing shift towards western lifestyle of living, people still prefer the traditional qualities of housing which provide spaces that suit the social, cultural, and climatic conditions of the region.

This thesis is also expected to establish the importance of doing a POE, a concept that is not at all practiced in the Indian subcontinent. As mentioned in the earlier chapters, POE is one of the techniques most useful in assessing the degree to which the design is a success, yet it is rarely used. Most professionals will recognize this, but will blame economics for such a

lack. It is hoped that this study would set an example to other architects/ builders to learn the success or failure of their project and the associated reasons. Moreover, POE can also create awareness among users' and make them realize the importance and need for their involvement in creating the environment in which they live.

It is hoped that with an increased awareness among the users, they would be more interested in contributing their input into the design at an early stage. The researcher, after this study, strongly believes that, given an opportunity, user groups would be glad to involve themselves in understanding and bringing forth the issues, concerns and aspects they like and do not like. With their understanding and knowledge, the users can use the power they possess to achieve the rights that are due to them. The users can exercise their freedom in choosing between the builders/ architects that provide them with such opportunities from those who do not. This in turn could result in a healthy competition amongst builders/ architects and could eventually lead to a better physical environment. As the Navdeep Apartment demonstrates, it would not make a big difference in the construction cost and can be a big boon in the marketing strategy for the builders. In such a process, the building industry and the entire society would benefit.

Architecture is a socially responsible and responsive ethical character to which many architects have failed to recognize and to respond. Navdeep Apartments is an example for architects to take upon themselves the responsibility to educate both the developers and users to help build better environments. This thesis is also an attempt to introduce this idea into formal and professional higher education and to establish the importance in the

student's mind, and enable him/ her to acquire relevant knowledge while still in school.

Architecture is a profession of public service. It is a profession that has developed in modern times a strong tradition of concern for social issues. Burgess says that the architect's role in society is multi-dimensional and is in society, not above it. Architects are the standard bearers of aesthetic tradition and design quality. But, they are just as important as citizens, as critics, and as active participants in the ongoing human struggle to improve the quality of life in all its aspects, not just the pure architectural forms. As Ellahi says, "Forms and concepts can be borrowed form the west, but should not be transplanted with total disregard towards social, cultural, and climatic needs of a place. This would result in a failed environment (Ellahi, 1999)."

This is a complex task that should be studied/practiced by designers/architects so that the society can be served better. This thesis provides evidence that the understanding and acknowledgment of architectural traditions is extremely important to build user-satisfying environments. Architects should satisfy their personal, professional and societal goals. Thus he/she must be active sensitive, and responsive to the goals and values of those who make and use the created work. They should anticipate the various behaviors of people in their encounters with architecture and provide them with more choices. Only then will architecture be more lasting. It is hoped that this study would set an example for future similar housing projects and that more research would be done on the subject to master the problems.

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APPENDEX A

QUESTIONNAIRE

Project : Masters Thesis
Department of Architecture, Kansas State University

Title : Users' Perception of Selected Design Elements in a Multi-Family Apartment Complex

Researcher : Srinivas Konada

Following is the questionnaire, your responses to which would be of great help in successful completion of the research. Please note that your answers are entirely voluntary and you may skip any particular question that you do not wish to answer. The information provided by you shall be kept confidential and it is assured that the survey will not be published in any way that the individual could be identified.

(To be filled and kept by the field researcher for coding)

Name of the Apartment Building:

Flat number:

Floor number:

Flat description (single/double bed):

Owner/Tenant name:

(To be filled by the respondents)

1. Have you lived in this building for two or more years? Yes__ No__
2. Sex:
3. Relationship with the family:
4. Age
5. Family size:
6. Occupation of the head of the family:

7. Monthly household income in Rupees

   a) less than Rs 5,000/-

   b) Rs 5,000/- to Rs 10000/-

   c) Rs 10,000 and above/-

8. Priorities for purchasing/ residing in the flat?

   a) location

   b) budget

   c) design

   d) other reasons

9. Previous type of dwelling unit? _____

10. How often do family members circulate in and out of the apartment on a working day

	Children	F. Adults	M. adults	Sr Citizen
Fewer than 5 times				
5 to 10 times				
more than 10 times				

11. What ways do you use the corridor other than circulation? Mark all that are appropriate

   a) socializing with neighbors

   b) ventilation

   c) viewing the nature outside

   d) child play areas

   e) other purposes

12. How satisfied are you with the placement of the living room windows opening into the corridor?

a) very satisfied

b) satisfied

c) mixed reaction (equally satisfied and dissatisfied)

d) dissatisfied

13. What is your reaction to the visual contact between the corridor space and the living room?
Mark all that are appropriate

a) close the windows for privacy

b) see it as opportunity for increased social interaction

c) open the windows for more ventilation and natural light

d) other

14. How satisfied are you with the corridor spaces?

a) very satisfied

b) satisfied

c) mixed reaction (equally satisfied and dissatisfied)

d) dissatisfied

e) very dissatisfied

15. Vehicle/s owned by the family:
Mark all that are appropriate

a) two wheeler

b) four wheeler

c) none

16. How often are noises heard in your flat from the following sources?

	From adjacent flats	From lobby	Vehicularnoise
Few times per day			
Few times per week			
Seldom or never			

17. What is your reaction to the noise
Mark all that are appropriate
a) close the doors and windows
b) get disturbed
c) makes no difference
d) other

18. What is your reaction to the open-to-sky spaces in between adjacent flats?
Mark all that are appropriate
a) source of good ventilation and natural light
b) loss of privacy from adjacent flats
c) loss of privacy from the flats on the upper floor
d) increase the level of noise coming into the flats
e) check all that applies

19. How do you react to these open-to-sky spaces?
Mark all that are appropriate
a) pull the curtain
b) close the windows
c) no reaction
d) other

20. How satisfied are you with the open-to-sky spaces between adjacent flats?

a) very satisfied

b) satisfied

c) mixed reaction (equally satisfied and dissatisfied)

d) dissatisfied

21. Would you recommend a friend of yours to live in this apartment or a similarly designed apartment?

a) surely

b) maybe

c) not sure

d) no

Thank you very much for having spent the time and effort in participating in the survey. Your help is greatly appreciated. Please note that this questionnaire will be destroyed after the completion of the research.

APPENDEX B

Informed Consent for Interview

Srinivas Konada has explained that he is doing a study on the users' perception of the selected design elements in a multi- family apartment building in the Indian cultural context.

I understand that my participation in his study is purely voluntary on my part. I do not have to take part in the interview, and if I do, I may choose not to answer any question that he asks. I understand that my refusal to participate will involve no penalty and that I may discontinue to participate at any time without loss. Mr. Konada has given me my own copy of this form; I know that if I have questions about the study, I may contact Srinivas Konada at 913 Laramie, Apt. 1, Manhattan, KS 66502; phone: 785-565-0432; or e-mail: srinivas_konada@yahoo.com or contact O. John Selfridge at the Department of Architecture, 211 Seaton Hall, Kansas State University, Manhattan, KS 66502-1102, U.S.A ; phone: 785-532-2425; or e-mail, ojs@ksu.edu.

I also know that if I have any questions about the rights of subjects in this study or about the manner in which the study is conducted, I (or my legal representative) may contact Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 1 Fairchild Hall, Kansas State University, Manhattan, KS 66502, U.S. A, by phone 011-785-532-3224.

I agree to participate in an interview, or interviews, as part of Srinivas Konada's study. I understand that my participation is entirely voluntary and that I have the right to not answer any question I choose or to withdraw my participation any time.

Signature_____

Date _____

APPENDIX C

Visakhapatnam City Building Bylaws

The building bylaws for the city of Visakhapatnam are the same as the bylaws for the state of Andhra Pradesh. The next few pages show the highlights of the building policy and the various G. Os. (Government orders) issued for the state of Andhra Pradesh. For the purpose of this study only the bylaws associated with apartment buildings are shown.

Government of Andhra Pradesh

F A R & BUILDING POLICY

Contents

HIGHLIGHTS

- **Speedy disposal of applications:** The time period for disposal of building applications reduced to 15 days for individual residential buildings and 30 days for other buildings.
- Emphasis on boosting suburban development by providing higher FAR in the peripheral areas of Municipal Corporations
- The areas of local bodies and Urban Development Authorities are regrouped into five groups for computing FAR
- Height restriction on the construction of buildings is removed for plot areas of above 1,000 sq.mtrs.
- Additional FAR of 0.5 will be considered when land affected in road widening is surrendered free of cost
- Row housing will be permitted in plots with area of 1000 sq.mtrs. and above
- A new concept of Transferable Development Rights will be introduced in HUDA area on an experimental basis
- **Plot sizes restructured (for FAR) :** (i) Below 200 sq mtrs. (ii) 200 sq mtrs to 1,000 sq mtrs (iii) 1,000 sq mtrs to 2,000 sq mtrs (iv) Above 2,000 sq mtrs.

Easy to obtain permissions

- Individual residential building on plots upto 100 sq.mtrs. in approved layouts can now be constructed after paying the required fee and charges and intimating the municipality which will ratify them.
- In plots of 100 to 300 sq.mtrs. empanelled licensed architects, engineers, town planners and surveyors will be empowered to grant permission to the construction of individual residential buildings subject to certain safeguards

Parking Area

- Multi level parking is allowed in plot areas of above 1000 sq.mtrs.
- Parking standards are rationalised. Provision of one slot for every flat of above 1000 sq.mtrs. built-up area.

Lighting and Ventilation Requirements

- New regulations to allow enough lighting and ventilation in buildings, both residential and commercial.

Rainwater Harvesting

- Provision of facilities for conservation and harvesting rain water made mandatory for better ground water management.

GOVERNMENT OF ANDHRA PRADESH

ABSTRACT

Municipalities not covered by Urban Development Authority areas - Rationalisation of Floor Area Ratio (F.A.R) and other standards of Building Requirements - Orders - Issued.

MUNICIPAL ADMINISTRATION AND URBAN DEVELOPMENT (M1) DEPARTMENT

G.O.Ms.No.422, M.A. Dated: 31st JULY, 1998.

Read the following:

1. G.O.Ms.No.584, M.A., dated 28.5.1987.
2. G.O.Ms.No.313, M.A., dated: 11.5.1993.
3. G.O.Ms.No.274, M.A., dated: 19.5.1994.
4. G.O.Ms.No.292, M.A., dated: 28.5.1994.
5. Govt. Memo No.3150/M1/98-1 M.A., dated:09.02.98.

ORDER:

In the G.Os. read above, orders have been issued fixing standards of F.A.R. values and standards of building requirements for different types of buildings, uses, and occupancies in Municipalities. Various representations have been received from different interest groups like builders and developers on one hand and environmentalists, academicians and residents on the other for further rationalisation of the standards of F.A.R. and building requirements.

The Government, after holding discussions and deliberations at various levels involving various groups like builders, developers, architects, engineers, town planners, representatives of Urban Development Authorities and local bodies, public representatives, academicians , officials and general public, have decided to further rationalise the F.A.R. values and standards of building requirements for different types of buildings, uses and occupancies in Municipalities which are not covered by the Urban Development Authorities. Accordingly, the Government issue the following orders:

1. PROCEDURE FOR OBTAINING BUILDING PERMIT

1.1. No person shall carry out development without obtaining permit from the Authority except in the following cases and unless exempted by State or Central Acts/Rules/Orders:

(a) No prior sanction of building applications are necessary for the construction of individual residential buildings in plots upto 100 sq.mtrs. and height up to 10 mtrs. i.e. Ground + 2 Upper Floors (without stilts) subject to the following conditions:

i) such plot should be less than or equal to 100 sq.mtrs and as per the following:

6. GROUP HOUSING / APARTMENT SCHEMES :

6.1. Group Housing Scheme means the development of buildings having FIVE or more dwelling units and common services on a given site or plot, in single or multiple blocks, without customary sub-division of land by way of individual plots.

6.2. Minimum Plot Area : 335 sq.mtrs.

6.3. Minimum abutting road width:

Group Housing shall be permitted on 12.2 Mtrs.(40') wide roads. However, Group Housing shall also be permitted on 9 Mtrs. wide road subject to handing over of 3 Mtrs. wide strip to the local authority free of cost subject to the condition that the remaining plot shall be 335 Sq.Mtrs. or more.

Construction of compound wall will be permitted after leaving 3 Mtrs. wide strip. The Local Authority shall pave the area and utilise it for public purpose.

6.4. Maximum permissible F.A.R.

Road Width	F.A.R.	Maximum Height Permissible
Less than 12 Mtrs.	1.25	11.00 Mtrs.
12 Mtrs. to 18 Mtrs.	1.50	15.00 Mtrs.
More than 18 Mtrs.	1.75	15.00 Mtrs.

NOTE :

i) The common areas, and structures such as balcony projections, corridors, staircase/ lift blocks etc.. (excluding parking area to be provided) shall be included in the calculation of F.A.R. For this purpose, the gross F.A.R. shall be computed by adding 30% of prescribed F.A.R.

6.5. Maximum Plot Coverage : 40%

6.6. Building Set back requirements:

a) Minimum front Set back :

Width of abutting road	Minimum front set back
9 Mtrs. to 12 Mtrs.	3.0 Mtrs.
Above 12 to 18 Mtrs.	4.0 Mtrs.
Above 18 Mtrs.	4.5 Mtrs.

Note:

However if the height of the building exceeds 12 Mtrs. then front set back shall not be less than 1/4 th of the height of the building.

b) Rear and side set backs:

Plot size in Sq.Mtrs.	Minimum Rear Set back	Side set back on either side
335 to 670	3.00 mtrs. or 1/4th of the height of the building whichever is higher	3.00 mtrs. or 1/4th of the height of the building, whichever is higher
Above 670	4.5 mtrs.	3.00 mtrs. or 1/4th of the height of the building, whichever is higher

Note:-

a) Ventilating spaces for water closets and bathrooms if not open to front, sides or rear open spaces, shall open to a ventilation shaft of size not less than 4.0 sq.mtrs. with a minimum width of 1.5 mts.

b) All buildings and habitable rooms shall have one or more openings for admission of light and air. Such windows and fan lights opening directly on to an exterior open spaces shall open to the sky. An interior open space shall not be less than 9 sq.mtrs. in area and 3 Mtrs. in width. No portion of a room shall be assumed to be lightened if it is more than 7.5 Mtrs. away from the opening .

c) The distance between two blocks shall not be less than half of the height of the tallest building.

6.7. RECREATIONAL OPEN SPACE (TOT-LOT)

In case of plots having an area 671 to 2000 Sq.Mtrs. 5% of the plot area shall be left towards tot-lot and in case of plots above 2,000 Sq.Mtrs. 10% of the plot area shall be left towards tot-lot which shall be open to sky. In the case of Group Housing being developed with more than one block, the Recreational Open Space/ tot-lot may be provided within the mandatory open space between the two blocks after 3 mtrs. wide circulation space is left along the building. The tot-lot shall be provided at ground level only and should be open to sky.

6.8. PARKING REQUIREMENTS

Grade of the Municipality	Parking Requirement
a) Selection/Special Grade Municipalities	One car parking and two Scooter parking for every two flats
b Ist, IInd and IIIrd Grade Municipalities	One car parking and four Scooter parking for every four flats

Note:

a) In addition to the above one car parking for every 10 flats shall be provided for visitors as visitors parking.

b) In case of Apartments/Group Housing only stilt floor parking is allowed.

c) Parking requirement shall be deemed to have been fullfilled in Apartments/Group Housing which is built within the maximum permissible F.A.R., if the entire stilt floor is used for parking purpose except the portion used for the staircase and lift.

d) Two common toilets not exceeding 1.2 Mtrs. x 2.0 Mtrs. for each toilet have to be provided in the stilt floor for the use of watchman, servants, drivers etc., and this shall not be included in calculation of FAR.

6.9. MAXIMUM PERMISSIBLE HEIGHT :

(a) 18 Mtrs. including stilt in respect of road width of 12 Mtrs. and above.

(b) 14 Mtrs. including stilt in respect of road width less than 12 Mtrs.

7. COMMERCIAL / MERCANTILE BUILDINGS

7.1. Minimum plot area 18 sq.mtrs

7.2. Maximum permissible FAR

Road Width	F.A.R.	Maximum Height Permissible
Less than 12 Mtrs.	1.25	11.00 Mtrs.
12 to 18 Mtrs.	1.50	15.00 Mtrs.
More than 18 Mtrs.	1.75	15.00 Mtrs.

Note: Common areas such as balcony projections , corridors, staircase, lift block, Air conditioning plant room , Electrical transformer cabin , Pump house ,Watchman booth, Garbage shaft shall be included in the calculation of F.A.R. For this purpose the gross F.A.R. shall be calculated by adding 35% of the prescribed F.A.R. in case of Commercial Buildings /Institutional Buildings.

7.3. Maximum Plot coverage:

Plot area in Sq.mtrs.	Maximum Permissible Coverage
a) Upto 300	As per minimum building setbacks
b) 301 to 670	60%
c) 671 to 2,000	50%
d) Above 2,000	40%

7.4. Building setback Requirements:

i) For Buildings upto 300 sq.mtrs. plot area and upto 10.0 mtrs. height.

a) Minimum front setback:

Width of abutting road	Minimum setback
Upto 12 Mtrs.	3.0 Mtrs.
Above 12 to 18 Mtrs.	4.0 Mtrs.
Above 18 Mtrs.	4.5 Mtrs.