READING CONTEXT IN DESIGN

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June 1990

Submitted to the Department of Architecture
in partial fulfillment of the requirements for the degree of
Master of Science in Architecture Studies
at the
Massachusetts Institute of Technology
May 1993

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ABSTRACT

This study explores how, in the process of design, the *reading* of an existing order in the organizing features of a setting potentiates form.

For this purpose, a design exercise on a site in the city of Jaipur in India has been chosen. The focus of the study lies in the way in which the natural and built environment of the site might relate to the larger urban context and its extensive systems and tightly controlled parts. It attempts to extract the essential elements of form and space in the natural and designed environment, and to discover their principles of organization.

This study is conceived in an effort to internalize the tenets of a fundamental language in design process - one that rejects the mediation of styles, and gains its validity both from existing aesthetic structures and from a reality which would affect and alter these structures.

Thesis Supervisor : William L. Porter
Title : Professor of Architecture & Planning

Acknowledgments

to **Bill Porter**, my thesis adviser, for the insightful and rewarding discussions I had with him during the course of the development of this thesis.

to **Ron Lewcock**, my thesis reader, for giving me complete guidance and support not only in the development of this thesis as a reader and critic, but also throughout my entire stay at MIT.

to **Peter Serenyi**, my thesis reader and critic, for his interest, guidance and time.

to **Charles Correa** and **Michael Brawne**, visiting professors of design at MIT in the Fall of 92, for the several rewarding discussions I had with them, in developing my initial thoughts on this thesis.

to **Bobby**, my brother, who in his most caring manner provided me with the information and support from Jaipur.

to **Ritu**, my wife, who so generously provided me with the excellent research she had done on the writings and thoughts of Kahn and Wright.

to **Christiane, Sonit, Wael** and **Zisong**, my friends, who always found time for me, and were always by my side.

and finally, to my **Parents**, my close friends and mentors, the people who have always been by my side and have taught me and given me so much.

Thank You !

Contents

Title Page 1
Abstract 3
Acknowledgments 5
Contents 7

Chapter One

1. Introduction 9
   1.1 Objective 10
   1.2 Hypothesis 10
   1.3 Site 13

Chapter Two

2. The City of Jaipur 15
   2.1 Birth of the City 16
   2.2 The Underlying Paradigms 17
   2.3 Jaipur - The Renaissance City 23
   2.4 Jaipur - Growth Scenarios 31

Chapter Three

3. The Site 33
   3.1 Location of the Site 34
   3.2 An Analysis of the Potentials of the Site Location 36
   3.3 Criteria for the Selection of an Appropriate Function for the Site 38
   3.4 Proposed Program 40

Chapter Four

4. The Design 45
   4.1 Design Approach 46
   4.2 A Reading of the Site Context 46
   4.3 Ordering the Landscape 48
      4.3.1 Beginning with a Theme 50
      4.3.2 Recognizing Constraints 51
      4.3.3 Developing a System 51
      4.3.4 Preliminary Studies 52
      4.3.5 Demarcating Zones 54
      4.3.6 Developing Hierarchy 58
   4.4 Inhabiting Form with Design 60
      4.4.1 Library 64
      4.4.2 Museum 65
      4.4.3 Crafts Institute 66
      4.4.4 Office Buildings 67
      4.4.5 Commercial Space 68
      4.4.6 Faculty Housing 69
      4.4.7 Building Facades 70
   4.5 A Final Remark 73

Bibliography 74

Figure Credits 76

Chapter One

Introduction

1.1 Objective

Perhaps the most crucial problem in architecture today is that of its relationship with its context. Is every piece of architecture to be considered as a self-referential system, with its own traditions and its own system of values, or is it rather a composite product which only becomes an entity once it has been reconstituted by forces external to it ?

The objective of this thesis is to develop, with the help of a design study, an understanding towards how *buildings fit their context* – the historical, social, cultural, behavioral, physical and formal setting of the place. It explores how, in a design process, a reading of the formal elements and systems as constituent parts of a context, makes visible the relationships amongst themselves and in the setting as a whole. It is the perception of these relationships which contributes to the development of an existing conceptual Order and a singular nature of the setting. This *reading* then provides the designer with the necessary cues to build and expand on the existing Order, and finally inhabit it with the specificity of Form and Design.

1.2 Hypothesis

Architecture is a willful act, always conceived (designed) and realized (built) in response to an existing set of conditions - purely functional, or reflecting varying degrees of social, economic, political, even whimsical or symbolic intentions. In order that architecture have an artistic structure, it must in relation to reality perforce recognize aesthetic norms as a matter of convention. But however much the importance of such norms and of architecture as a self-referential system may be stressed, one cannot

support a view that would regard such norms and rules to be autonomous or absolute and unalterable. Architecture must begin with an existing rule system, adapt it to new conditions, and lay down a revised set of rules.

Architects are trained to work with a timeless and fundamental vocabulary of design, shaped out of their understanding of the primary elements of form and space, and through the more universal concepts of style, program, structure, materials, technology and efficiency - ideas they come to share through their training and interaction with the global establishment of their profession. However, as experience of any building or place will demonstrate, architecture comes to be understood by its users within the specific circumstance of the setting in which it is conceived. This dichotomy of architecture as an internally or externally referential system brings into play a dialectical process in which architects modify their internal aesthetic norms, by recognizing external forces, in order to achieve a partial synthesis.

Design, thus, is an act of recognizing, and in fact *creating* constraints, and not of ignoring or avoiding them. It is through the recognition of sufficient externally derived constraints and rules - through an abstraction of elements and conditions constituting a context, or otherwise - that a design theme (which may either be derived from the larger urban context of the city, or through ideas and concepts internal to the designer, or possibly through several other sources external to the designer), allowing us to connect to others, may be qualified through an imposition of the set of rules to create a system. A system that extrapolates the existing Order to a level that potentiates Form. The personalized component of the designer's input unto this point lies in initiating the theme, and in the rules derived as result of a highly personal reading and abstraction of the context he or she was operating in. Form remains impersonal. It is now that the

architect begins to inhabit the Order, and the Form brought to life, with the particularities of the highly personal act of Design.

Designers, then, must first document the existing conditions of a problem, *define its context*, collect relevant data to be assimilated, and only then proceed with the problem solving stage. But the resulting nature of the solution will inexorably be related to how the problem was perceived, defined, and articulated by the designer. In fact, even before the formal problem solving has begun, designers inevitably already have prefigured solutions to problems they are confronted with, the depth, range and richness of which is heavily dependent on their internal design vocabulary and affects not only the shape of the solution but also the perception of the problem itself. From this repertoire of internally and externally derived notions, designers select, test and manipulate elements into coherent, meaningful, and useful organizations of space, structure and enclosure.

Thus, while the result may be both highly personal, idiosyncratic, peculiar and distinct, it is capable of being reduced to types, classifications and generalizations. Although, unduly confident personal statements can strike high decibel levels at the expense of producing misfits, architecture that slavishly follows the dictates of its external forces can be equally debilitating. Indeed, it is at the point of an optimum trade-off that "good" architecture may be created.

1.3 Site

For an exploration and understanding of the ideas articulated above, a design study on a site, in the city of Jaipur, has been proposed.

Jaipur has been chosen to be the location for the project since I am a native of the city, and have lived for most part of my life in Jaipur. It would be advantageous to me, in view of the limited time available for this thesis, to be able to support my knowledge of the context by drawing upon my memory and experience.

The site chosen for the study is a 50,000 sq. m. rocky and slope terrain, two miles south of the walled city, free of the rigid urban design constraints of the walled city. The site lies at the base of a rocky hill, the silhouette for which is formed by the *Moti Doongri* - a fortress from the nineteenth century, with its monumental walls and bastions growing out from the slope of the hill, belonging to the royal family of Jaipur. In the immediate vicinity of the site, located on its south side, is the rocky and sandy terrain of the neighboring Rajasthan University. On its north and west sides, the site is surrounded by a low density housing area comprising of anti-urban bungalows and government offices, setback from their plot lines, and hidden behind large trees and boundary walls which

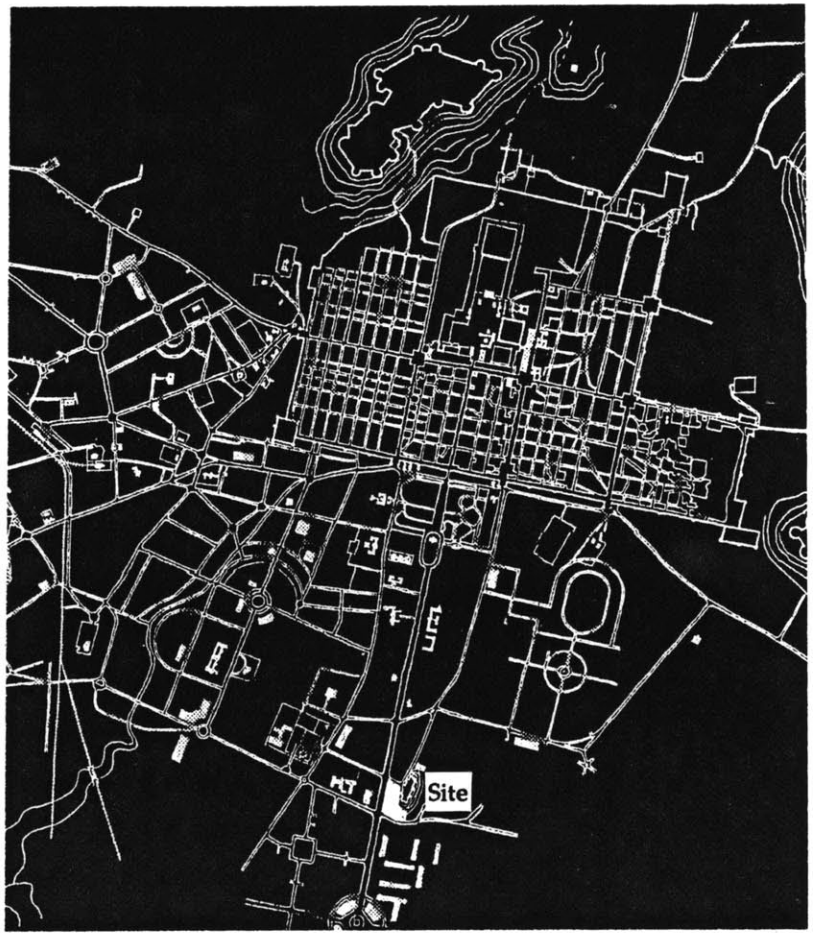

Fig. 1. City of Jaipur

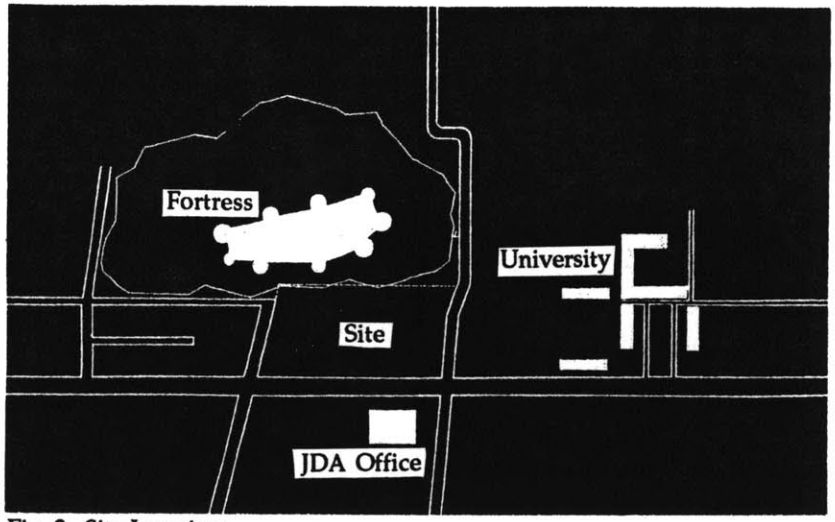

Fig. 2. Site Location

define the public right of way. Along the western edge of the site runs the SMS Highway, which intersects with the road connecting to the *Jawahar Nagar* residential area, while running between the university and the site's southern boundary.

The site thus acts as a transitional zone between the low lying, sprawling character of the residential area to its north and west, and a major institutional zone to its south. A detailed analysis of the site, and the choice for an appropriate function for it will follow in Chapter Three.

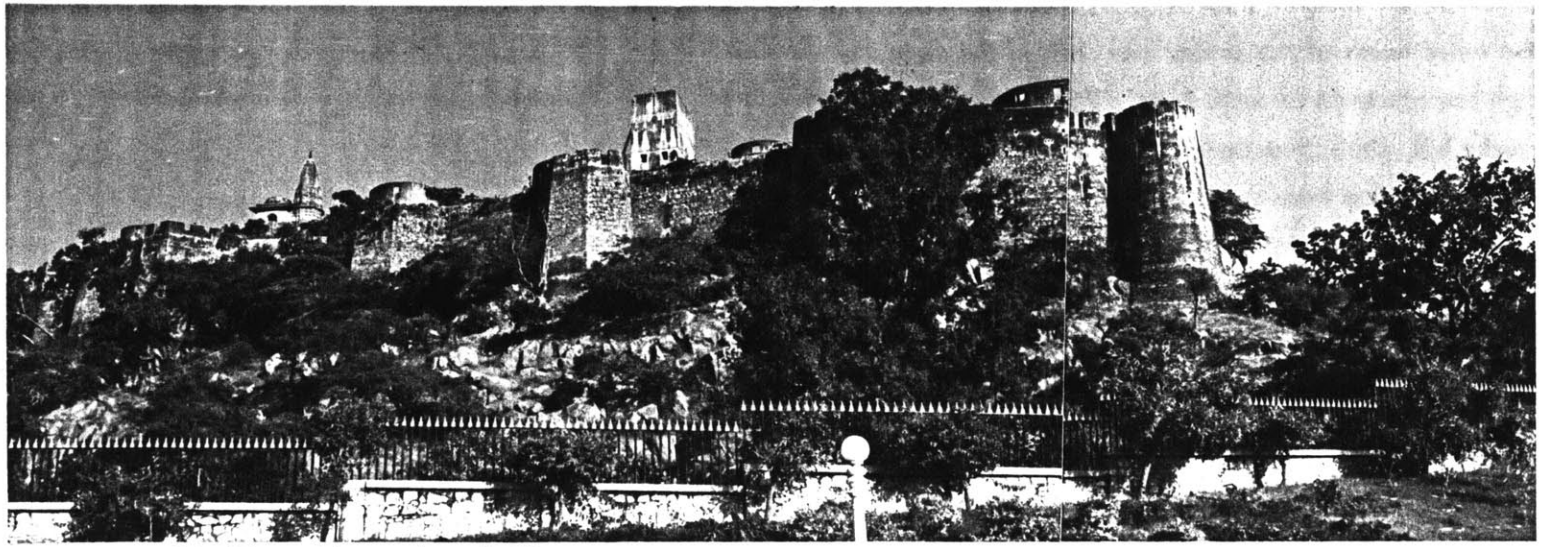
Fig. 3. View of Moti Doongri fortress from the Site.

Chapter Two

The City of Jaipur

Fig. 4. Map of India showing location of Jaipur

2.1 Birth of the City

The kingdom of Amber was established, eight kilometers north of the present Old City of Jaipur, in the tenth century. Sited on the hilly terrain of the Aravalis, it had impregnable fortifications to meet the demands of security of a growing state. In the eighteenth century under the rule of Sawai Jai Singh (1700-43), who ascended the throne at the age of thirteen, Amber flourished through the wisdom, stratagem and statesmanship of its ruler and wielded considerable power over local and small principalities.

Such siting, however, precluded the possibility of further expansion with corresponding socio-economic growth of the kingdom. In such prosperous and peaceful circumstances it was but natural that Sawai Jai Singh, a highly learned and erudite individual, aspired to found a new capital city; one which would reflect his wider consciousness and sensibilities in the many fields of science and the arts.

In realizing this task, Sawai Jai Singh was ably assisted by his architect, Vidyadhar Bhattacharya, who had successfully undertaken the construction of several structures of importance for the king before the founding of the new city, Jaipur, on 17 November 1727.

"Vidyadhar's skills not withstanding, Jai Singh's own pursuit of astronomy, arts, and particularly the study of ancient scriptures seemed to be the major inspiration behind the conception of the plan of Jaipur (now Old Jaipur). The works of Hindu, Muslim, and European astronomers were familiar to him and he was particularly impressed with Ulegh Beg's concept of an observatory city at Samarkand. For the purpose of gathering new observations he had set up observatories in five cities : Varanasi, Mathura, Ujjain, Delhi and Jaipur. Besides this, he was also thoroughly conversant with the Hindu scriptures, particularly the Vastu Shastra and those related to the fine arts."[1]

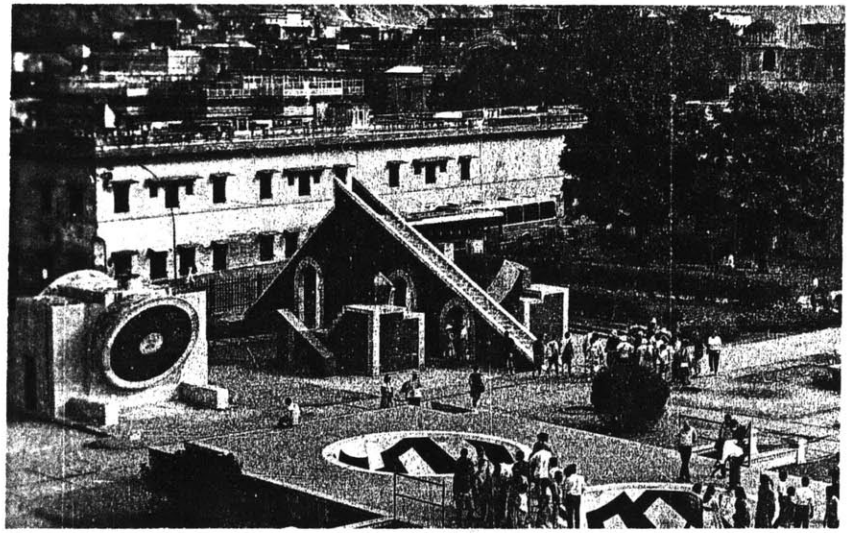

Fig. 5. Jantar Mantar - the observatory in Jaipur

2.2 The Underlying Paradigm

Scholars, based on formal analyses, have suggested that the *Prastara* concept in Hindu town planning underlies the layout of Jaipur[2]. *Mansara*, an ancient treatise on Hindu town planning, describes a *Prastara* plan as being the town which is either square or oblong in form[3]. Most often it is so divided as to

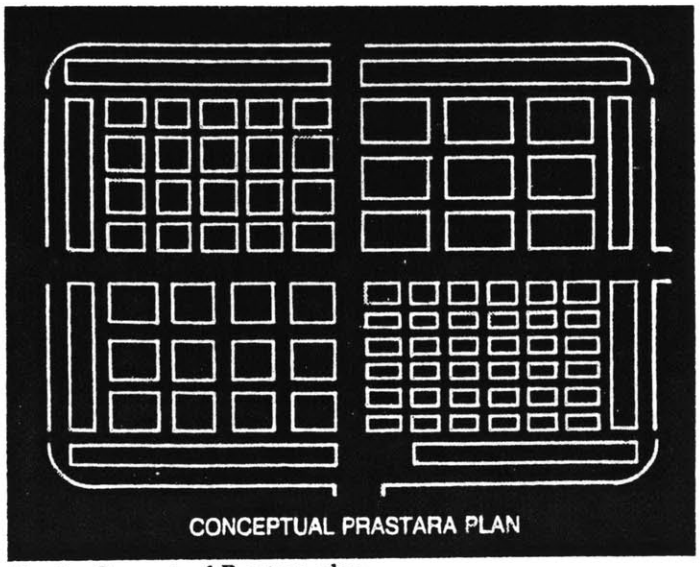

Fig. 6. Conceptual Prastara plan

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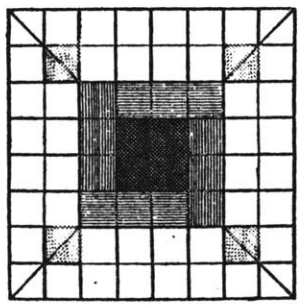
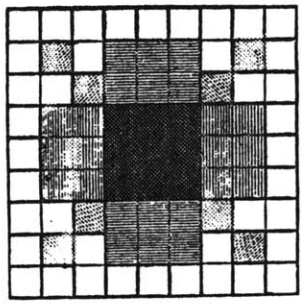
[1] Doshi, Balkrishna V. "City of Jaipur", *Architecture + Design*. New Delhi, Vol V, No. 2, Jan-Feb 1989.
[2]Volwahsen, 1973; Mitchell 1978; Jain, 1978; Roy, 1985; Doshi 1986.
[3]Begde, Prabhakar. *Ancient and Mediaeval Town-Planning in*



64-square mandala



81-square mandala

Fig. 7. Mandala

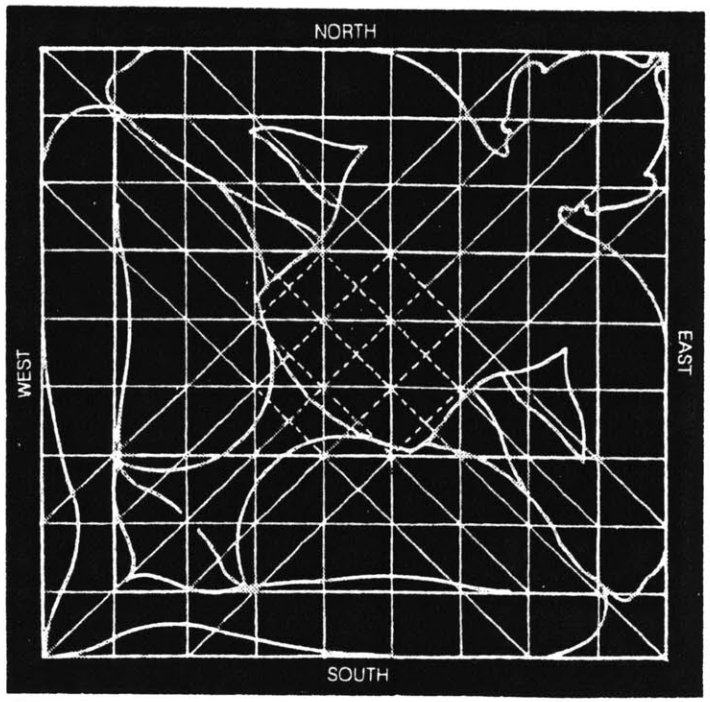


Fig. 8. The Vastu-Purusha Mandala

form the mystic figure of a *Paramasayika Mandala* (81 divisions) or a *Manduka Mandala*. (64 divisions).

The Vastu-*Purusha Mandala* represents an image of the laws governing the cosmos, to which men are just as subject as in the earth in which they build. It is seen as a certain form to which, with the aid of Gods, any existence that is undefined and does not follow any principle can be ordered up and set into a geometrical form[4]. Based on the premise that the act of building is an act of bringing ordered existence into conformity with the basic laws that govern it, the treatise suggests that the only way of ordering up a harmonious environment is to make every building endeavor, from a hermit's retreat to a city plan, to follow the magic drama of the *Vastu-Purusha Mandala*.[5]

Within the boundaries of a *Vastu-Purusha Mandala*, a *Prastara* town is divided into four, nine or sixteen major wards

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India. New Delhi, 1978.

[4]It is believed that "A long time ago something existed that was not defined by name or known in its form. It blocked the sky and the earth. When the gods saw it they seized it and pressed it down upon the ground, face downward. Brahma had it occupied by the gods to hold it down and called it Vastu-Purusha. .... Brahma had forced the undefined purusha into a geometeric form.....", Volwahsen, A. *Hindu Architecture*. London, 1973.

[5]Volwahsen, A. *Ibid*.

by an appropriate number of roads which run east-west and north-south. Roads are once again deployed to subdivide the resulting wards into plots of similar size in a grid-iron pattern. Wards that are sub-divided into a larger number of plots, consequently have smaller plots as their constituents and are occupied by people of lower ranks. All published material on ancient Indian town planing refers to distributing different castes/classes of people within the overall framework of the *Vastu-Purusha Mandala* by assigning them specific quarters with respect to the cardinal points.

The most commonly accepted speculation on the development of the layout of the city is the sequence postulated by Kulbhushan Jain (1978), which envisages the basic *Prastara* plan adopted for an orthogonal cluster of nine squares with two major roads running east-west and north-south. Jain speculates that owing to the constraints of the southern boundary of the Agra-Ajmer route (which the Mughal rulers used for their religious visit to Ajmer every year), the hill in the north-western corner displaced one square to its current location adjoining the south-eastern sector. The central square is believed to have merged with its adjoining square in its effort to accommodate certain critical functions of the palace, its gardens and the administration, in addition to the observatory.

In addition to these speculations, studies conducted by the

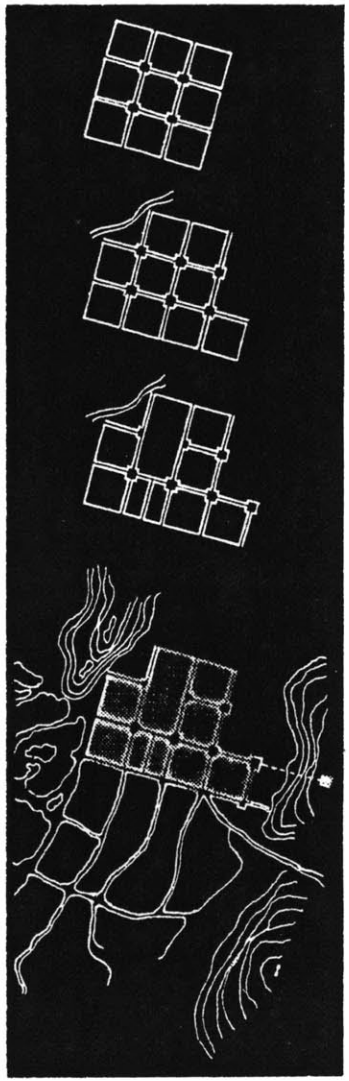

Fig. 9. Evolution of the "nine square city", postulated by Kulbhushan Jain

Fig. 10. Gangaur festival in the Old City area.

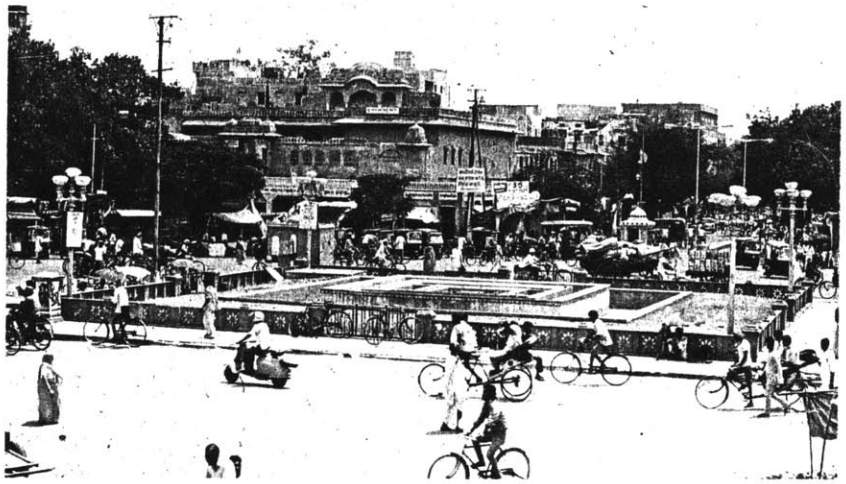

Fig. 11. The Chaupar or city square

Vastu-Shilpa Foundation under Doshi have revealed other interesting observations. The presence of a ridge occurring in the middle of the site and running along the east-west axis seems to have played a major role in locating the major north-east axial road along it, thus bringing to the layout an optimum gradient for drainage of water. Then, the deviation of the entire layout by a careful 30-35 degrees clockwise from the cardinal directions allows for maximum advantages in terms of cutting out the unwanted low angle morning and evening sun on the major east-west axis; allowing early morning winter sun to stream in but cutting out the evening sun; and aligning with the prevalent breeze direction to keep the streets cool.

Axial Streets or *bazaars*, 33 meter wide, define the *chowkris* and create market squares or *chaupars* of 100mx100m size at their intersection and terminate in city gates. The two central *chaupars* form the most distinguishing feature of urban public space in the city. Considering that the city was planned for 60,000 inhabitants the squares can definitely be considered adequate in size for public gathering on festive occasions - a tradition that persists until today.

Each of the squares or *chowkris* in the layout is 800x800 meters in size, placing the innermost resident of any *chowkri* at a pedestrian distance of less than 400 meters (5 minutes walking distance) from the hub of commercial activity. These *chowkris*

Fig. 12. Old City of Jaipur

Fig. 13. Sector Layout Plan, Old City

contain whole communities and are further subdivided by a hierarchical pattern of 16.5 m, 8.25 m and 4 m wide streets into 16 residential clusters or *mohallas* that could accommodate a village of 50/60 families. The frequency of occurrence of the streets internal to a *chowkri* depends upon the required size of the *mohallas* - the south eastern sectors for the *kshatriyas* (warriors) and the *vaishyas* (traders) have a much lesser frequency than the western sector inhabited by artisans and craftsmen. Guided by this framework and regulations regarding form and height[6] the city was allowed to develop further freely.

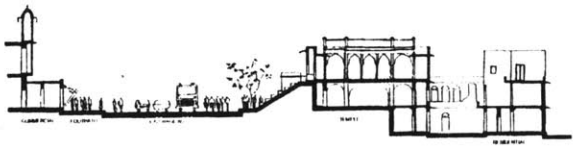

Fig. 14. Section through Ramganj Bazaar

Fig. 15. Section through Temple School

2.3 Jaipur - The Renaissance City

In Jaipur, we arrive at a point when existing procedures in building the city had been revolutionized by proposing that the act of building was something that should be conceived as a total project and carried out according to a preconceived plan. A city or a building was considered an act of the mind; its construction was the work of builders who merely carried out the instructions of this mind. It is true that already in the middle ages the Indian cities/palace complexes were a

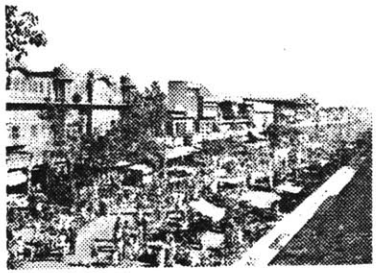

Fig. 16. The Public realm - Ramganj Bazaar

Fig. 17. The Private realm - A narrow street in a residential cluster directly behind Ramganj Bazaar.

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[6] And later color, when the entire city was painted pink in the 19th C. cf. Sahai, Yadunandan. *The Color of the Walled City and its Allied Problems*. Unpublished paper. Jaipur, 1986.

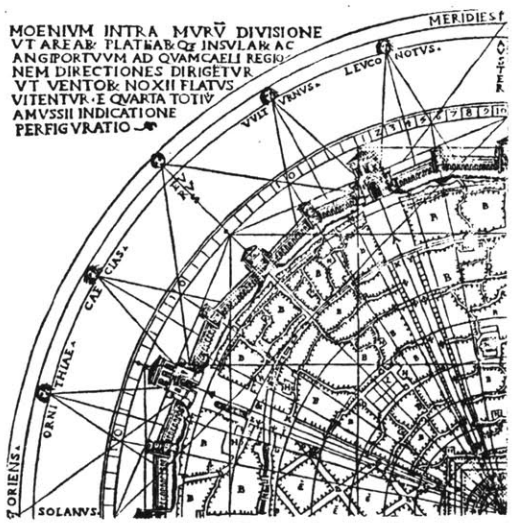

Fig. 18. A Renaissance City Plan
- A section of the "City of Vitruvius", in the reconstruction by Cesare Cesariano, 1452.

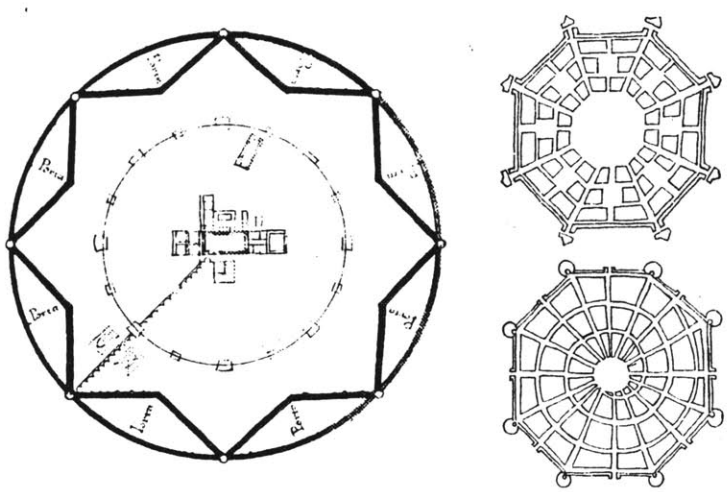

Fig. 19. Renaissance City Plans for cities on plains and hills, by Francesco di Giorgio Martini, 1451-1464.

conscious political and aesthetic object, but the traditional crafts made a greater contribution to its total semantic elaboration than in the case of Jaipur, and the role of immediate tradition was correspondingly greater. With Jaipur, in India, we arrive at a point when architecture is transformed from a craft to a "liberal art" and its practice is raised, from the realm of *doxa*, or opinion, to that of *episteme*, or certain knowledge.

During the Renaissance and in the early eighteenth century, a number of critical changes had occurred in European cities which were to revolutionize the public realm and, though somewhat belatedly, the private realm as well. G. C. Argan has noted three fundamental characteristics of the Renaissance city:[7] first, a new historical awareness which transforms the city from a commercial to a political entity; second, the revival of the platonic doctrine that the nature of the universe was geometrical[8]; third, a change in design method, which was

---

[7] Giulio Carlo Argan. *The Renaissance City*. Trans. Susan Edna Bassnett. New York, 1969.

[8] It is important to note that, as Karl Popper has pointed out, this doctrine was instrumental as well as metaphysical; the development of modern science was due to the fact that a Platonic view of the world yielded insights that could be checked by observations and form the basis of predictions. See Popper. *Conjectures and Refutations : The Growth of Scientific knowledge*. New York, 1968. ; in Colquhoun, A. *Essays in Architectural Criticism : Modern Architecture and Historical Chnage*. Cambridge, Massachusetts, and London, England, 1985.

virtually the invention of a single man, Fillippo Brunelleschi.

Similarly, the entire city in the case of Jaipur, was projected in this manner and reflected the triple Renaissance values - political meaning, geometrical construction, and a conscious totality. The layout of Jaipur was thus concerned with linking the city with the heavens, either by recreating the structure of the universe in the form of a sacred *Mandala* or by incorporating into the city, a means by which the heavens may be observed and the movement of the stars measured. Interestingly, the central position in a *Mandala* is occupied by Brahma, which could readily be interpreted as the position of the king in the case of a monarchy. Locating both the palace complex and an observatory in such a position in Jaipur, as to study the heavens (Brahmand) further strengthens the symbolic case sought to be made of recreating the city of Jaipur in the image of the universe.

Available records indicate that Jai Singh also took special care to invite groups of traders and craftsmen to assure them of the success of the new city he was establishing. Being conscious of the social and economic interdependence in a tradition-bound society and its hierarchical nature, Jai Singh planned different zones of the city in conformity with the principles of the Vastu Shastra. Accordingly, brahmins were allocated areas in the north, Kshatriyas in the east, Vaishyas in the south and

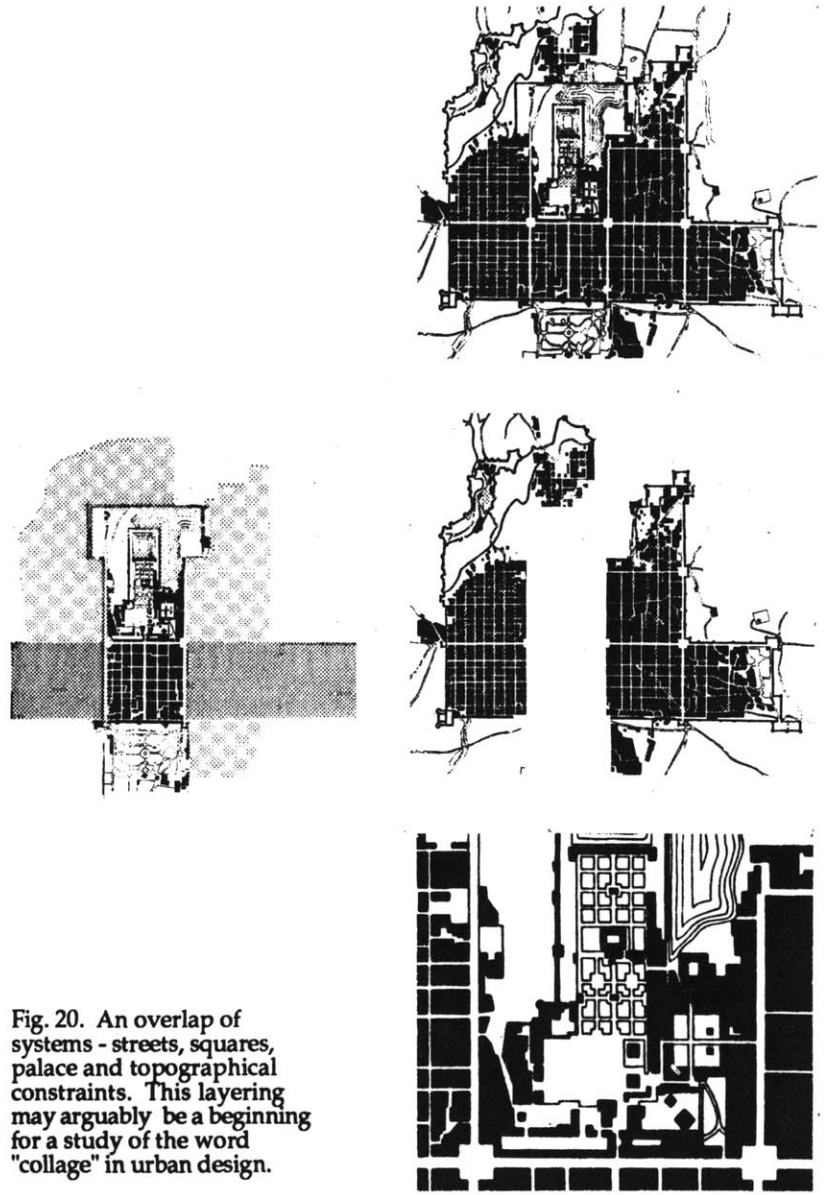

Fig. 20. An overlap of systems - streets, squares, palace and topographical constraints. This layering may arguably be a beginning for a study of the word "collage" in urban design.

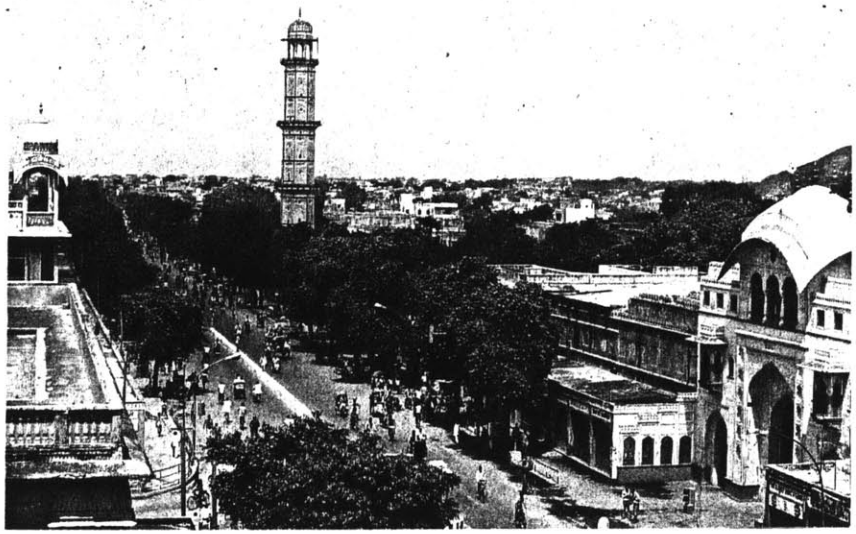

Fig. 21. A Democratic Public Realm
- the edge of the palace against a major street.

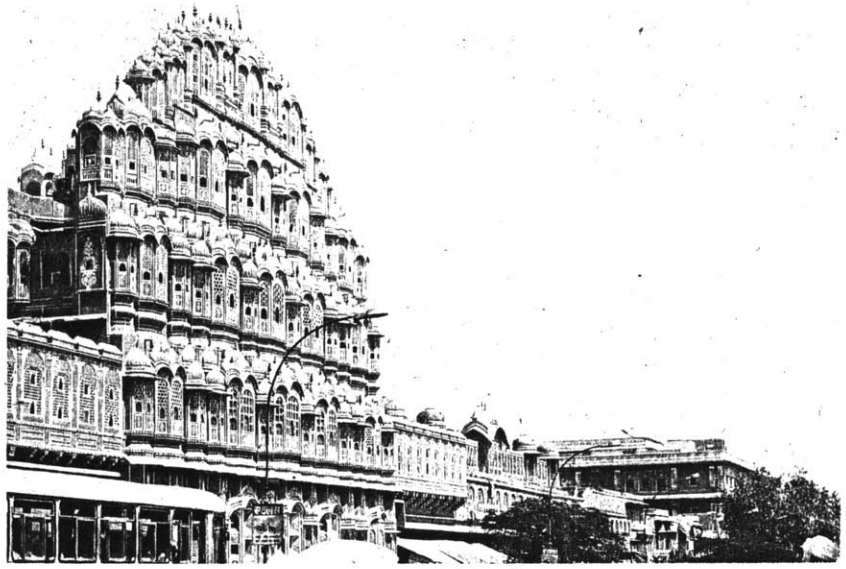

Fig. 22. Hawa Mahal - Representational Facades

Shudras (artisans) in the west. This arrangement was responsible for strengthening the economic base of the city, and commercial facilities and major roads were among the first structures to be constructed.

That the structure of the layout denotes a democratic character can be noticed in the neutral grid-iron network that does not unduly stress on any particular area in the city and is "open-ended but not endless"[9]. In fact, despite the many controls, the resulting urban experience is quite modest in its character. None of the axial roads terminate in any authoritarian manner into palaces or monuments and there is no imposition of the monarchy onto the urbanism of the city. In most cases the major axial streets relate, in long perspective, to temples located in the hills.

Not only the city structure but even individual buildings and architectural details confirm this certain designed nature in the architecture of Jaipur. It seems clear that in the city there were two types of structures : representational buildings and ordinary habitations. There is admittedly a fundamental difference between the medieval Indian cities and this "Ordered" city. In the former, both representational and private buildings were constructed according to the principles of

[9]Doshi. *op. cit.*

craft tradition, upheld by the guilds, and transmitted, like an aural literary tradition, by rules of thumb. In the case of Jaipur, both the aesthetic and the constructional codes became subject to systematic theory, and art and science were harmonized through the epistemology of a geometric universe. So radical is this difference, that it reflects a new split between the ruler and the ruled.

The palace became the symbolic representation of the *logos*, rather than a natural forum of the masses, and the city consisted of an undifferentiated mass of houses or tenements out of which emerged the buildings which represent the mythos of collective life - social, political, and intellectual. The palace was no longer an object placed on a hill detached from the common inhabitants of the city, but a private realm defined merely by a wall, governed and ordered through geometric rules, proportions, color and material similar to those of any other structure defining the public realm. The meeting place between the palace and the common realm was an understated affair.

Some classical facades of Jaipur were measured drawn and formally analyzed - *Mandir Sriramchandraji* area in the walled city by Pranay Deep (Center for Environmental Planning & Technology, Ahmedabad, 1987), and the *Ghat Ki Guni* area facades by me later in 1989. A striking feature of

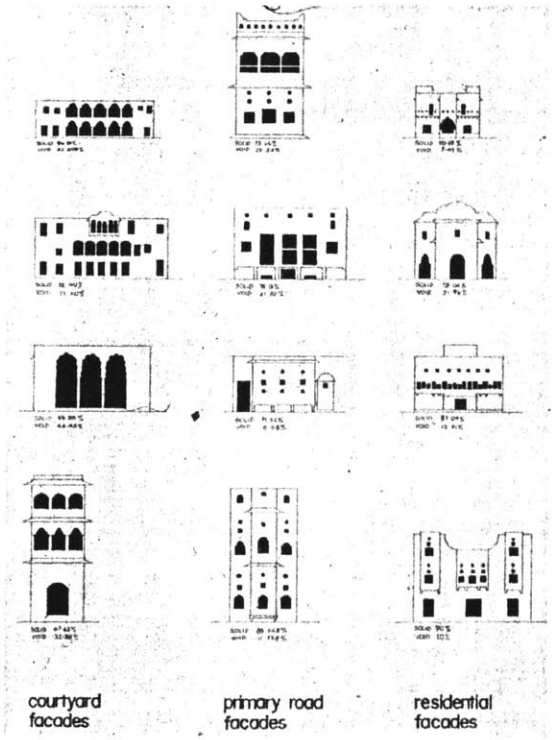

Fig. 23. Facades of Jaipur havelis.

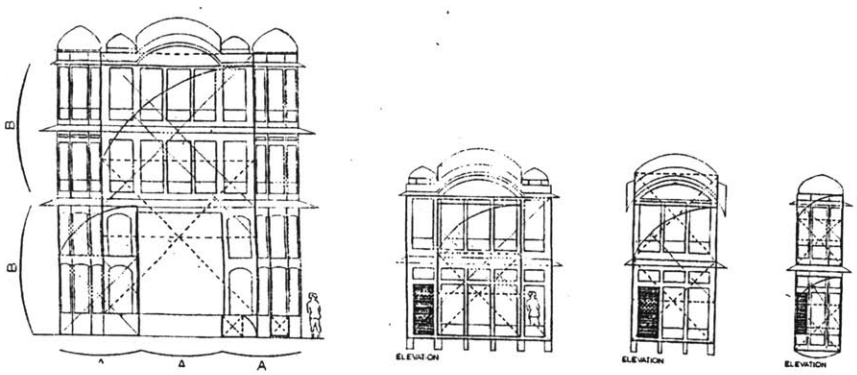

Fig. 24. Elements of classical Jaipur facades constructed as Golden Sections.

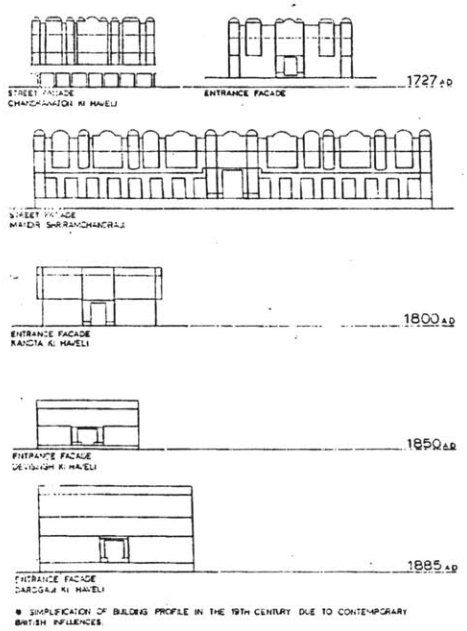

Fig. 25. Transformations in Jaipur facades.

these studies was that each of the classical facades done during the early eighteenth century period in Jaipur were found to have been structured through principles of geometrical construction, employing Golden Sections. Not only were the entire facades reducible as Golden Sections, but each of their constituent elements - the *Jharokhas*, the balcony, the archways, the central gateway, the bay windows and the turrets - were ordered as Golden Sections in their own right. This suggests that construction of these buildings was not simply the result of the efforts of a guild or craft passed over generations but that ideas and concepts of geometric proportioning by a single mind were being followed.

Indeed, in Jaipur we look at those inherent values that had become a part of any Renaissance city plan - we see the image of a community whose organic unity is metaphorically expressed in terms of geometric forms and by the geometrical dominance of the Palace or public square. The city is conceived as a solid, carved up by streets, hollowed out by squares, and articulated by public buildings. The individual house does not contribute to this imagery. The prolongation of the public realm that takes place by means of unified street facades and residential squares does not radically alter the status of the private dwelling.

The design of individual houses behind facades was often left to the private individual or entrepreneur, none of which

originally ever opened out on the public axial streets. Even in the subsequent developments of the nineteenth and the twentieth century, where the houses were and are designed at the same time as the facades, the houses conform to the public order of the facades rather than presenting themselves as independent components.

The structure of the walled city of Jaipur, more than two hundred and sixty years old now, is still so strong that one is continually reminded of the distinction that has always been fundamental to the economy and mythology of the city - the distinction between the public and private realm. Demonstrating a highly developed sense of urban space through the celebration of the public domain at the expense of rejecting the freedom of the individual, Jaipur reflects a sensitivity towards a reciprocity between the private and the public realm, whereby the validity of the former depends upon its ability to shape the latter.

The public realm is representational; it not only housed activities of public and collective nature but it symbolized these activities. The aesthetic of public architecture consisted of a second-order language organized, to use a linguistic analogy, into syntagmata, and constituting a complete text. The private realm, on the contrary, though still comprised of aesthetic formulae common to the whole society, was not

Fig. 26. The Private hidden behind the Public.
The steps lead up to a Temple-School.

Fig. 27. Entrance to Ghat ki Guni
- The Samander Pol.

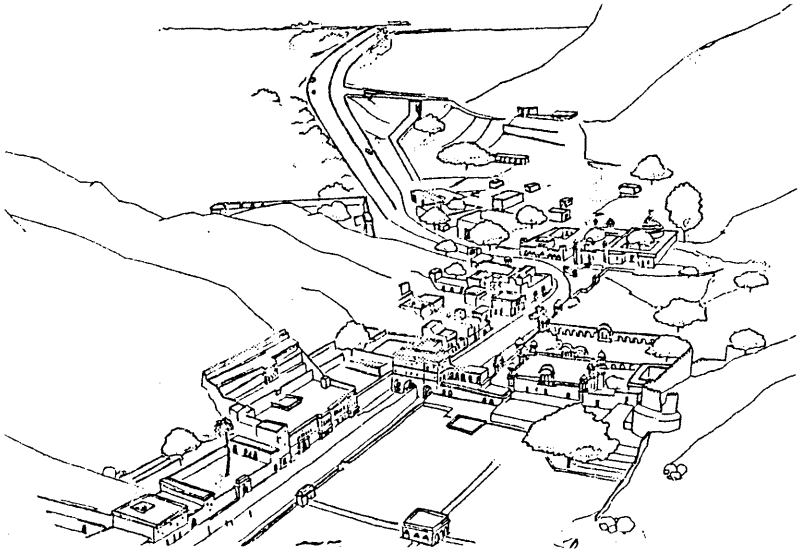

Fig. 28. An aerial view of the havelis of Ghat ki Guni.

representational in the public sense, and was the property of the individuals who were free to use them - much as one uses everyday language as a personal possession.

In the eighteenth and nineteenth century the city belonged to the merchants and artisans, who still make up the primary inhabitants of the city. The representational elements were the palace, the fort above, the city squares, and the city gates. All these elements constituted a collective investment. Individual houses, on the other hand, were not financed as whole groups. Although the town was laid out on a regular grid and all the plots were identical, the housing consisted of a kind of connective tissue. The public realm of the town consisted of the axial roads, and the city squares, occurring at their intersections and converting them into covered arcades.

It is true that sometimes, as in the *Ghat ki Guni* or in the Palace area, the street is made up of individual mansions. But here each house is thought of as a palace, and a whole class of inhabitants takes on a representational role - the class of aristocrat or man of wealth, whose representational function corresponds with its instrumental function in society.

2.4 Jaipur - Growth Scenarios

1. Extrapolating the present rate of population growth, i.e., 4.13 % during 1971-81, the population of Jaipur city by 2016 is expected to be 5 million. The projected WPR (Work Participation Rate), based on observations made between 1961-91, is 30.5%.

2. The master plan envisages the total developed urban land in the city by the year 2016 to be 13,557 Ha. Taking the *existing number of workers in the city per hectare* of developed urban land, the master plan projects the total number of workers in the city by the year 2016 as 1.2 million - a four fold increase since 1985 !

3. The Occupational Structure : Of the several growth scenarios sketched in the master plan, the low growth scenario - one that is most likely to occur in any event - projects the growth in employment/ annum, as 4.16 %[10]. Accepting these low growth trends, the total number of workers in Jaipur by the year 2016 has also been projected as 1.03 million.

4. Observations over the last two decades have shown that there was no increase in the total amount of industrial and commercial land in the city, while the number of workers increased at a rate of 4.16% per annum. The available land in these years was thus being used more intensely. It is very likely that the trend will continue.

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[10]based on past trends observed between 1971 and 1981.

5. The city has to provide employment facilities for a minimum of 1.03 million workers by the year 2016. However, analyses done by National Transportation Planning Commission (NATPAC) have shown that the employment potential in the non-residential urban land created in Jaipur by the year 2016 is only 0.44 million.

This value is less than half the projected requirement of 1.03 million (assuming low growth trends) or 1.2 million (based on current growth observations). Therefore, it is apparent that the master plan provisions for urban land generating employment opportunity is grossly on the lower side.

It seems then, that there will have to be some policy decisions taken before the term of the master plan expires to reduce worker density in the use of non-residential urban land.

Even if it is assumed that they will bring down the land use intensity by half the difference between the lower of the projected requirements of 1.03 million and the observed potential of 0.44 million (i.e., the land use will accommodate 0.73 million workers), there still remains the need to identify work centers for the balance 0.3 million workers over the next two decades.

Chapter Three

The Site

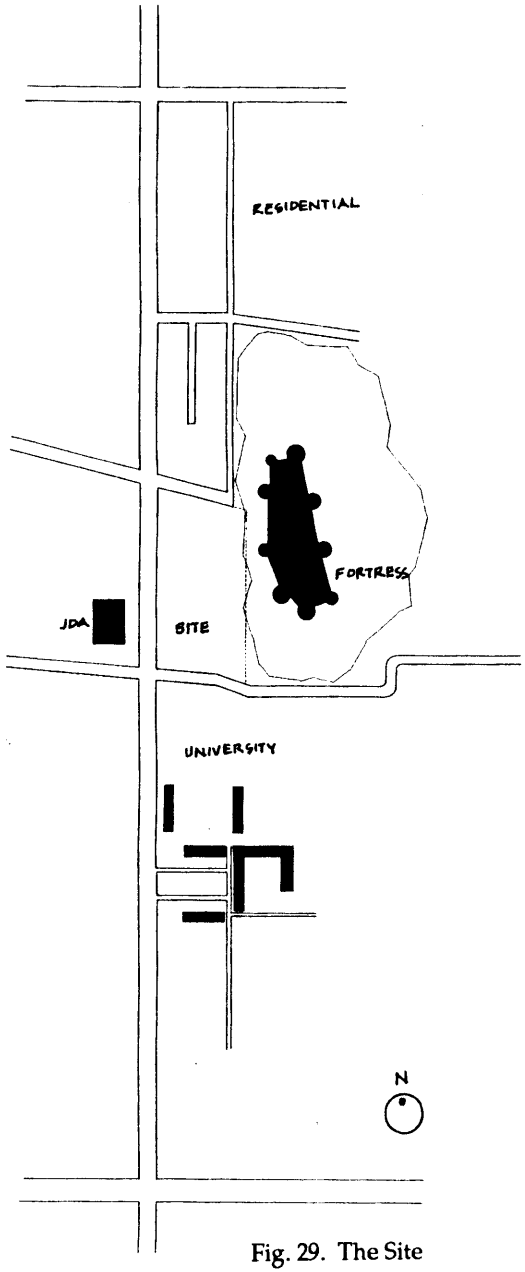

Fig. 29. The Site

3.1 Location of the Site

The site chosen for this study is a rocky and slope terrain at the base of the *Moti Doongri* fortress, measuring approximately 50,000 sq. m. in area. This is located roughly 2 miles south of the walled city, on the SMS Highway, and is shaped by the intersection of the highway with the major road connecting to the *Jawahar Nagar* residential area.

Free of the rigid urban design constraints of the walled city, the physical context of the site is shaped by the strong presence of the rocky hill, the silhouette for which is formed by the *Moti Doongri* - a fortress from the nineteenth century, with monumental walls and bastions growing out from the slope of the hill, belonging to the royal family of Jaipur. In the immediate vicinity of the site, located on its south side, is the rocky and sandy terrain of the neighboring Rajasthan University. On its north and west sides, the site is surrounded by a low density, middle and high income residential area, comprising of anti-urban bungalows and government offices, setback from their plot lines and hidden behind large trees and boundary walls which define the public right of way. Along the western edge of the site runs the SMS Highway, which intersects with the road running between the university and the site along the southern edge.

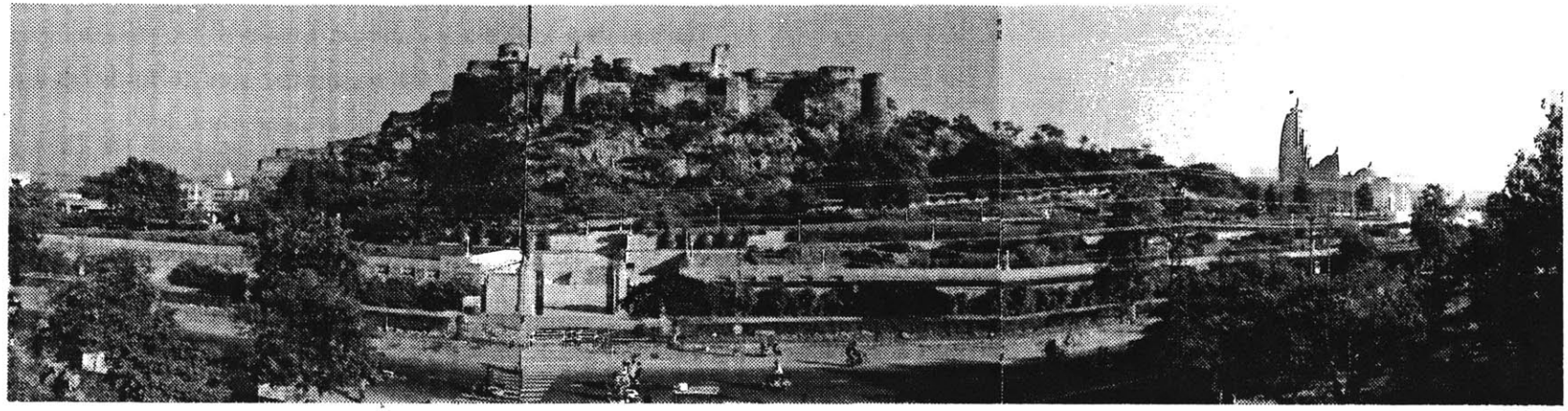

Fig. 30. Panoramic view of site looking eastward.

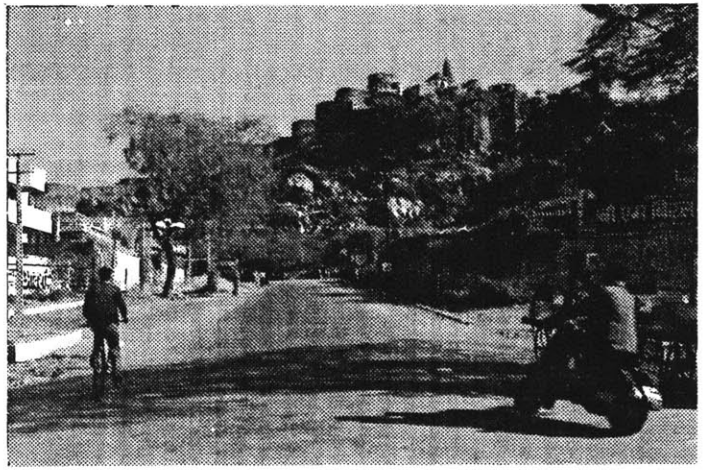

Fig. 31. View along street on northern edge of Site.

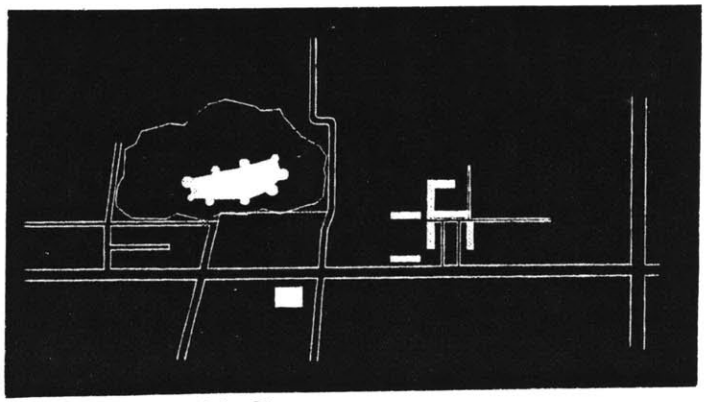

Fig. 32. Vicinity of the Site.

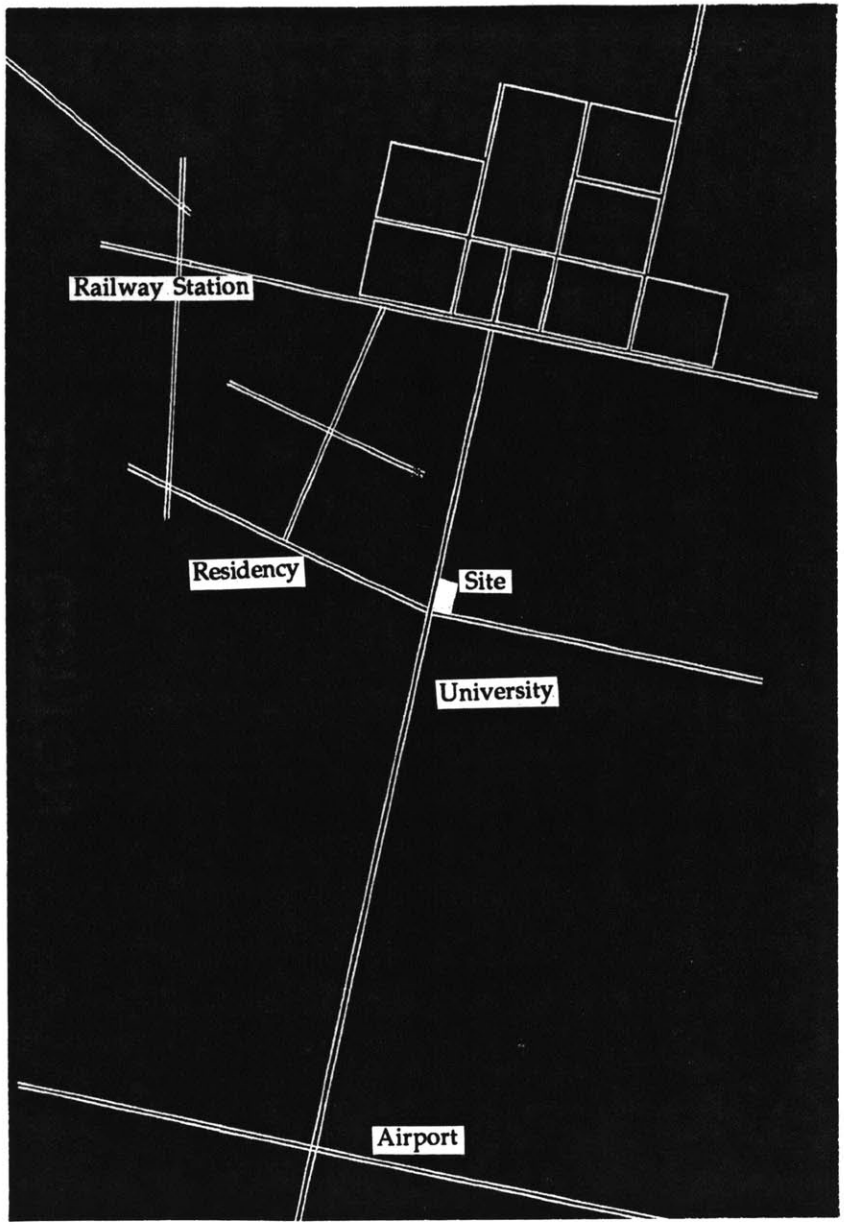

Fig. 33. Location of Site.

The site thus acts as a transitional zone between the low lying, sprawling character of the residential area to its north and west, and a major institutional zone to its south.

3.2 An Analysis of the Potentials of Site Location

1. The land use plans in the 1991 master plan for Jaipur show that the site chosen for development has not been planned/projected for any industrial, commercial, government, public, semi-public or residential activity. This area has loosely been classified as recreational or green belt zone.

2. In 1963, the walled city had only major arterial roads under commercial use, which gradually spread to secondary and tertiary streets. By 1983, the walled city had become the Central Business District for the city of Jaipur.

3. The growth patterns in the city structure over the last few decades have largely been governed through the following :

- Attributing higher status and prestige to the residential development toward south has resulted in a low density sprawling character with little or no business activity save local commercial facilities. The decision to locate the

Rajasthan University has further ensured this pattern.

- The decision to locate major industrial zone toward west and north-west of the walled city implies that,

  (1) An increasing thrust on the residential activity in this direction.
  (2) A natural extension of the commercial activity toward these zones from the walled city.
  (3) A majority of the squatter settlements will locate themselves in this direction.

Urban growth beyond the walled city, since the early 20th century, has largely depended on the development of institutional landmarks (such as the Railway station, the British Resident's Bungalow, the Civil Lines, and the Rajasthan University) as strong nodes, defining between them interstitial spaces that subsequently fill with residential fabric at a very rapid pace.

3. The presence of the rocky Aravalis has prevented any development to the north and the east of the walled city and ensures all further development to proceed southward and westward.

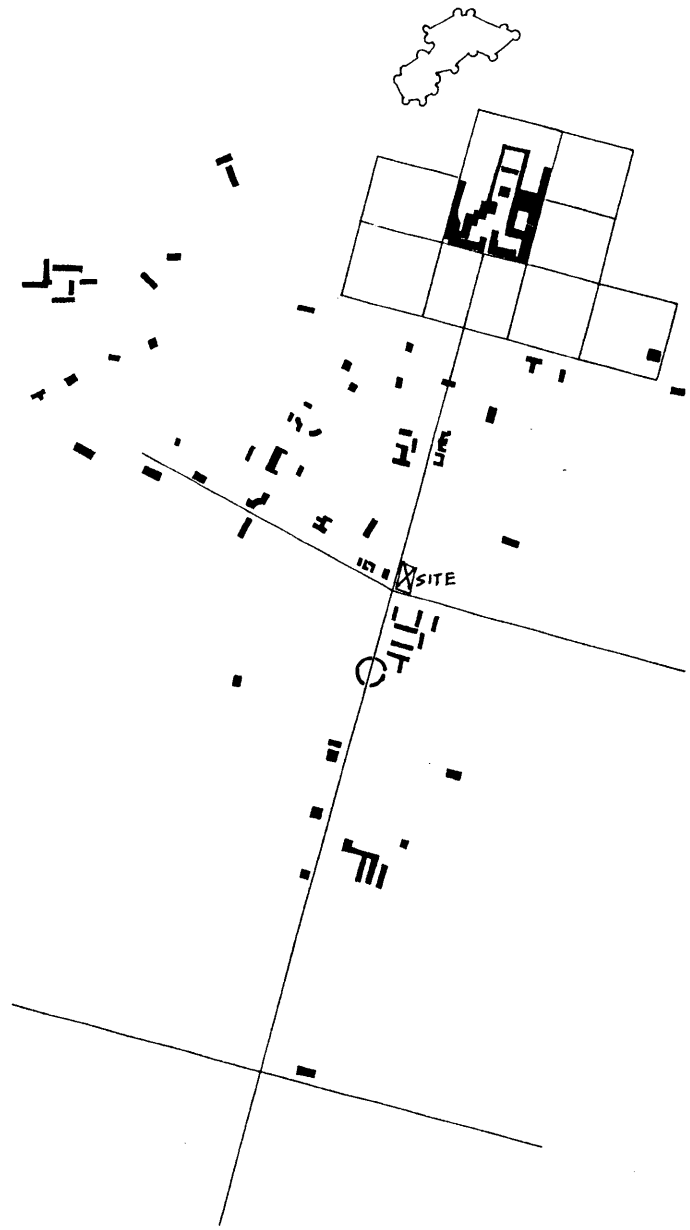

Fig. 34. Major Institutions in Jaipur.

In the light of the above observations, the site selected for development assumes increased importance in its potential to alleviate, to some extent, the acute shortage of urban land capable of supporting work centers on it. This chunk of loosely identified urban land, due to its strategic location also provides an opportunity for the creation of one such strong landmark that binds the loose development of institutional and commercial activity occurring outside the walled city, and thus increases the potential of several hectares of open land south of the walled city for further development. This will not only relieve the excess pressure on the walled city, which at present is the only organized business district in the city, but will also work as a counter-magnet to the strong industrial and institutional development that is generating rapid urban growth westward, by inducing development toward south .

3.3 Criteria for the Selection of an Appropriate Function for the Site

Owing to the transitional nature of the site, located between a sprawling residential area and the inward looking Rajasthan University, the site assumes an important role by providing the potential to be developed as an outreach arm of the University towards the city.

Jaipur, at present lacks a public library for its citizens and certain other important public buildings, such as museums, office buildings for research and documentation, organized crafts institutes, and work centers, a pressing need for which has increasingly been recognized by the Jaipur Development Authority in the past decade. Associating such critical functions in a city with an important institution as the Rajasthan

University, which is otherwise only an enclosed campus, of interest to an elite few, to my mind offers interesting possibilities for fostering a close collaboration and working relationship between the community at the university and a skilled working class.

Likewise, proposing faculty housing on this site integrated with these public functions makes a strong social statement on behalf of the university towards the city. Such proximity of the intellectual class to the skilled working class is perhaps the need for a healthy overall development of an otherwise polarized and heavily class ridden society.

Another significant feature of the location of the site is the absence on any organized commercial activity in a 2 mile radius of the site. The nearest location for such a development are the walled city commercial zones or the Raja Park commercial area, which are under a severe pressure due to the increasing population they serve. Clearly, under the present trend of increasing residential development in this area southward, it would be very crucial to induce the development of an organized commercial activity that not only relieves the walled city of the increased pressure, but also provides for the much needed service and income in the area.

3.4 Proposed Program

Based on the analysis done above, the program proposed for this site is a complex consisting of a mix of public buildings, such as a large public library, offices for research and documentation, museums, a crafts institute, several workshops, and faculty housing for the university. A large amount of area for an organized commercial activity has been also been proposed.

Permitted FAR	*1.5*
Permitted Maximum Ground Coverage	*50 %*
Total Site Area (sq. m.)	*51,150*

A. Crafts Institute	**450 workers**		
		AREA	sq. m.
	workers	covd.	open
1. Terra-cotta	100	200	1500
2. Jaipur Blue Pottery & Tile-work	50	300	200
3. Jewelry	50	600	
4. Metal-work	40	750	500
5. Leather-work	30	500	500
6. Wood-work & Puppetry	50	500	500
7. Quilts	50	700	1000

8. Stone-work		50	500	500
9. Musical Instruments		30	500	200
10. Dormitories for Visiting Craftsmen		25	225	25
SUB TOTAL		**450**	**4775**	**4925**
B. Workshops		**125 workers**		
1. Textile	Block Printing & Mirror Work and Embroidery	70	500	100
2. Weaving	Cotton	25	500	100
3. Art Galleries (3 nos.)		30	400	200
SUB TOTAL		**125**	**1400**	**400**
C. Museum				
Total Display Area			12500	0
Administration & Storage			400	0
SUB TOTAL			**12900**	**0**
D. Performing Arts				
Outdoor Theater for 200			**200**	**500**

E. Jaipur Public Library

Shelving Books & Slides/AV Tapes	7875
Reading Halls	1780
Staff	150
Addnl.	150
SUB TOTAL	**9955**

F. Offices

Total Office Space	6000
Lecture/Seminar/Conference/Theater (3 nos.)	80
Addnl.	200
SUB TOTAL	**6280**

G. Commercial Space

1.	36 @ 120 sq. m. ; 20 @ 82.5 sq. m. ; 20 @ 55 sq.m.; 21 @ 50 sq. m. and 7 @ 95 sq. m. at the Ground Level of Housing and office buildings	8785
2.	16 @ 70 sq. m. and 16 @ 50 sq. m. attached with the crafts institute	1920
3.	Emporiums and Museum Shops : 4 @ 200 sq. m. and 5 @ 150 sq. m.	1550
4.	Cottage Industries Showroom : 1 @ 400 sq. m.	400

SUB TOTAL	**12655**

J. University Faculty Housing

108 D.U. of 196 sq. m. each. on plot size 11m x 11m	21168
108 covered garages for 2 car parking capacity each	3250
SUB TOTAL	**24418**

GRAND TOTAL	**72583**
Proposed FAR	**1.42**

Chapter Four

The Design

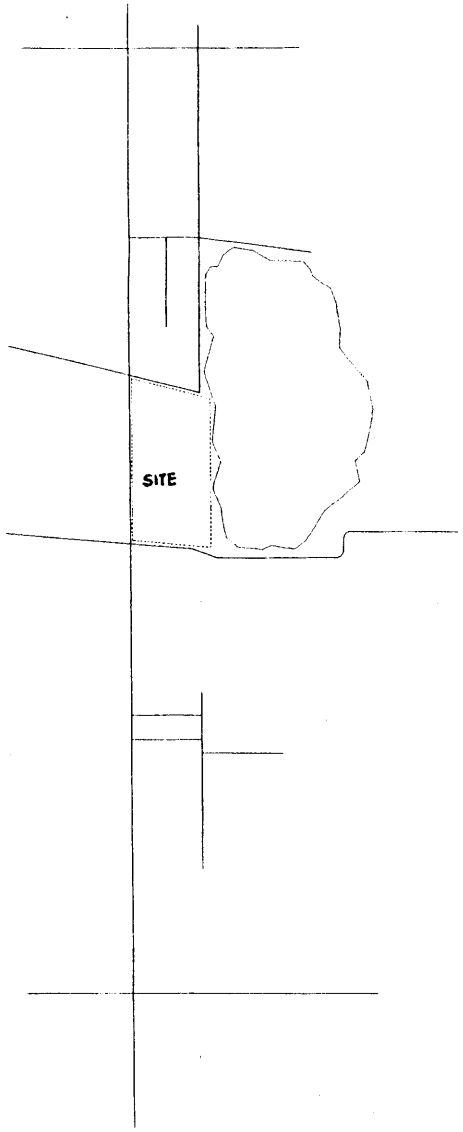

Fig. 35. Streets defining Site and its environment.

4.1 Design Approach

The task was conceived to be of a dual nature :

First, to understand the ordering principles that generate the high urban form of the walled city of Jaipur, and to deploy these ordering principles in communion with the built and natural organizing features of the site landscape to develop a thematic field; and secondly, to inhabit the order thus developed and the *form it potentiates*, with the specificity of a given program and a design.

4.2 A Reading of the Site Context

The site is a transitional zone and strikes an observer with the following distinct characteristics :

1. A rocky terrain, with a major slope along its East-West axis, builds the site up into a hill, culminating in a dark gray monolithic mass of a nineteenth century fortress, presently the residence of the Prince of Jaipur.

2. Next, it acts as a transitional zone between a sprawling residential area to its North and West, and a major

institutional zone comprising the Rajasthan University, several other colleges, educational and cultural institutions, and offices to its South.

3. Finally, there is a complete absence of any urban character in the area due to surrounding anti-urban bungalows. These bungalows are setback from their plot lines and hidden behind trees, vaguely flanking boundary walls defining public right of way. The roads merely act as connecting links between plots, most of which are occupied by large houses only partially visible from the main roads. There is a complete absence of any commercial activity in the entire zone, the nearest organized commercial area being the walled city or the Raja Park commercial area.

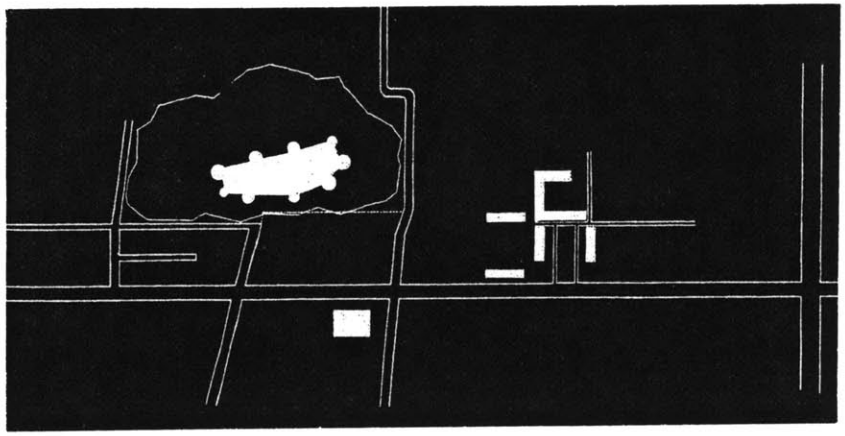

Fig. 36. Location of Site.

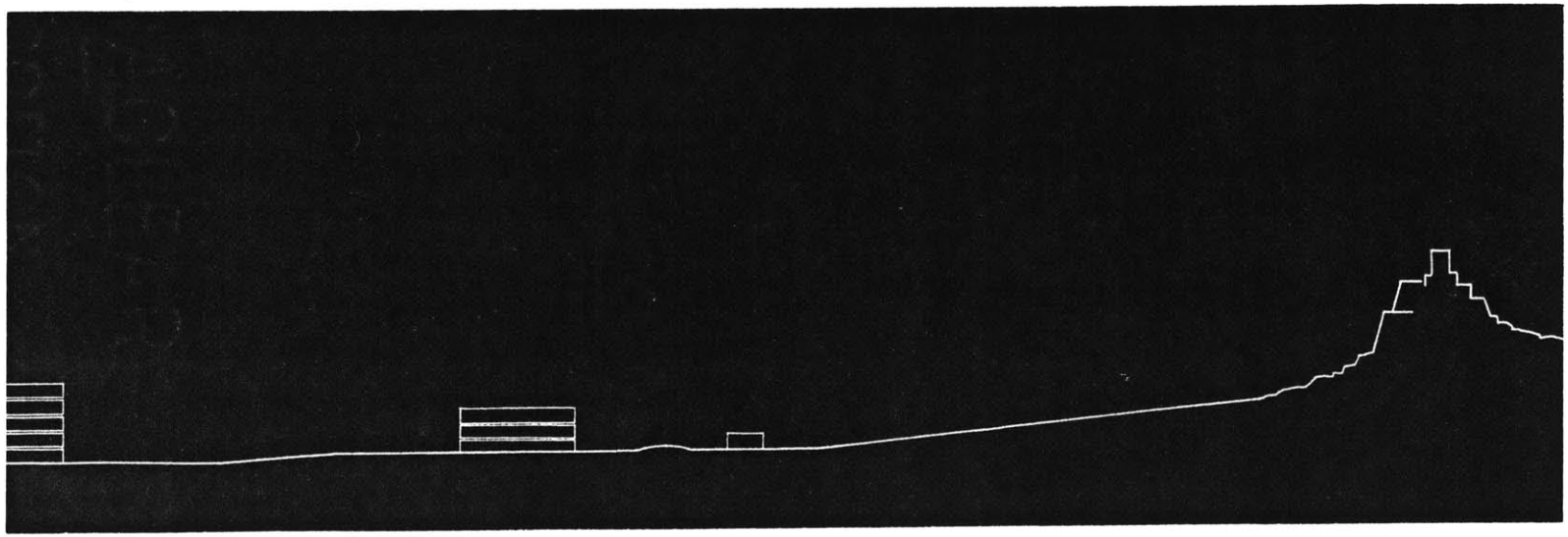

Fig. 37. Section across SMS Highway and Site.

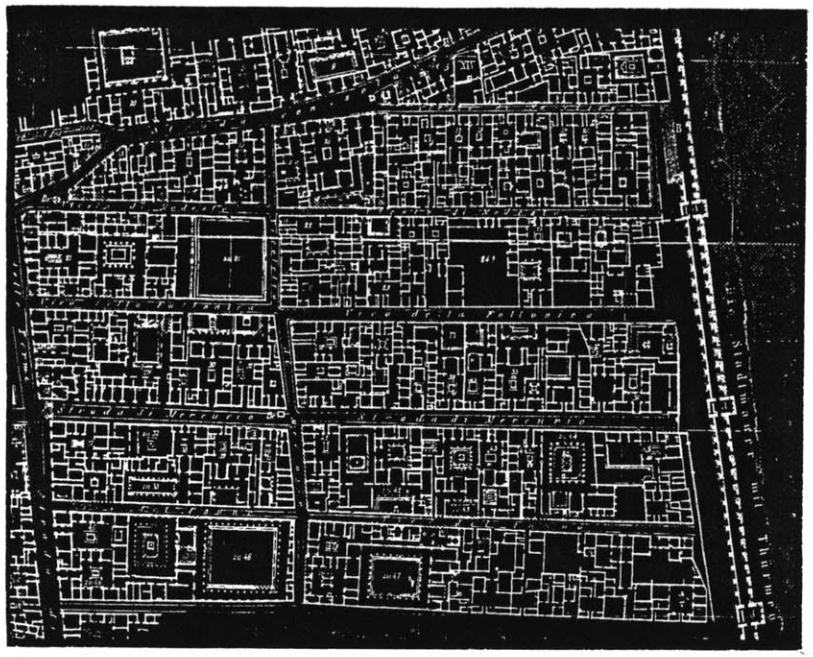

Fig. 38. Pompeii as an example of a continuous architectural field. The field can be read in two ways : first, as a deployment of walls and columns, following certain continuous patterns across the whole field; and second, as a combination of *territorial* units.

4.3 Ordering the Landscape

As articulated in Sections 1.1 and 1.2 of Chapter One of this thesis, the concept of a theme is understood as one which allows us to connect and to communicate ideas to others through implicit understandings and conventions. Someone who can recognize the theme will know what the designer is trying to express. This communicative power of the theme is also found in systems. A system emerges when we seek to establish rules. It gives us a choice of elements and their allowed relationship in space. By approaching systems this way we can see their thematic potential, which can serve as a means for generating variety by following rules. Within a theme, the constraints are implicit; in a system they are spelt out explicitly. Thus, a system then may be considered *rules*, while a theme, *convention*. Both, themes and systems, are means of *creating* constraints on what we do.

Once the thematic is understood as a means to guide our actions and connect to others, violating the theme or the convention, and creating the non-thematic, opens up possibilities for a powerful expression. It is this tension between the thematic and the non-thematic, between the special and the conventional, that brings out the qualities of Form. 11

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11 cf. N. John Habraken. "The Control of Complexity" ,*Places*, A Quarterly Journal of Environmental Design, Volume 4,

Thus, when rules, set up by the recognition of constraints derived through abstracted site conditions, are applied on a thematic field, we create a system. This system, which is a combination of the intuitive and the rational, defines Order through the constraints it sets up. An Order which *potentiates* Form. It is Form, potentiated through sufficient constraints, and identified through internally and externally generated notions, which provides the designer with the framework required to inhabit a program as a realm of spaces, through the highly personal act of Design.

Of course, the elements, creating the space that gave birth to the system, must be chosen so as to give the design, that inhabits it, a social context. Variation of Form, and consequently of Design is possible within the rules that the system has imposed.

To demonstrate the ideas articulated above, the design process followed in developing a proposal for the site selected was recorded at every stage, and has been described in the follwing sections.

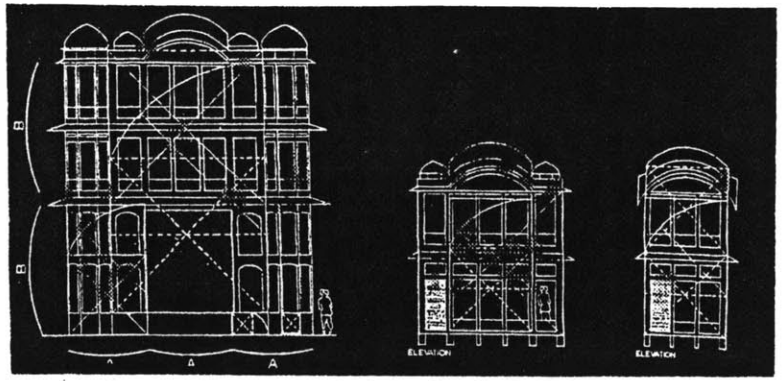


Fig. 39. Field deployment applied to a facade design. Each is structured geometrically as a Golden Section.

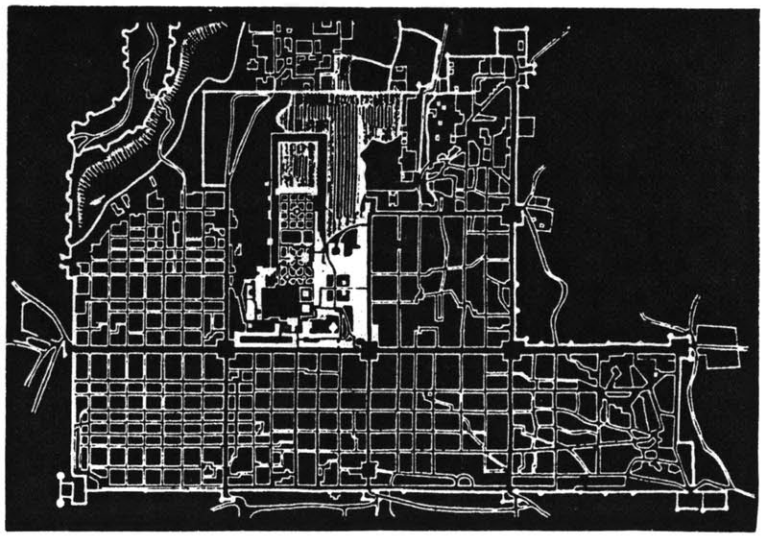


Fig. 40. Jaipur as an example of field deployment through a system of streets, squares, palace, clusters, and facades.

Number 2. Cambridge, Massachusetts, 1987, pp. 3-13.

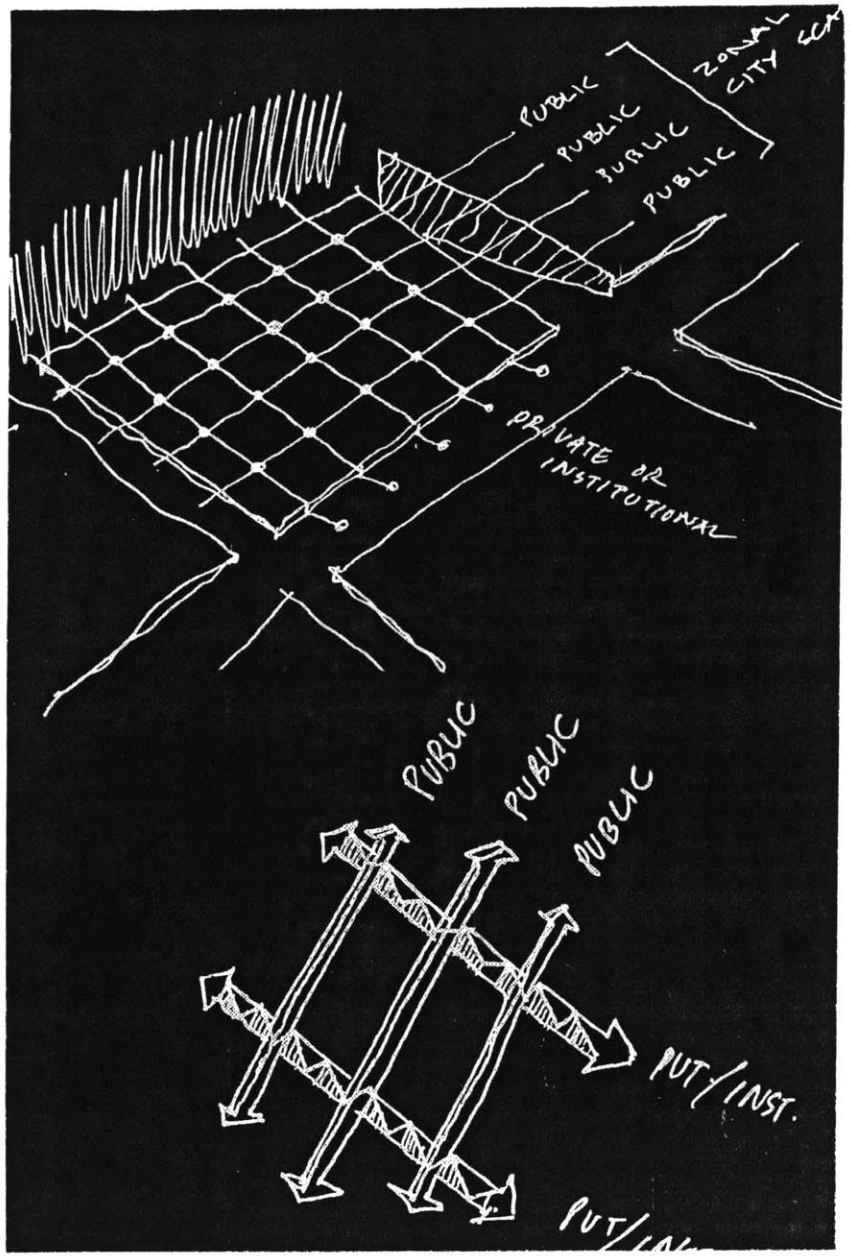


Fig. 41. Sketches illustrating the theme.

Step 1 : Beginning with a Theme

Based on the epistemology of a geometric universe, the city of Jaipur is ordered in geometric form through the deployment of a homogenous grid and by the geometric dominance of the palace and the public squares. Conceived as a solid carved up by streets, hollowed out by squares, and articulated by public buildings, the private realm of the city conforms to the public order of the facades rather than presenting itself in independent components. Demonstrating a highly developed sense of urban space through the celebration of the public domain at the expense of rejecting the freedom of the individual, Jaipur reflects a sensitivity towards a reciprocity between the private and the public realm, whereby the validity of the former depends upon its ability to shape the latter.

In an effort to make a definite statement that resonates with these powerful notions serving as generators of the indelible urban form of Jaipur, and in an effort to order the landscape as a microcosm of the city, a continuous and homogenous orthogonal grid was imposed on the site. The north-south axes were laid parallel to the major north-south street, representing public order at the city and zonal scale, and the east-west lines along the slope, representing public order at the local level of the site, and the built form it supports. These lines, and the nodes

resulting from their intersection, then offer interesting possibilities for articulating the public and private domains through deployment of the natural slope of the site.

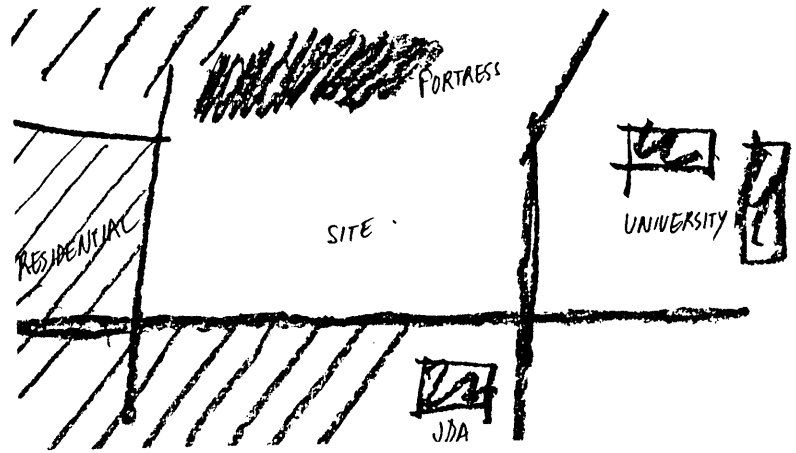


Fig. 42, 43. Reading Site Context.

Step 2 : Recognizing Constraints

By recognizing the gradients and deployment constraints through an abstraction of site conditions - from the residential to the institutional, and from a major road at a lower level (and consequently a high intensity of public use) to the private fortress at a higher level (with no public role save a visual one) - the field is no longer neutral and must be responded to. The predominantly continuous and homogenous grid was thus articulated with distinctions by designating particular properties to identified zones.

Step 3 : Developing a System

1. The orthogonal grid imposed on the landscape is connected to the edge conditions of the site. Along the north-south axis the north edge of the site picks up two streets - one, a major public street, and the other, a residential street terminating in a dead-end 50 meters north of the site edge - and pulls them through, and across the site, to match up with the layout of the major buildings of the University on the southern edge of the site. Two pedestrian bridges link the site along these lines to

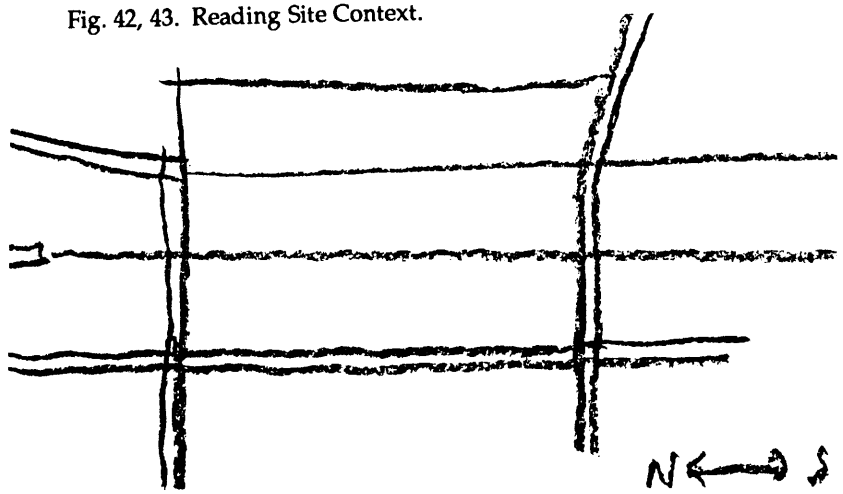


Fig. 44. Laying the NS axes.

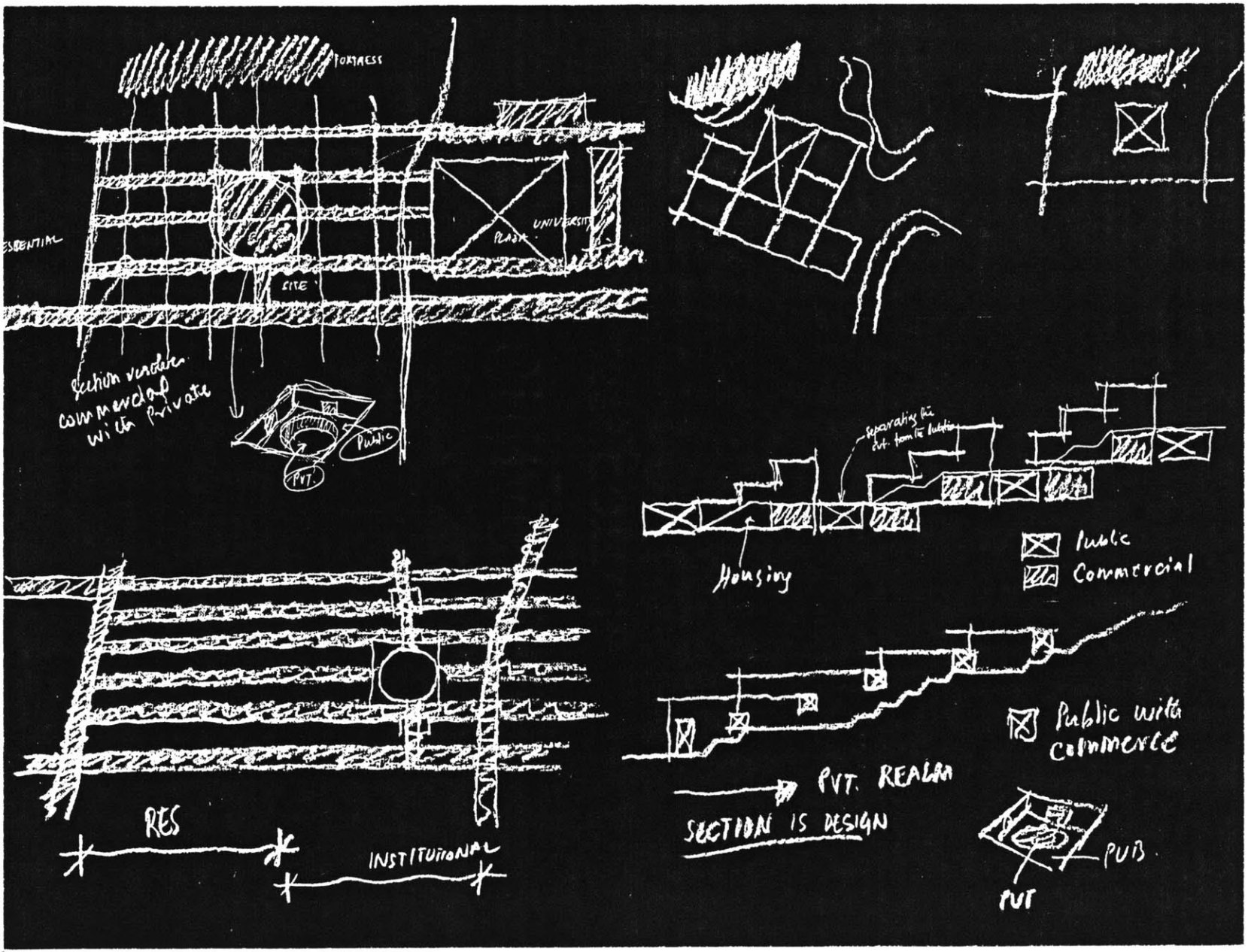


Fig. 45. Sketches of Preliminary Scheme 1 & 2

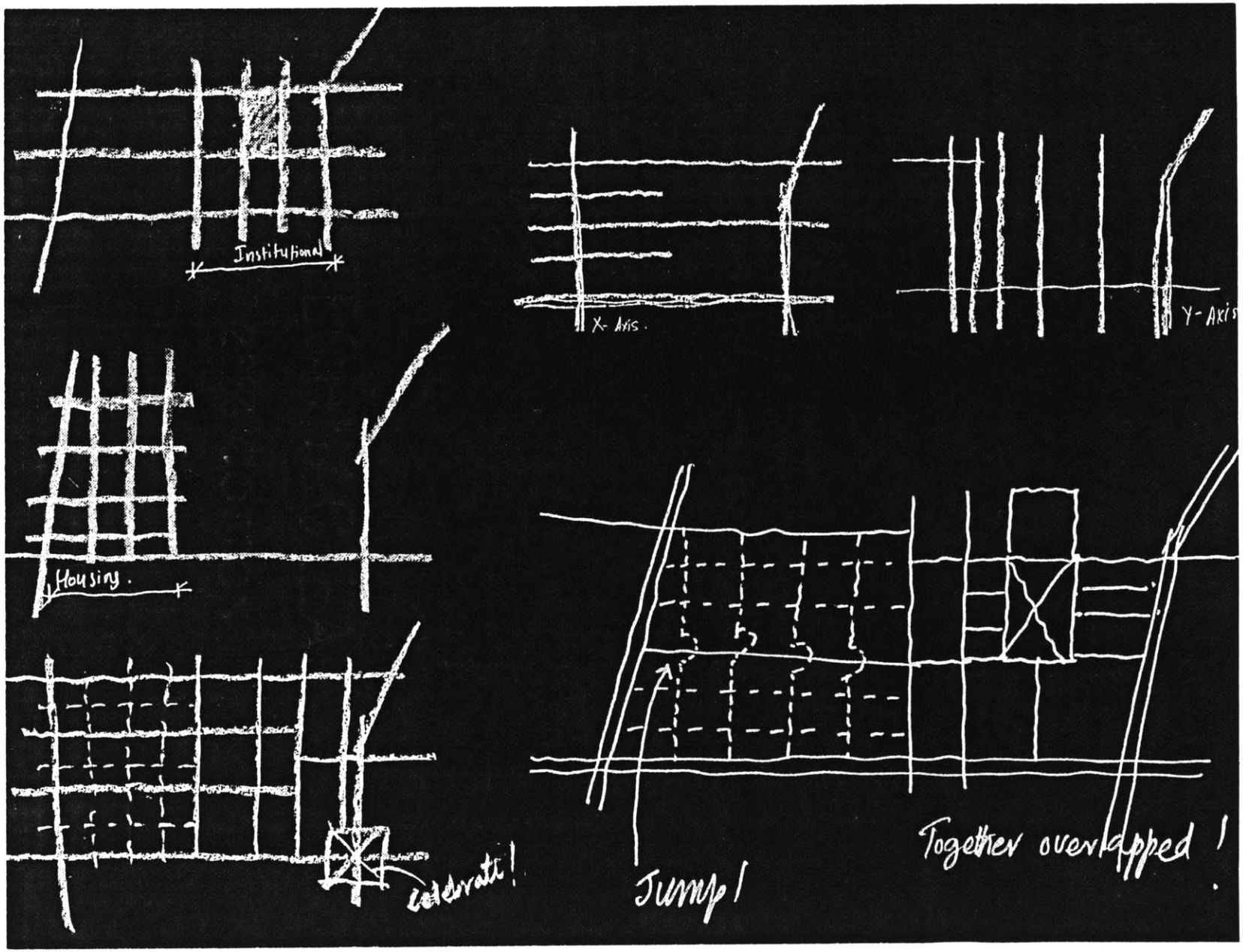


Fig. 46. Sketches of Preliminary Scheme 3

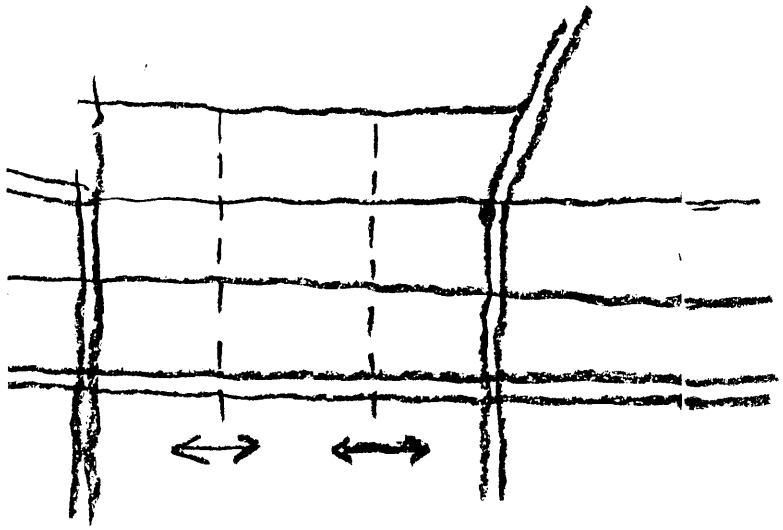


Fig. 47. Laying the EW axes at flexible locations.

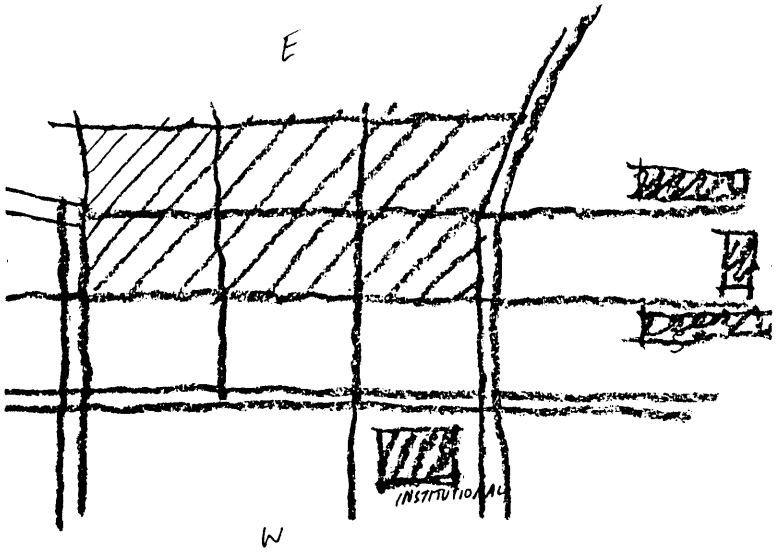


Fig. 48. Eastern half of grid occupied by institutional buildings.

form an urban plaza between the university and the proposed complex on site.

2. Similarly, two major public access lines are laid out along the east-west axis. Other than the presence of a major institutional building of the Jaipur Development Authority on the other side of the SMS Highway, the western edge is relatively free of any further constraint that polarizes it, and is therefore regular and homogenous. Thus, the locations at which the east-west axis will run have to be determined by constraints internally generated and imposed. Each of the resulting nine zones thus derived assume a distinct character owing to the varied peripheral conditions that flank their edges.

Step 4 : Demarcating Zones

1. Through associating form with the natural organizing features of the landscape, two things become apparent :

First, the distribution of the proposed program on site should perhaps be such that it locates the institutional buildings, such as the library, the museum etc. along the eastern half of the site, so that the monumental scale that these buildings demand forms a strong backdrop in transition between the small grain of the residential fabric in the front, and the monumental and

monolithic fortress at the rear. In symbolic terms too, these buildings become a vivid source for generating public penetration into the site. An upward movement along the slope is directed towards the proposed public buildings, with the fortress as backdrop, acting as a focus, and terminates in a more noble and urbane function.

Second, the natural slope of the site may be utilized in a manner that public and private domains are articulated through level differences that may not be traversed unless planned for.

2. Likewise, the three zones on the northern fringe of the site may be identified for residential use for two main reasons :

First, they continue the residential fabric well into the site, and thus allow for a transition between the institutional and the residential fabric to be a more planned activity through the specificity of design, than might be if the northern fringe were institutional.

Second, they place the faculty residing in them at the other end of the site from the university campus (less than 5 minute walk), thus inducing movement of these residents across the various activities of the crafts institute and work centers, that then occupies the eastern fringe of the site, and responds well,

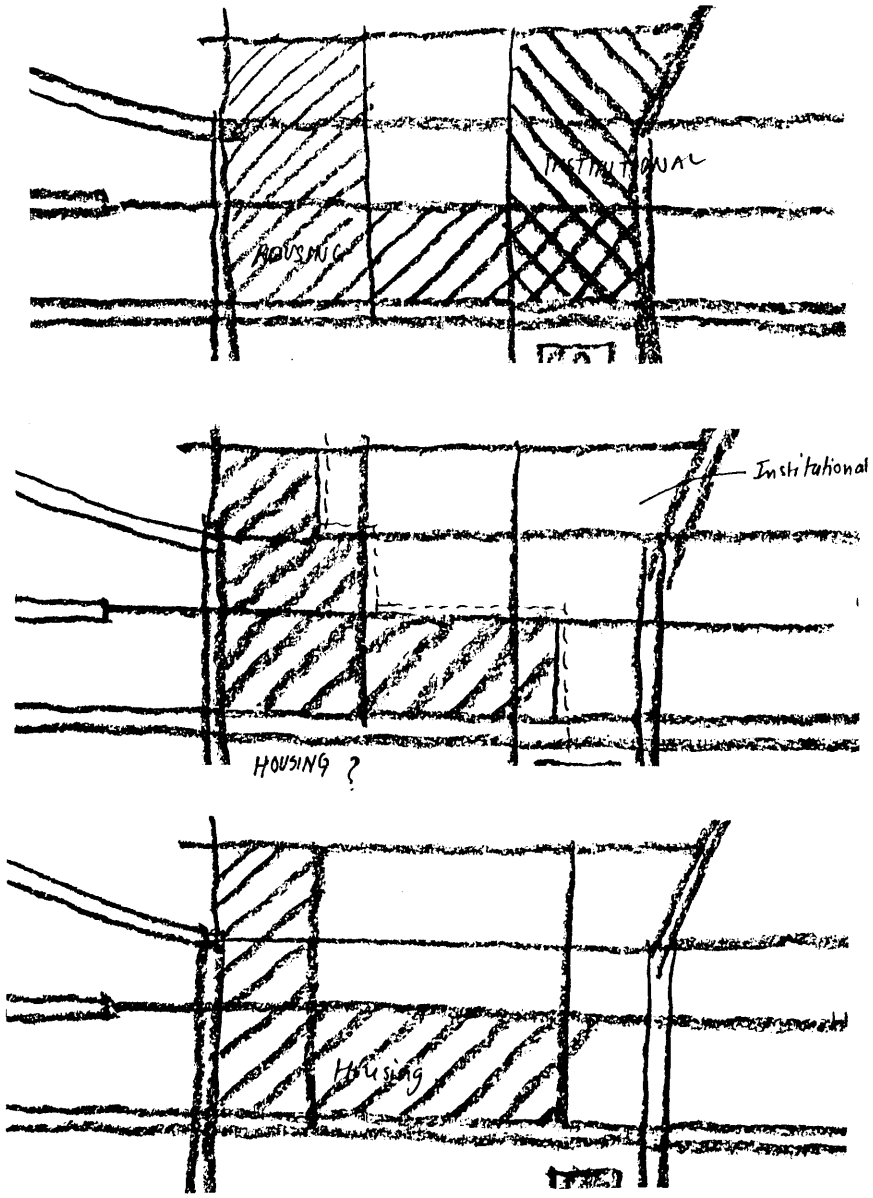


Fig. 49, 50, 51. Zoning Studies.

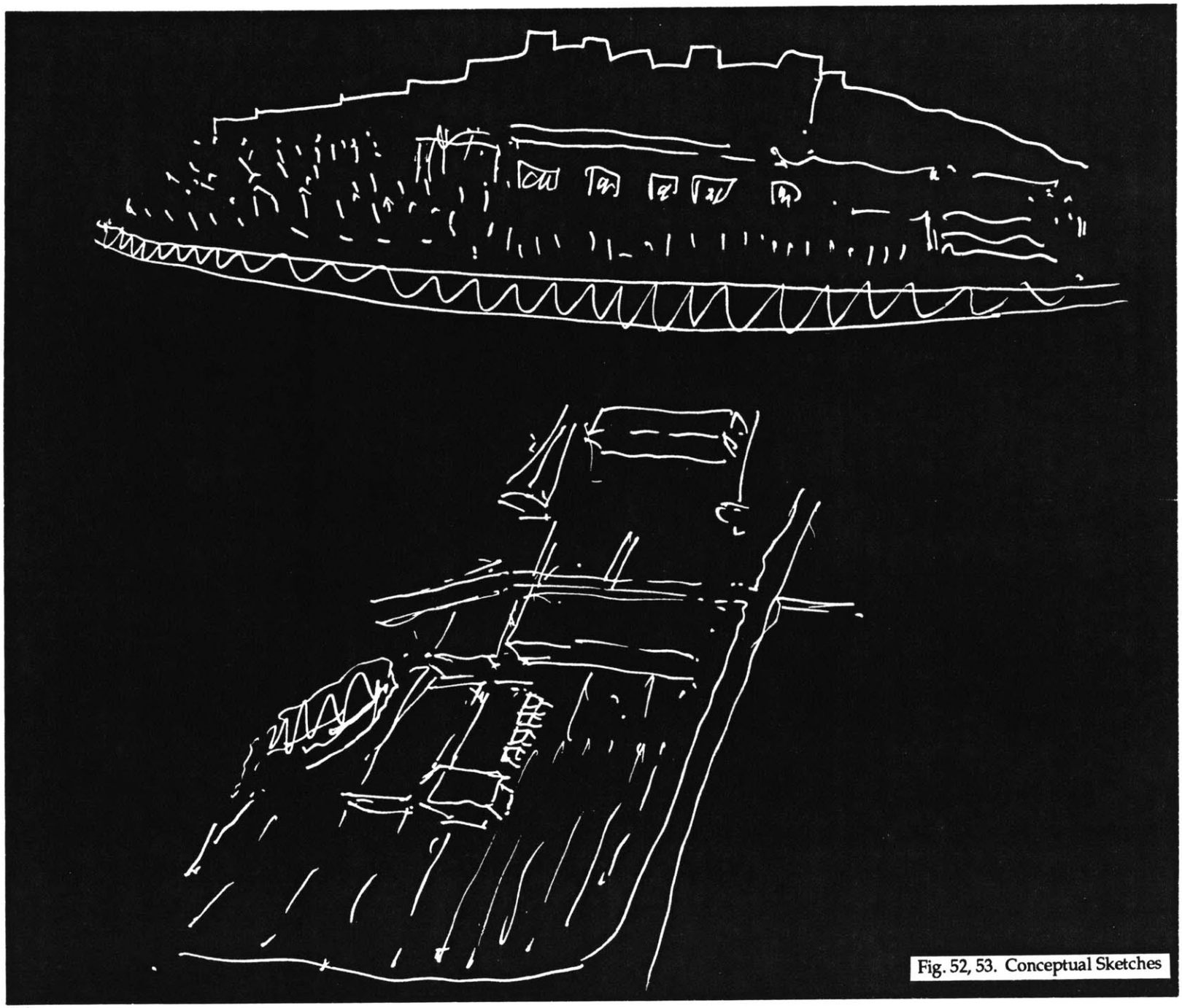


Fig. 52, 53. Conceptual Sketches

through an appropriate scale and function, with the institutional zone flanking along its south and west sides.

3. The public library occupies the central position owing to its symbolic and formal qualities, and truly becomes the most important building on site, to which the entire scheme converges. It creates the potential for development of a large urban plaza, to which all surrounding institutions conform, and into which their formal entranceways are located. The museum occupies the eastern sector, and is approached through and beyond the plaza. It does not need to be traversed by every visitor or resident of the site - a necessary requisite for a building of its nature.

Along the Western edge of the plaza a built form is proposed which provides for an appropriate transition required between the soft and amorphous fabric of the faculty housing and the monumental scale of the plaza. These buildings incorporate within them open-to-sky anterooms that one walks through before entering the "sacred" plaza. The western facade of these buildings is left blank, developing a scale commensurate with that of the library and forming an effective backdrop to the housing. These buildings then receive reflected natural light through the anterooms or courts they potentiate. They become an obvious choice for being inhabited as research and documentation offices, connected with the public library.

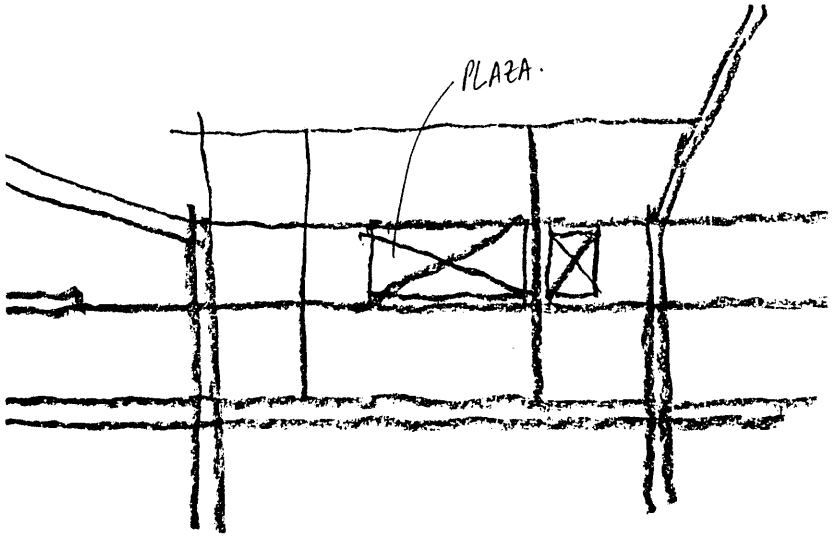


Fig. 54. The Order

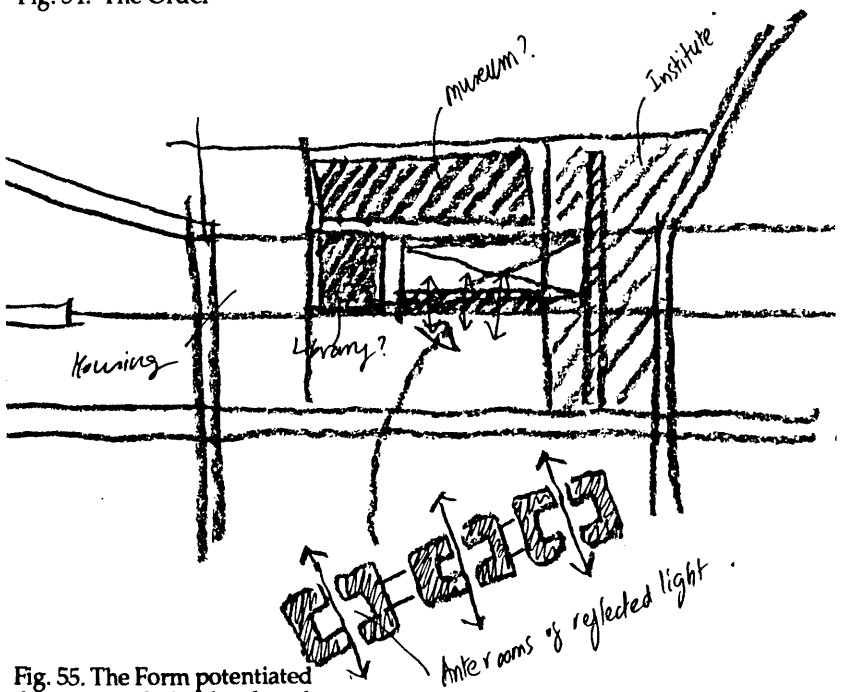
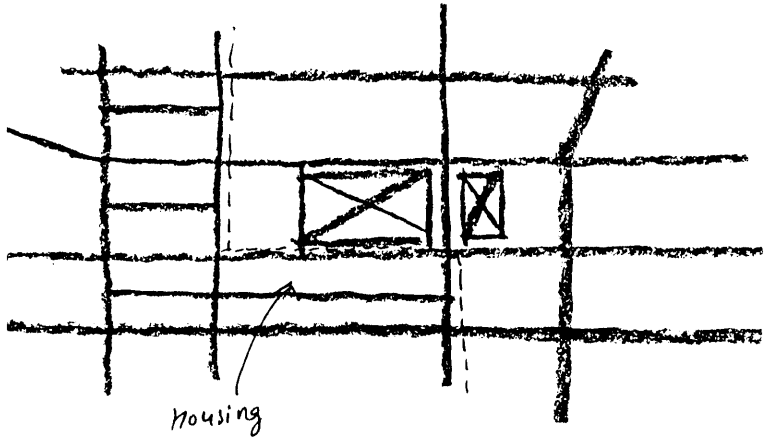


Fig. 55. The Form potentiated through the Order developed.



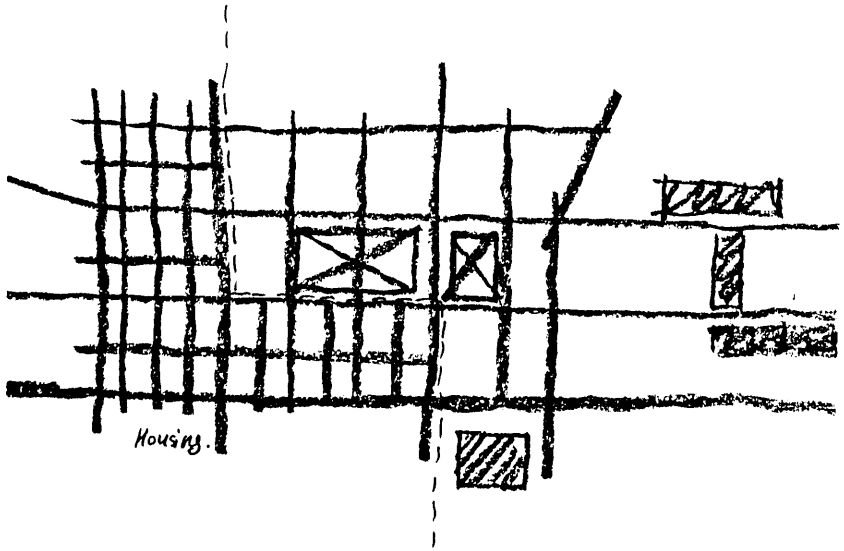


Fig. 56, 57. Developing grid hierarchy in various zones.

Step 5: Developing Hierarchy

A hierarchical structure was then developed by breaking the resulting grid further into a finer grid in accordance with the *capacity*[12] envisaged for each of the nine zones. The two major north-south axes, representing public order at the city and zonal scale, pick up the existing street ends on the north edge and connect the fabric across the site to the University campus and its layout. Three minor axes along the north-south direction begin as residential streets from the northern edge and terminate at their points of intersection with the major east-west axes. This defines a *closure*[13] which creates a sense of neighborhood space having a controlled degree of public penetration due to the function attributed to it. The two major east-west axes, along the slope, representing public order at the local level of the site and the built form it supports set up major links between the main road and the fortress and terminate in the hill. Several minor east-west axes are then laid out within the nine zones, each supporting the circulation local to the zone in which it is laid out. The nodes resulting from the intersection of these several major and minor axes then offer interesting possibilities for articulating the public and private

[12] The term "capacity" is a more general concept of what is called function. The capacity is what allows various functions to inhabit the spatial context that has been created. Summarized from Habraken, N. John, op. cit.
[13] Cullen, Gordon. *Townscape*. New York, 1961.

domains through the deployment of the natural slope of the site. The termination of the minor axes also generate several end-conditions that offer possibilities for development through design.

4.4 Inhabiting Form with Design

The Form that the Order deployed above potentiates, is inhabited with the specificity of the given program and its requirements. The buildings are inhabited "from the bottom up". The peripheral conditions of the public realm at the ground level are devoted to commercial use, which denotes a public claim to space, and draws a pedestrian into streets or alleys, with little or no hesitation. In the following pages, the design that inhabits the site has been described. The first few leaves are devoted to explaining the complex as a whole, and a brief design description of each building follows later.

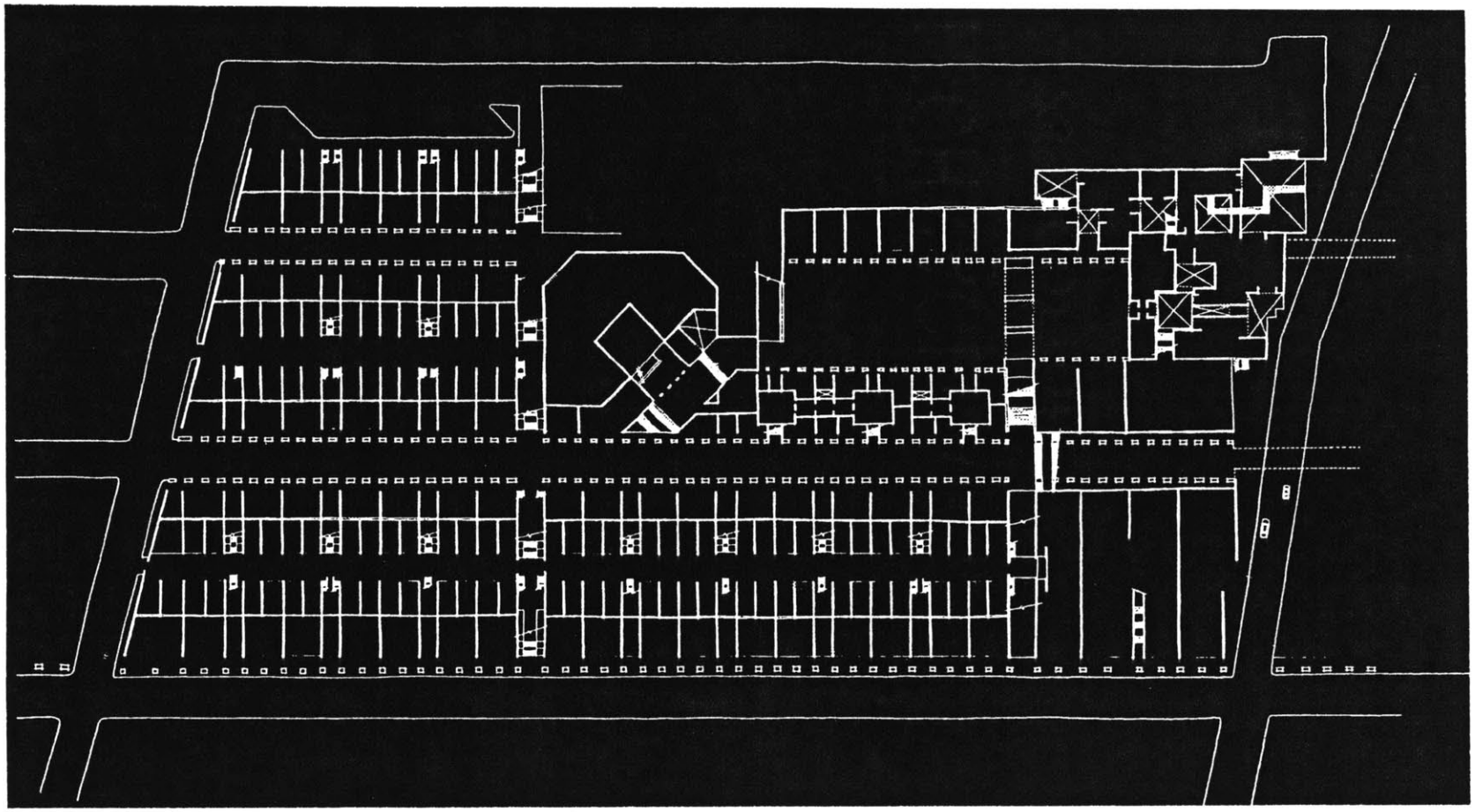


Fig. 58. Plan showing layout of built form at the ground level.

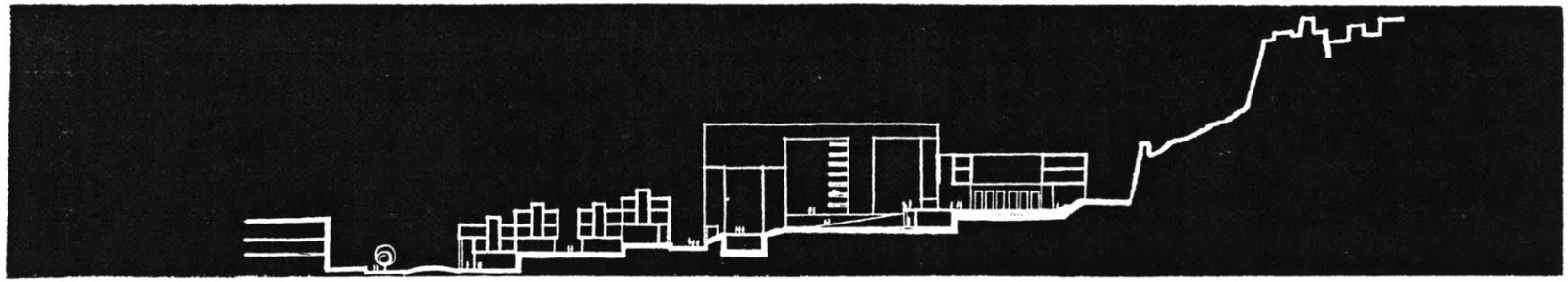


Fig. 59. Section thro' Site along EW axis.

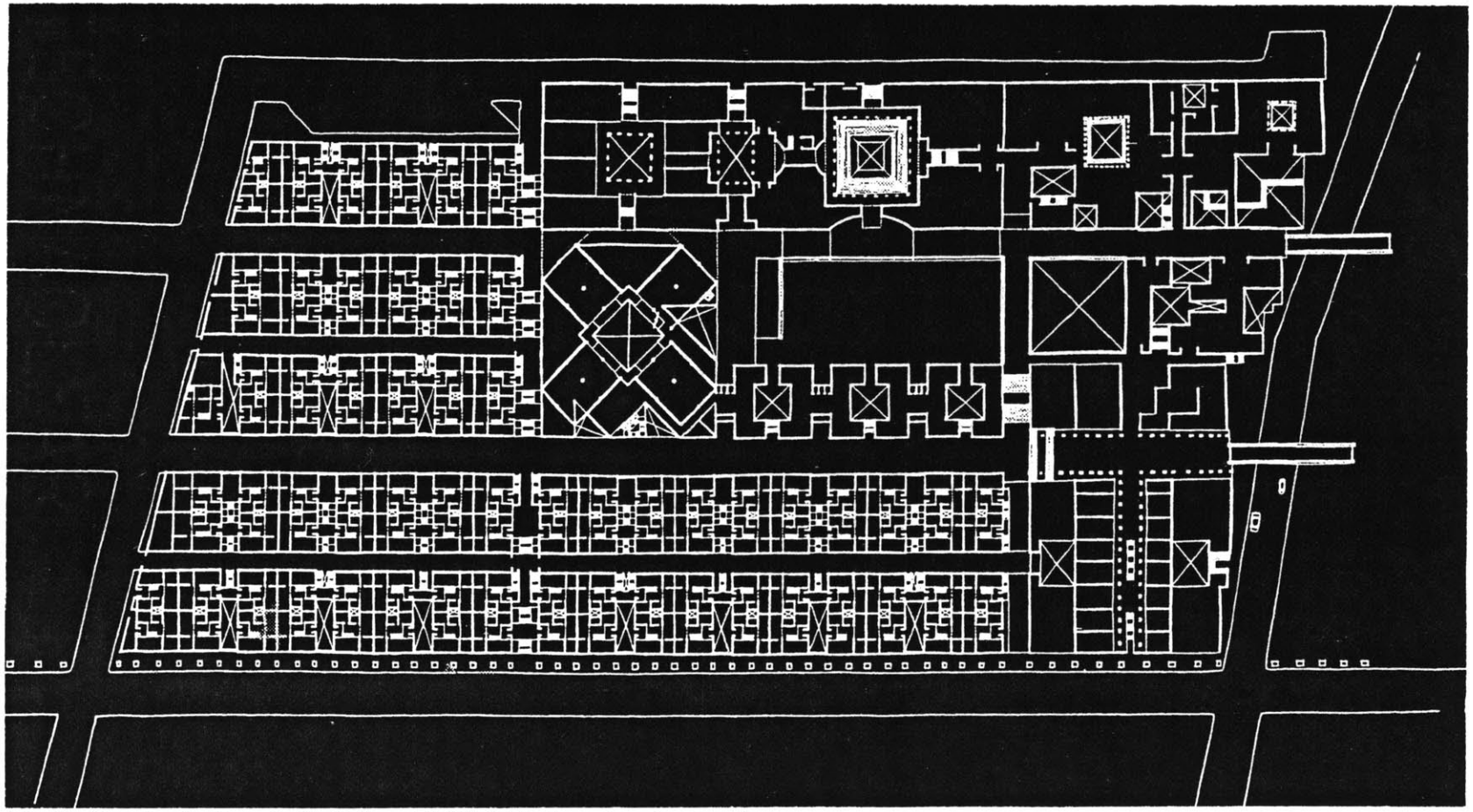


Fig. 60. Plan showing layout of built form inhabited into the system developed.

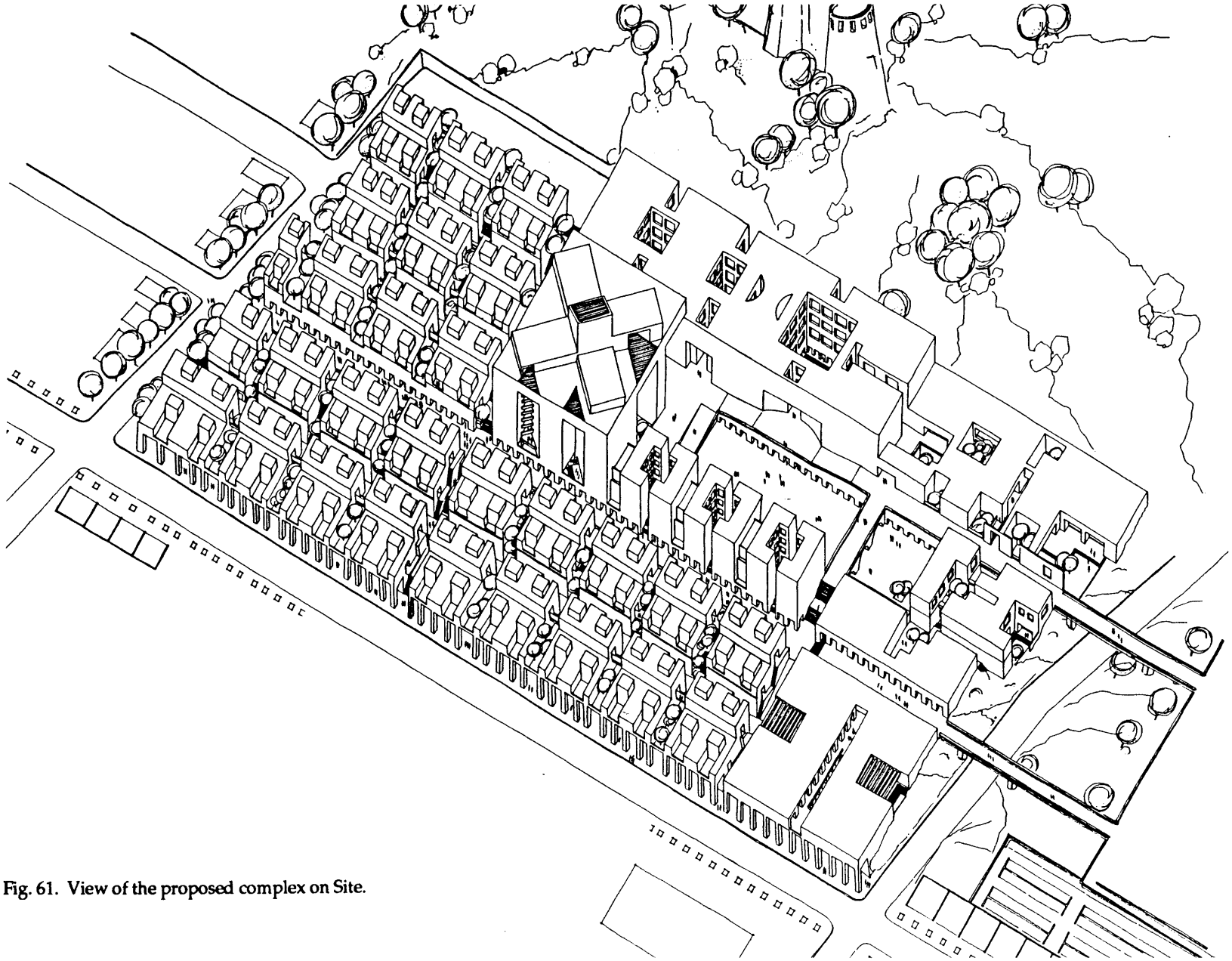


Fig. 61. View of the proposed complex on Site.

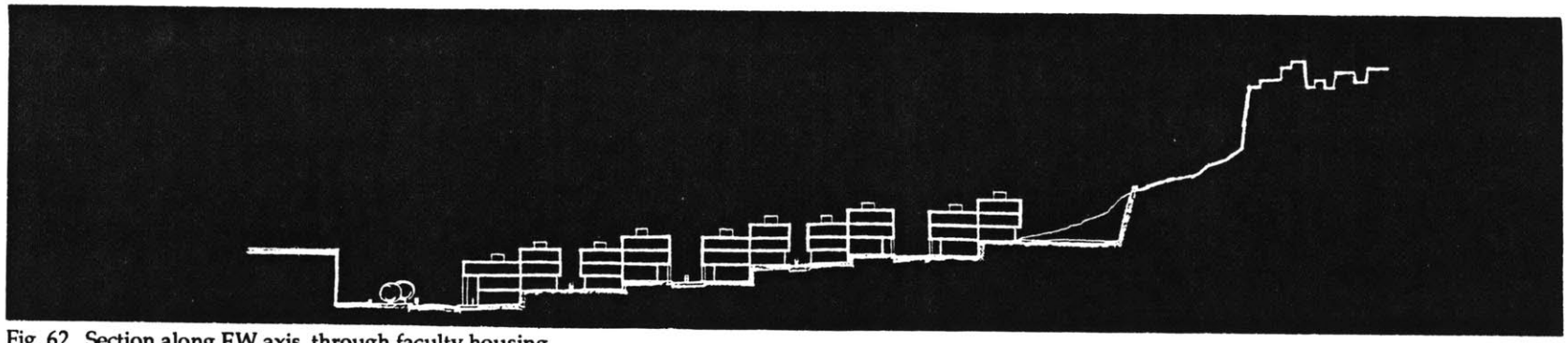


Fig. 62. Section along EW axis, through faculty housing.

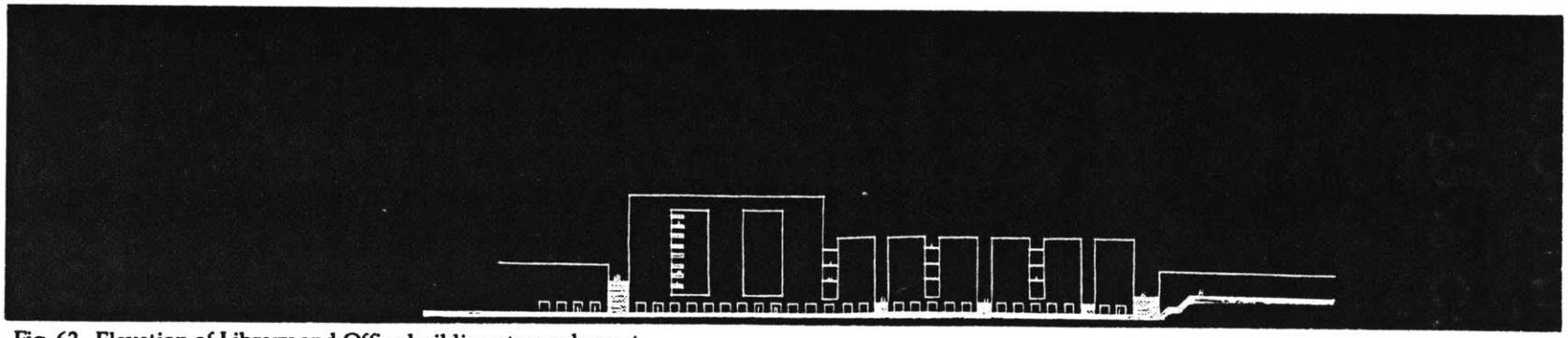


Fig. 63. Elevation of Library and Office buildings towards west.

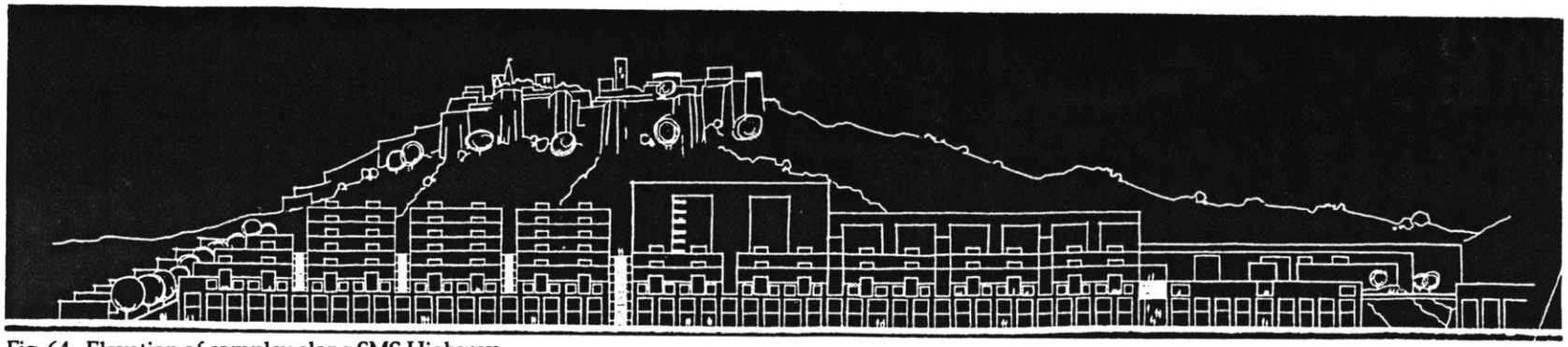
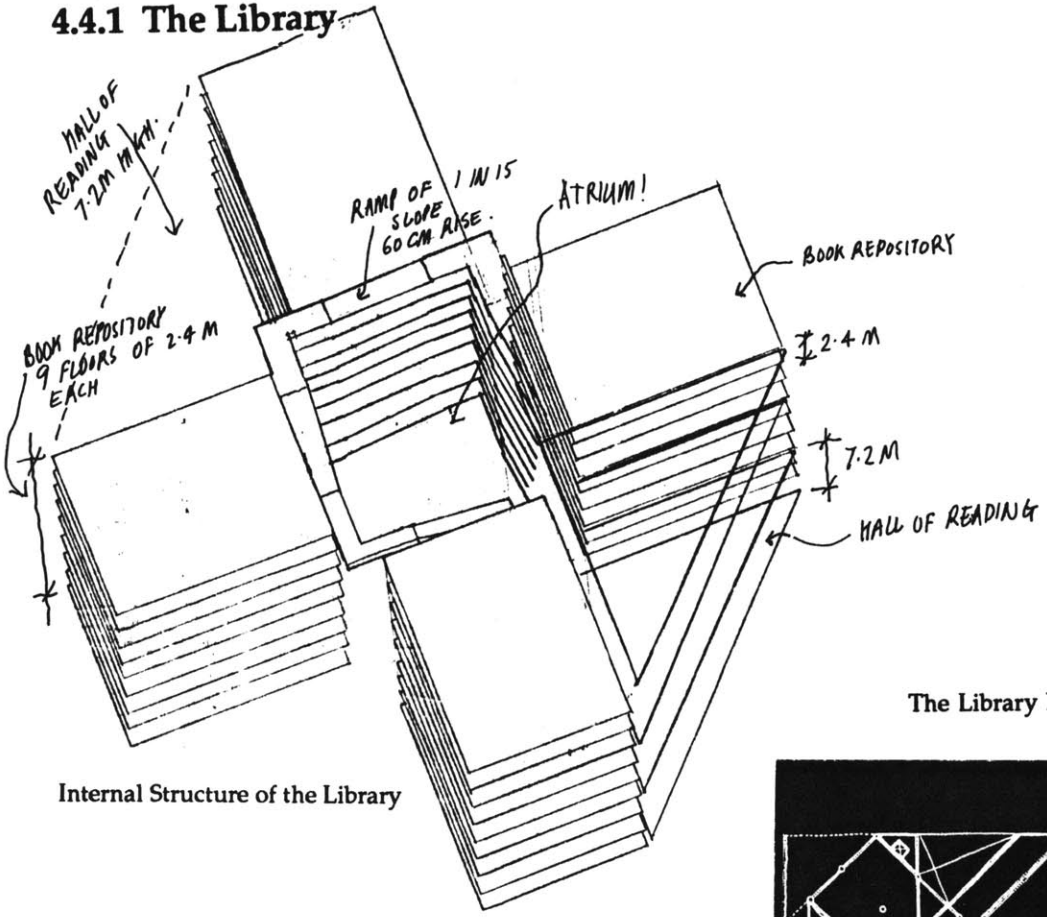
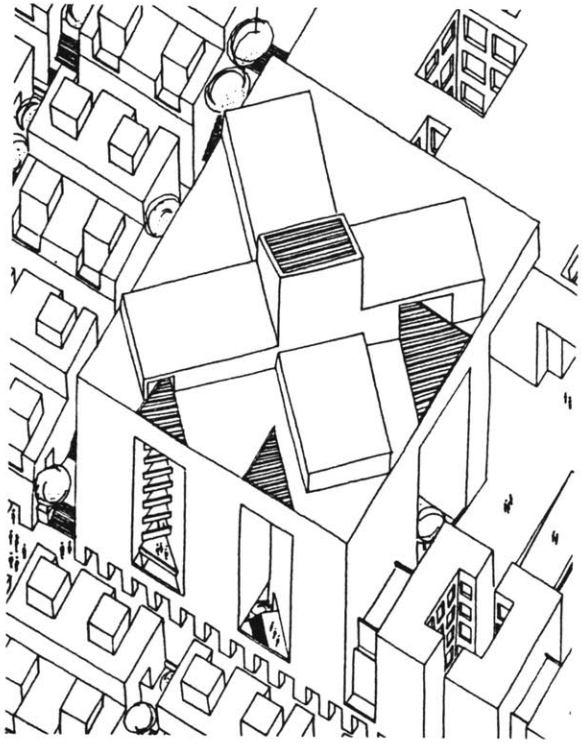


Fig. 64. Elevation of complex along SMS Highway.

4.4.1 The Library

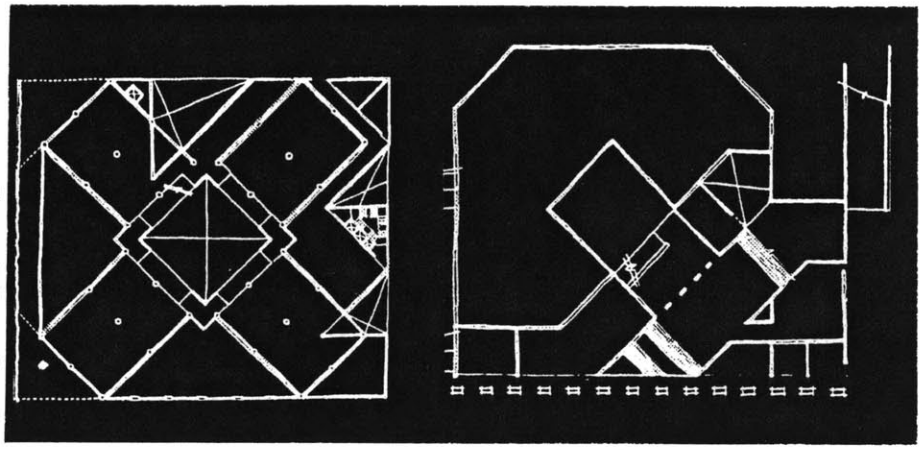


Internal Structure of the Library



The Library Bloc

The Library is conceived as being a repository of books, as well as a house of knowledge and learning. These two functions are expressed through a distinct articulation in the structure which builds around a central atrium. The floors supporting the book-stacks rise in a spiral through a system of ramps, while the halls of reading occur only after skipping every 3 floors of the book-stack structure, thus creating a triple height volume illuminated with natural reflected light. Monumental portal openings are cut in the western and southern faces of the library, which cut direct glare and heat of the sun through an articulation of volumes. Each hall of reading has a distinct character of its own. Although, neutral in its footprint, the facades of the Library are varied in the 4 cardinal directions, in their effort to respond to the complex context.



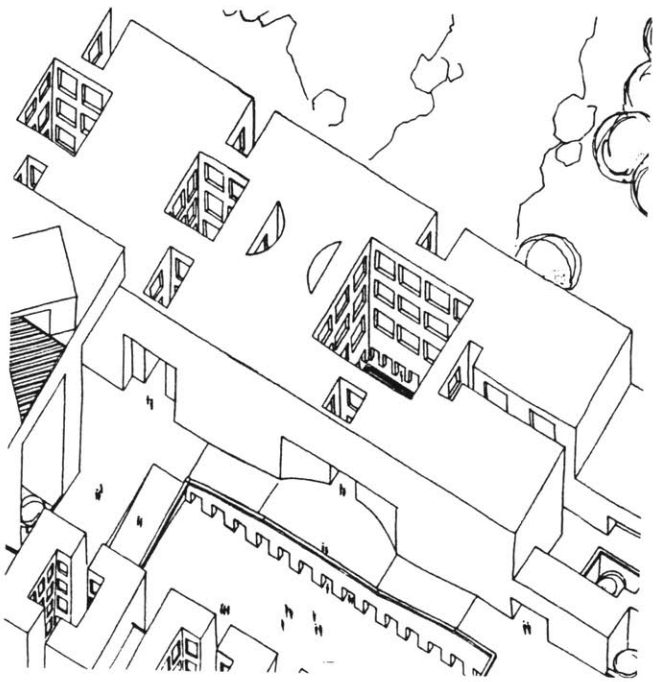
Typical Floor Plan

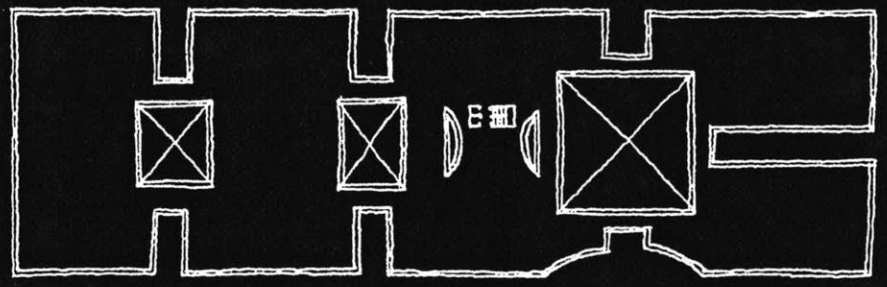
Ground Floor Plan

4.4.2 The Museum

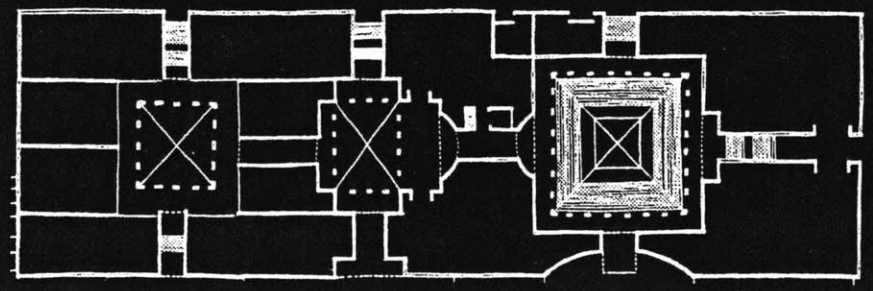
The museum is structured in a strong Order around wells of reflected light. These wells act as urban courts at the ground level and organize around them commercial activity related with the museum and the arts and crafts of Jaipur. One of the courts accommodates within itself an amphitheater as a system of steps.

The Museum





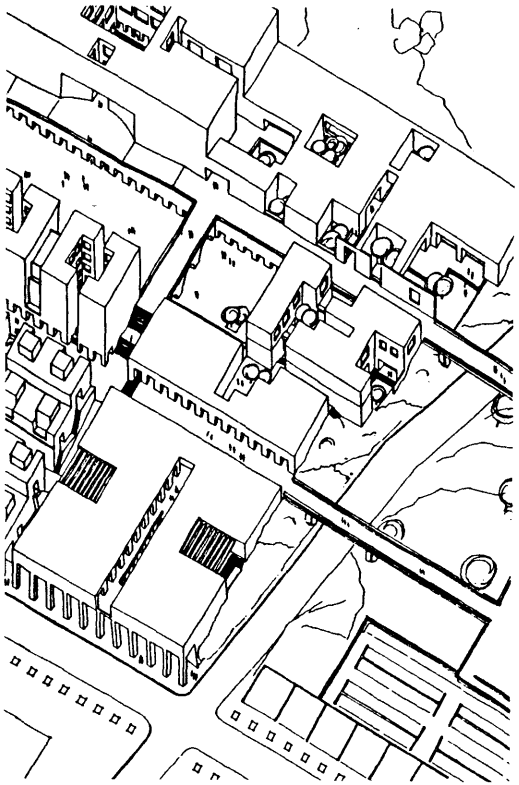
Layout of the Museum



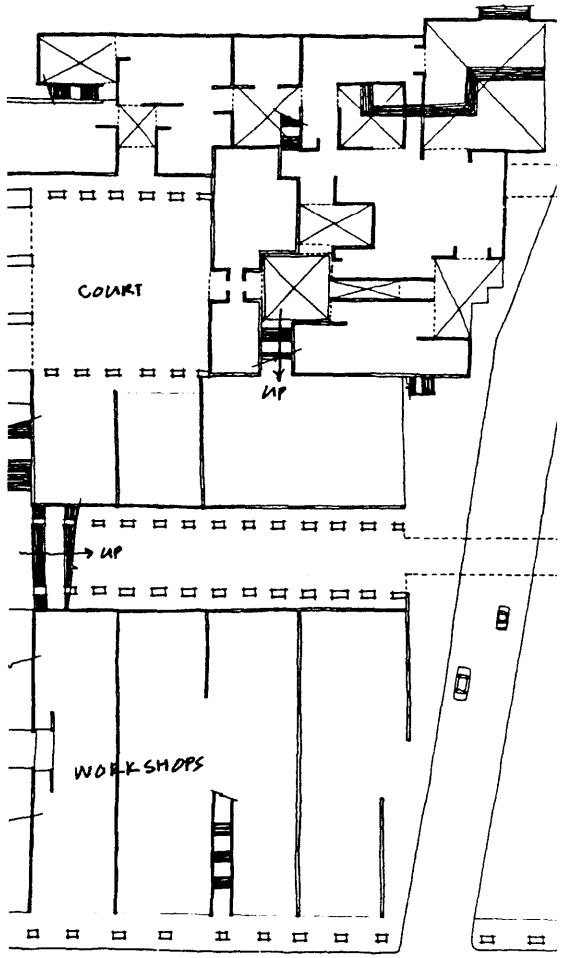
Ground Level Plan

4.4.3 The Crafts Institute

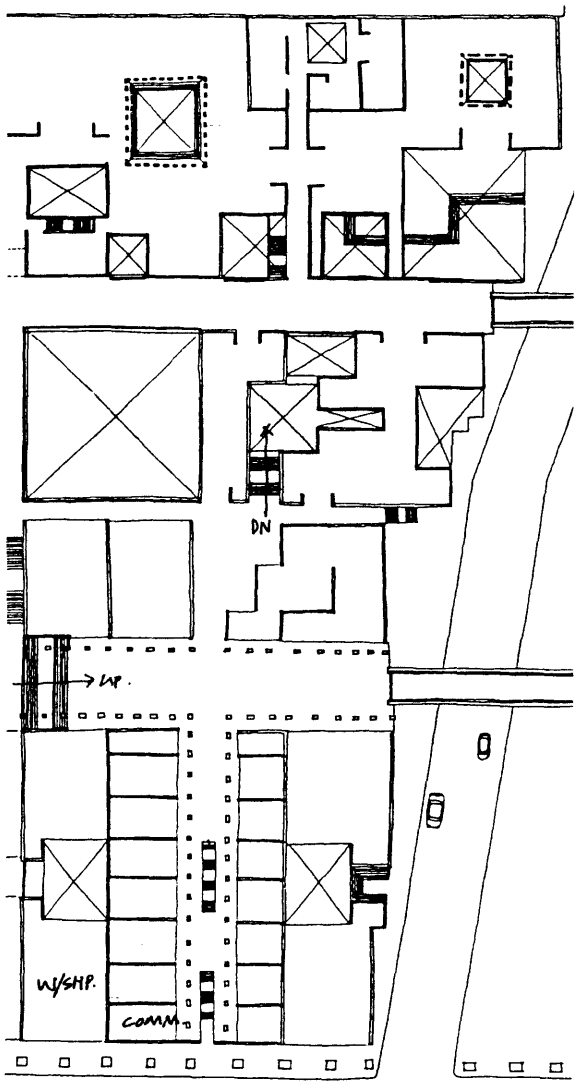
The Crafts Institute, laid out within the larger Order and System governing the complex, develops a theme and an Order local to itself. A linear organization of commercial space and workshops assumes a more clustered organization towards the rear, and creates a labyrinth in its effort to adapt to the contours of the site. The main entrance to the Institute is formally linked with the main plaza. An "internal street" runs along the EW axis as a structuring armature of circulation and activity.



View of the Institute



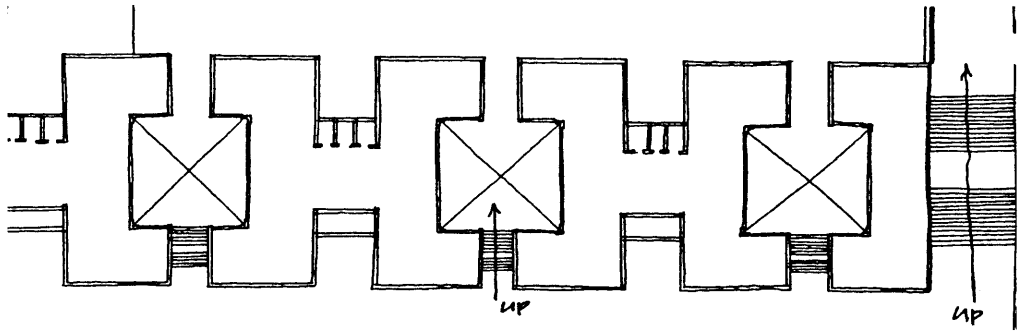
Ground Level Plan



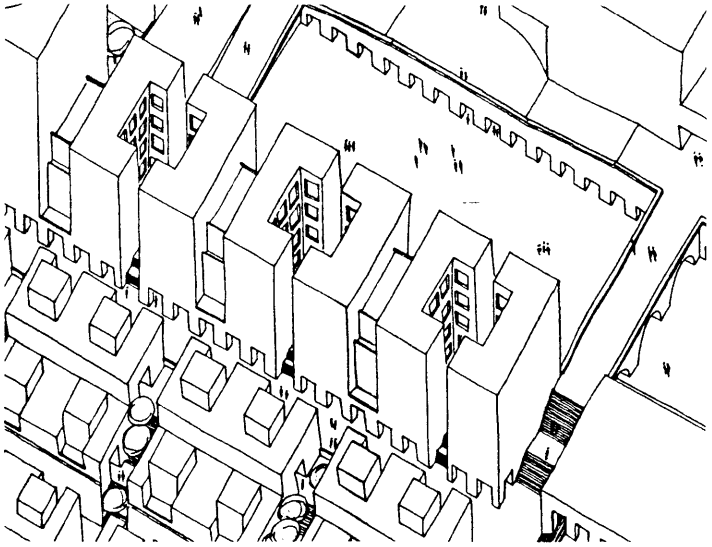
Upper Level Plan

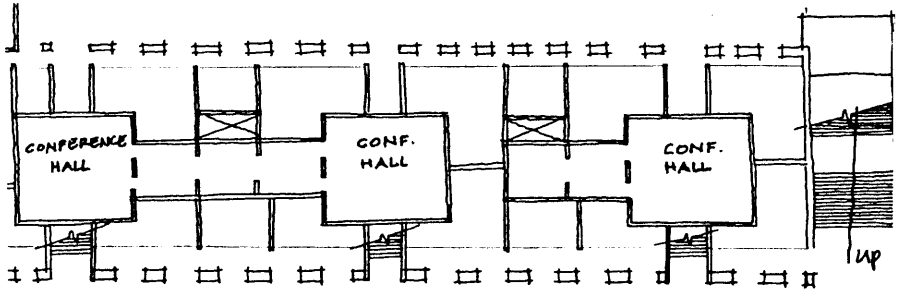
4.4.4 The Office Buildings

The Office blocs through their Form create a buffer zone of anterooms through which one passes from the commercial street to a more "sacred" plaza. The buildings may be entered from the ground level only through the plaza into which all institutions, that create it, open.



Typical Floor Plan



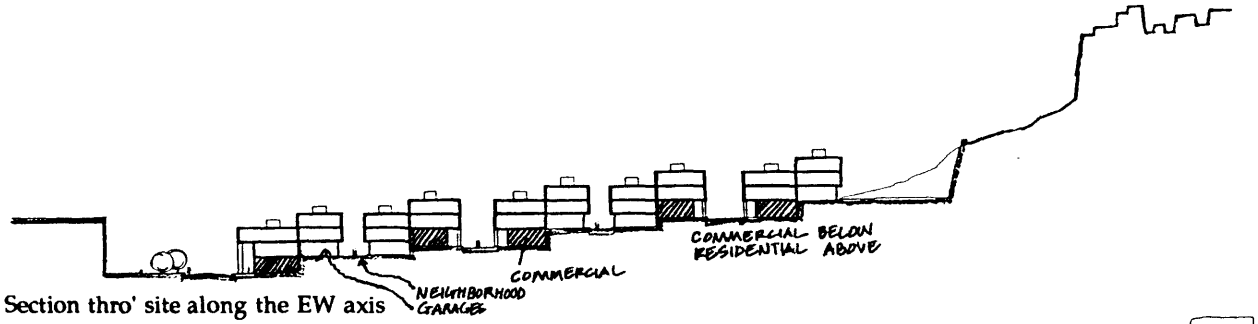


Plan at Ground Level with commercial space and conference halls.

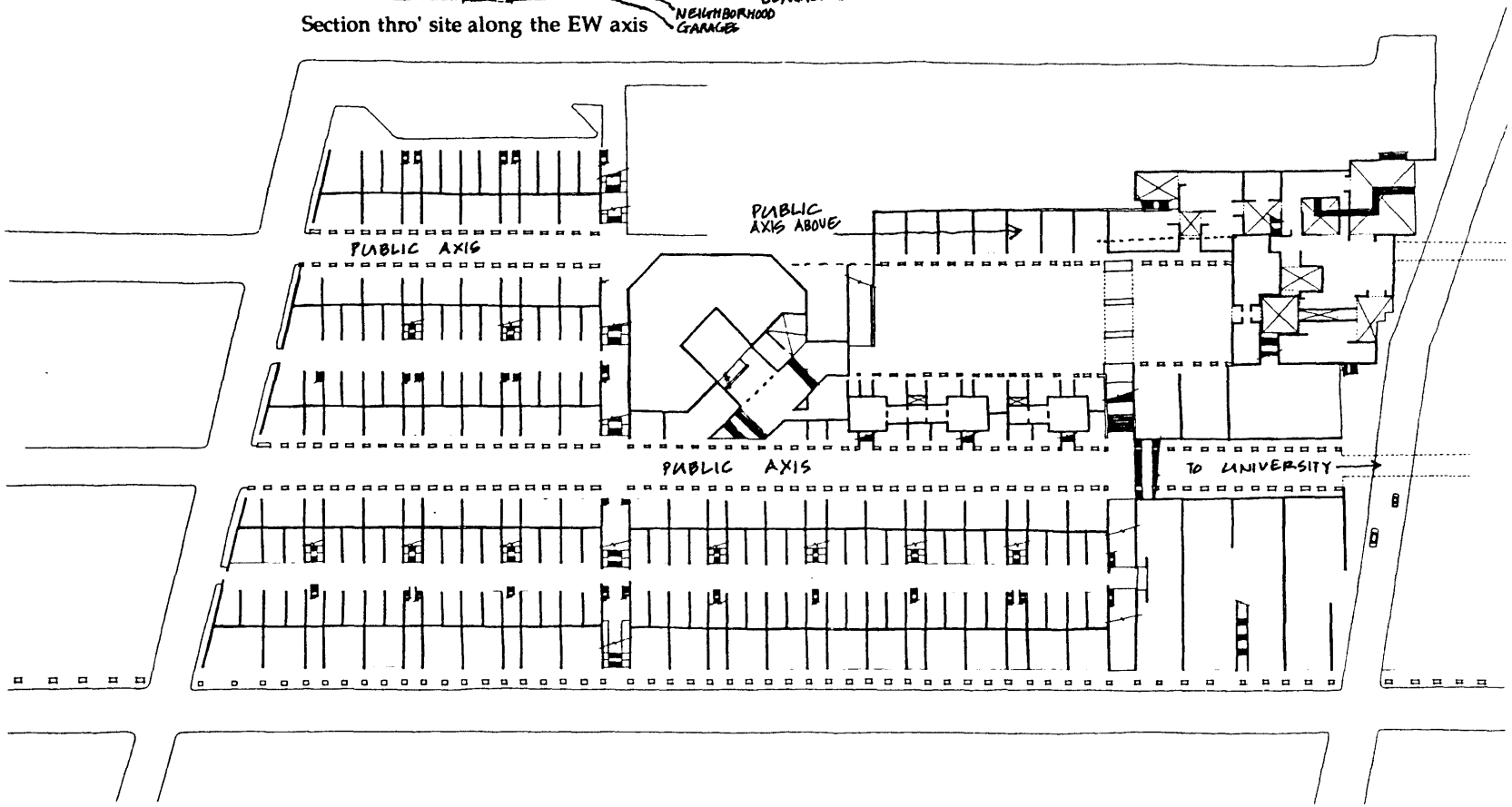
The Office spaces contained in these blocs are lit with natural light reflected through these courts. The blocs have blank stone facades, which reflect the setting sun of the west and allow the required backdrop and privacy to the housing adjoining it.

Elevation towards west.

4.4.5 Commercial Space



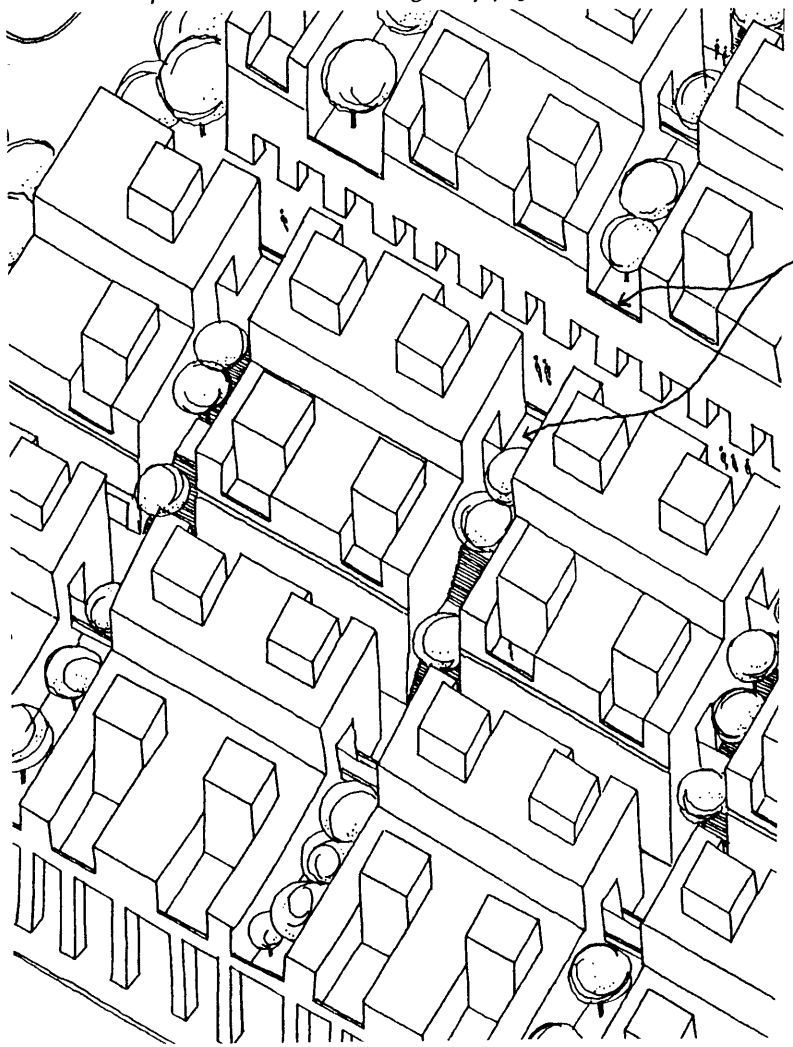
Section thro' site along the EW axis



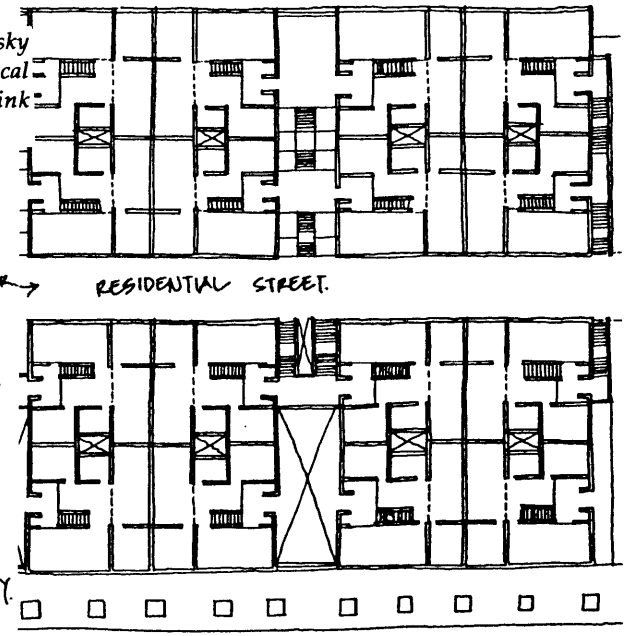
Layout Plan at the Ground Level

4.4.6. Faculty Housing

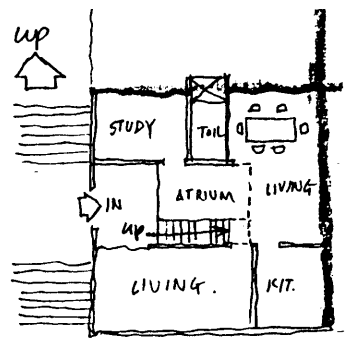
Each unit is organized around a central atrium, which works with the efficiency of an open-to-sky court but keeps the unwanted dust and rain out through the use of opening along its vertical face. The organization in the housing tissue develops neighborhood zones that allow visual link down to the public realm, but the degree of physical access is controlled.



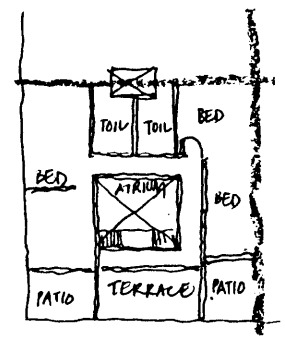
Axonometric



Housing Tissue



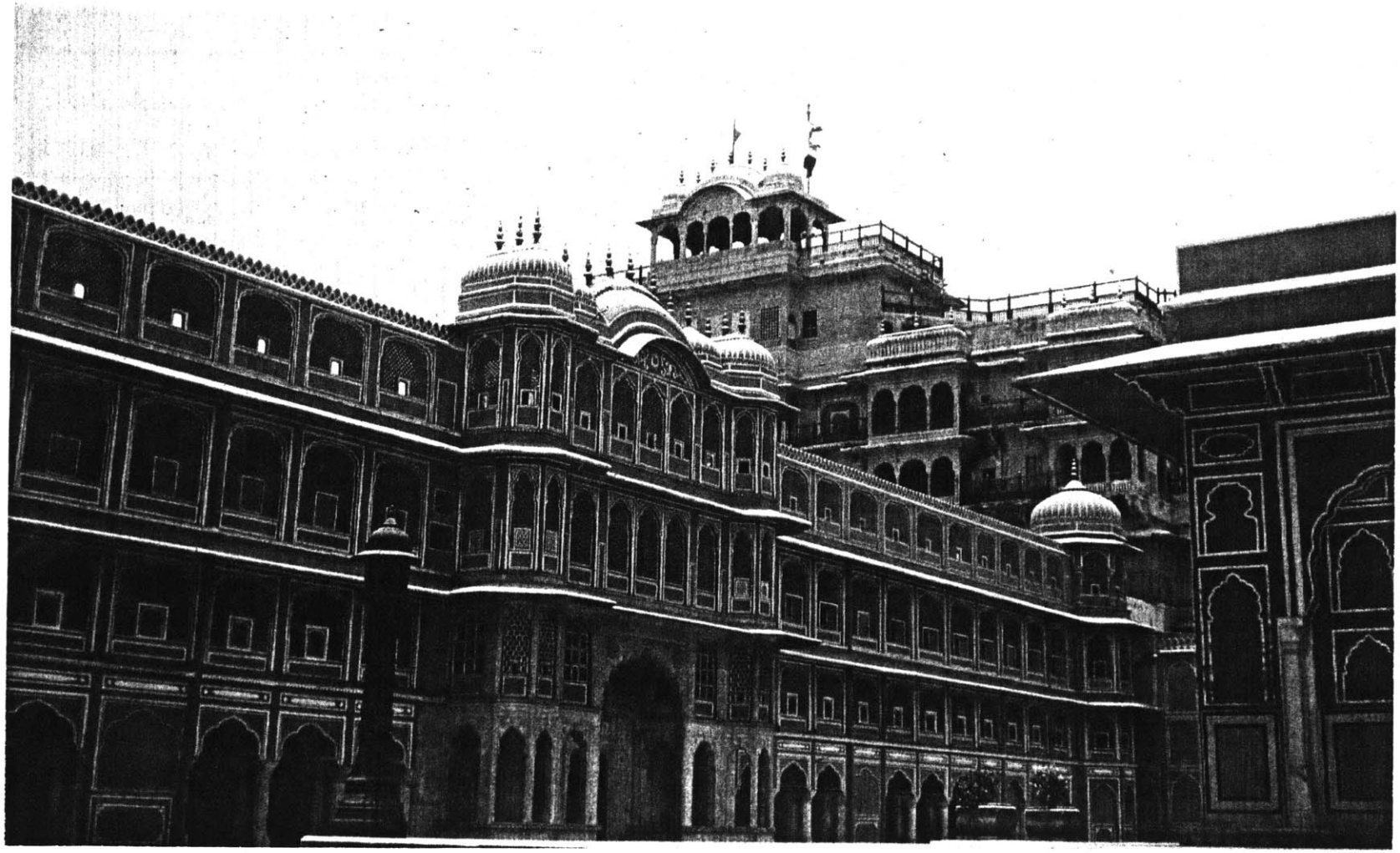
Plan at Lower Level of Unit



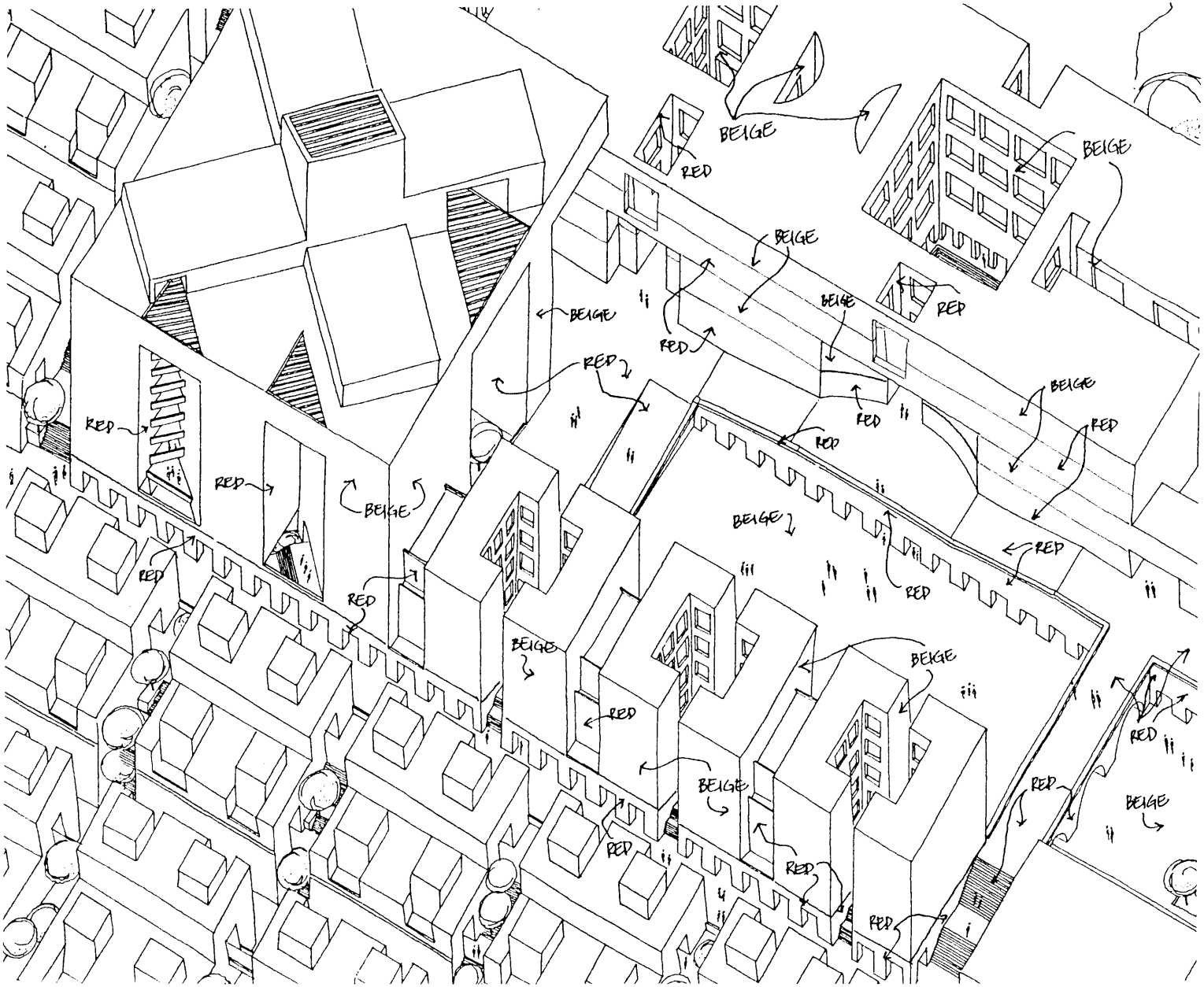
Plan at Upper Level of Unit

4.4.7 Building Facades

A combination of rough split Karauli red sandstone and beige sandstone (both locally quarried and available) is proposed for cladding the buildings of the complex. Buildings are articulated through change in color, but a uniformity of texture, in horizontal layering. Bands of red and beige sandstone wrap around and converge on the symbolic focus of the scheme - the Library.



The City Palace Precinct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4.5 A Final Remark

A formal analysis of the Order invented shows that the library, in anthropomorphic terms, symbolizes the head of the entire organization. At this point, I cannot help but point out the striking resemblance that this organization shares with the city palace complex, located in the midst of a residential fabric and flanked by institutional buildings, with its grand plazas. The relationship that this plaza, a more democratic version of its analog in the walled city, shares with the fortress above, is also very strikingly similar to the one shared between the palace and the *Nahargarh* fort on the Aravalis.

Through a discussion with Bill Porter, this observation brought to light the crucial realization that an act of design also aids the *reading* of existing Orders in a context, and that buildings do not merely reflect existing Orders, but actually *bring them to life.* Thus, while **"Order potentiates Form", "Form makes Order visible"** - not just any order, and any unrelated form, but the Form brought to life through the very Order structured by the designer.

The Form speaks back to the very same Order that gave birth to it, through the architect, and makes visible several inherent relationships. Also, the Order *brought to life* does not necessarily have to be a local one; it could well be the Order of a larger urban context, as is in this particular case of the Palace precinct, and the relationship which it shares with the residential fabric and the *Nahargarh* fort.

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Fig. 7, 12

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