A NEW THEORY OF URBAN DESIGN AND *RESPONSIVE ENVIRONMENTS*: A COMPARATIVE STUDY OF TWO APPROACHES TO URBAN DESIGN

by

BEENA R. MUKKAMALA

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ABSTRACT

This thesis compares and contrasts *A New Theory of Urban Design* (Alexander, et al., 1987) and *Responsive Environments* (Bentley, et al., 1985), two approaches to urban design that base their argument on the quality of urban life rather than on the esthetics of urban form. *A New Theory of Urban Design* develops seven rules (based on the concept of wholeness as the ideal quality of a city), while *Responsive Environments* develops seven qualities (all based on the concept of responsiveness), as tools to achieve ideal urban environments. Both works apply their design approaches to two urban sites--a waterfront site in San Francisco and a downtown site in Reading, England. Using these two sites as a design basis, this thesis compares and contrasts these two approaches to urban wholeness and urban responsiveness.

The thesis uses Bennett's (1993) *tetrad* model as the basic framework for the comparative study. The *tetrad* is a generic model for understanding any activity as a whole and consists of four sources which together provide a comprehensive picture of the activity. In this thesis, urban design is the activity, and the four sources are identified as *ground*, *instrument*, *direction* and *goal.* These four sources are used to provide a descriptive basis for comparative study of the two urban design approaches. Using these four sources, the thesis attempts to answer two questions: (1) How do the two approaches contribute to an effective urban-design process? (2) How successful are these approaches in actualizing the San Francisco and Reading designs?

The thesis presents conclusions drawn from the comparative study and discusses the relative strengths and weaknesses of the two approaches. The thesis closes by suggesting ways whereby modifications might make the two approaches stronger tools for urban design.

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Chapter 1

INTRODUCTION

Ideally, the urban designer should be able to tackle the design and morphological problems of the city and provide a wholesome urban environment. Because the city is such a dynamic and complex entity, designing a city is no easy task. There are no simple relationships among various parts of the city, and this lack of overriding linkage makes it all the more difficult to find a starting point. What is the point of departure? From where should we begin to design cities?

Urban designers have tackled this question from varied perspectives and arrived at a great range of approaches to urban design. In his comprehensive review, Broadbent (1990), examines urban design efforts that begin with Vitruvius's classical ideas (n.d./1914) and continue with such later approaches as *The City Beautiful* (1893), Corbusier's *Ville Radieuse* (1924), and recent urban-design theories like those of Jacobs (1961), Alexander (1965), and Newman (1973).

Edmund Bacon, in *Designing of Cities* (1975), explores and analyzes cities with a premise that "the form that they [cities] take will be a true expression of the highest aspiration of our civilization" (p. 13). He studies, for example, the urban architecture of the Renaissance builders who introduced in cities like Rome wide promenades, piazzas and so forth. This period of master architects especially explored the nature of architectural form in urban design. The composition of individual buildings and their location within the fabric of the city was of uppermost concern.

Modern architecture, on the other hand, subverted this earlier tradition to urban design and substituted a totally different and radical machine-age ideal, probably best

illustrated by Le Corbusier's 'Ville Radieuse' (1924). Corbusier envisioned the city as a park with buildings standing within it. A rectilinear grid was the city's basic ordering principle expressed physically by great arterial roads. He published his ideas on urban design in several books, for example, *The City of Tomorrow* (Le Corbusier, 1929), *The Radiant City* (Le Corbusier, 1935) and so forth. His ideas captured the imagination of many contemporary architects, who quickly adapted these ideas in their designs (Broadbent, 1990, p.133).

Even in Corbusier's approach, however, urban form continued to dominate the process of design as is evident in his design for the city of Chandigarh in India. Moreover, a common criticism of Corbusier's city plans is that he designed with a whole way of life in mind. His designs were for a manufacturing-oriented economy where life was neatly divided into eight hours of work, eight hours of leisure and eight hours of sleep, and a society where everybody owned a car--it was the age of the automobile. Thus, the city that emerged from his design dictated the lifestyle of the people. Barnett (1974), however, rightly observes that "the modern city, and the modern social organization of which it is a part, are clearly far more subtle and complex than the revolutionary vision of fifty years ago had recognized" (p. 12).

Some urbanists and designers, therefore, directed their focus away from urban form to urban life. Jane Jacobs (1961) criticized Corbusier's preoccupation with form as the ordering element of the urban fabric and, instead, argued that urban life should guide the design of cities. Jacobs showed that the essence of urban life lies in exuberant diversity created by intricate economic and social concerns and this is reflected in the liveliness of the city's streets. Hence, urban design should sustain these

intricate relationships through diversity of uses, small blocks, high densities and so forth. Jacobs' work gave a whole new direction to urban design.

Overall, Jacobs was a theorist but her work became an important model for applied efforts in urban design, including the two design approaches that are the focus of this thesis. These two works--*A New Theory of Urban Design* by Christopher Alexander, Hajo Neis, Artemis Anninou and Ingrid King (1987) and *Responsive Environments* by Ian Bentley, Alan Alcock, Paul Murrain, Sue McGlynn and Graham Smith (1985)--attempted to translate concepts very similar to Jacobs' into design guidelines that could be implemented in the real world. Alexander, like Jacobs, criticized orthodox planning principles such as zoning and blamed segregation of various building processes in the city as the main reason for urban decline. Further, in works like *Pattern Language* (Alexander, 1977), he spoke of lively public places, variety of uses, active street life, and so forth. Similarly, Bentley and the other four authors of *Responsive Environments* sought to actualize Jacobs' vision of a dynamic city, directly drawing on her concepts like multiplicity of choice, variety of use, active street life and so forth.

This thesis overviews and critiques *A New Theory of Urban Design* and *Responsive Environments*. These two works are compared and contrasted in regard to their approaches to urban design. The thesis examines the strengths and weaknesses of the two approaches and considers how well they can be translated into a real-world design process.

AIMS OF THE THESIS

In broadest terms, this thesis attempts to acquire an understanding of urban-design approaches. As evidenced from the above discussion, there are many ways to

understand and to design a city. However, this thesis focuses on approaches that first of all emphasize urban life rather than urban form.

As was mentioned above, the specific interest of this thesis is to compare two such urban design approaches--*A New Theory of Urban Design* and *Responsive Environments* (referred to, respectively, as NT and RE in the following discussion)--that seek to accomplish similar goals. The underlying goal of both NT and RE is to provide alternate approaches to current urban design in order to achieve better urban environments which eliminate many problems plaguing modern cities. Therefore, to begin with, both works define an ideal urban environment--what is called *wholeness* in the case of NT and *responsiveness* in the case of RE. Both approaches develop tools--seven rules and seven qualities, respectively--to help create that ideal environment. In order to show how the tools can be applied to design, both works develop two project sites--for NT, a bay front site in San Francisco; and for RE, a downtown site in Reading, England--to demonstrate their design ideas.

These two approaches to urban design are considerably different, however, both in terms of the tools developed to create the desired urban environment and the methods used to implement the design ideas. John Ziesel (1981), in *Inquiry by Design*, says that design methodologists' theoretical, personal and practical reasons for analyzing design result in their emphasizing different elements and using different analogies to describe how parts of the process fit together. Therefore, "comparing such descriptions is likely to provide both a useful, multi-faceted picture of design and interesting problems for further study" (p. 5).

More specifically, this thesis compares and contrasts NT and RE in terms of design tools, methods of design implementation and finally accomplishment of goals,

using the design projects developed by NT and RE--the San Francisco and Reading sites. It must be mentioned, however, that the completed designs for the two sites were merely conceptual exercises and neither was ever constructed[1]. Nevertheless, the San Francisco and Reading sites provide an effective applied context for discussing the design concepts of NT and RE.

APPROACH AND OUTLINE OF THE THESIS

The comparative study presented here was done in two phases. First, NT and RE were reviewed to develop a thorough understanding of the central concepts of the two works--*wholeness* and *responsiveness.* In addition, the broad themes developed by the authors, the various sources from which they developed these themes, and the specific rules were also reviewed.

Second, a framework was identified to compare and contrast NT and RE. This framework is based on British philosopher J.G.Bennett's (1993) *tetrad model.* A tetrad is a set of four elements called **sources** (p .63), each of which contributes to understanding an activity as it is a whole. Because NT and RE describe the activity of urban design, the tetrad's four **sources** provide a common underlying platform for analyzing and comparing NT and RE's ways of doing urban design. The four sources for understanding the activity in the two approaches of urban design were identified as **ground**, **instrument**, **direction** and **goal**.

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1 A portion of the Reading site was later developed along the lines of RE, into a housing project called the New Fobney Street Development ("Back to back in the street." (1986, July 16). *Architect's Journal.* v.184. pp. 38-42). Two of the original authors--Bentley and Murrain--teamed with a developer and a project manager to design and develop the five-and-a-half acre Fobney Street site, incorporating several features from RE, including permeability, visual appropriateness and so forth.

Ground is the city or parts of the city that need to be restored, which in the case of NT is the San Francisco site and in the case of RE, the Reading site. **Instrument** is the knowledge and tools required for actualizing the desired environment. In NT, the instrument is a set of seven design rules while, in the case of RE, the instrument is seven designable qualities, which are called permeability, variety, legibility, and so forth. **Direction** is the force that guides the instrument and is therefore the practical method whereby the design process can actually be implemented. Finally, **goal** is the end result of an activity--the final aims and accomplishments--which in the case of NT is *wholeness* and in RE's case, *responsiveness*.

The chapters of the thesis are organized around the four sources just described. Chapters two and three introduce and review NT and RE, while the body of the thesis--chapters 5-8--compare and contrast NT and RE in terms of ground, instrument, direction and goal. Chapter 4 initiates the comparative study of NT and RE. First, a framework for comparison and contrast is presented, in which the tetrad model for comparison is explained and the four sources of the tetrad are defined. Next, in chapter 5, NT and RE are compared for the first 'source' in the tetrad for urban-design activity--the *ground*--in which the San Francisco and Reading sites are studied in detail for physical features, existing buildings, streets and land uses.

Chapter 6 discusses the second source of the tetrad for urban design, which, as explained above, is *instrument*. This chapter traces the design processes used for the San Francisco and Reading sites, in an attempt to bring out the link between conceptual ideas and their transformation into actual design. This comparison involves five themes: (1) initiation of the design process and basic layout, (2) mix of land uses and activities,

(3) public spaces and their character, (4) street systems and parking, and (5) scale and style of architecture.

Chapter 7 discusses the third source of the tetrad--*direction*. This chapter examines how the participants in the design process operationalize the design and work to move the process toward completion. In other words, *direction* discusses the methods of implementing the design ideas. Four themes provide the organizational framework for the discussion: (1) phases of implementation, (2) framework for implementation, (3) redefining the urban designer's role, and (4) two built projects.

Chapter 8 discusses the fourth and final source of the tetrad, which is the *goal*. This chapter considers how the ground--the San Francisco and Reading sites--achieves the realization of a vision through instrument and direction. Because Jacobs' ideas are a common thread running through NT and RE, her four criteria for a lively city--mixed primary uses, small blocks, aged buildings, and concentration--provide an ordering framework for evaluating the final designs of the San Francisco and Reading sites.

Chapter 9 presents conclusions drawn from the comparisons in chapters 5-8. The chapter compares and contrasts the relative strengths and weaknesses of NT and RE and suggests ways whereby modifications might make them stronger tools for urban design.

Chapter 2

A REVIEW OF A NEW THEORY OF URBAN DESIGN

In all his writings and designing, Christopher Alexander is concerned with imbuing cities with the same kind of beauty that he believes existed in traditional towns. But for Alexander, unlike many urban designers, aesthetic urban form, as seen in the classic compositional approach, is not the goal. Nor is Alexander interested in recreating the physical morphology of the traditional city. Rather, he dismantles the morphology of the traditional city to study the underlying essential spatial patterns that bring about this beauty. After studying these traditional places, Alexander proposes that what sets them apart is their quality of 'wholeness'.

For Alexander, this 'wholeness' is the starting and ending point for urban design. He derives this concept from what has endured through time and change (Alexander, 1977). Wholeness is the overriding principle, and every other design principle is derived from this understanding and simultaneously aids in achieving this primary goal. “Form”, says Alexander “is the spontaneous effect of wholeness” (Alexander, 1987, p. 14).

What is then this concept of wholeness? Alexander offers several definitions. Wholeness is to "put things together in a balanced fashion" (ibid., p. 22). Wholeness pertains to the harmonious integration of the various elements and processes in the city. The traditional hill towns of Italy and the towns of North Africa with their vibrant street life, the public places like the market and small square full of people, are some examples where this kind of harmonious integration can be seen and experienced. In such places, the social life gives rise to a certain pattern of events which in turn shape the pattern of spaces paving the way for a certain kind of symbiosis of social life, events,

people and geometry of space (Alexander, 1979). Alexander argues that, too often, this symbiosis doesn't happen in today's cities.

The reason that today's cities don't function well is because they are shaped by differing goals that do not relate to the overall growth of the city. Alexander points to the different processes--the transportation department that wants the best traffic solutions, city officials trying to enforce zoning rules, landlords trying to get the greatest profit out of their properties--produce an unbalanced system of forces (p. 18). In a critique of the Yerba Buena Gardens--YBG--project in the heart of San Francisco, for example, Sally Woodbridge (1995, pp. 60-67) observed that the project failed to bring about coherence in the urban district and turned its back to its surroundings. Further, individual buildings within the project failed to connect to each other. It is exactly this lack of integration with the overall aims of a city's agenda that Alexander is trying to overcome with his concept of wholeness.

The concept of 'wholeness' is by no means new. Various authors on urban design have discussed this issue, albeit from different perspectives. For example, Colin Rowe, in *Collage City* (1978), stated that "the relationship of the whole to the parts is really a matter of world view, of an age, a culture, or an individual" (p. 110). Maki, in *Modernism at the Crossroad* (1983, pp. 18-22), argued for a wholeness that had active and assertive parts characteristic of Gothic Architecture. According to Maki, "working from the parts permits a freer formal interpretation of how various functional and environmental demands . . . are to be met. The whole composed from a collection of such active parts never conforms to a formula" (p. 20).

Alexander, however, develops the concept of wholeness from a different angle. Wholeness is not just a relationship of the whole to the parts; it is also the overriding and

the underlying principle for city design. Every act of construction and design should aim to produce wholeness in a city. For this to happen, Alexander proposes to unify various building processes that reflect this single aim. However, Alexander's emphasis on the creation of wholeness as a single process requires changing the established practices in urban design. If various processes are to harmonize with each other, then they have to work together. As of now, there is no single committee or board that can oversee the kind of team work that Alexander proposes. This is why he criticizes the present-day urban-design processes as the cause for current problems in cities. Therefore, wholeness, as Alexander proposes, is the concept that can give a much needed life force to cities, make good new cities and heal the existing troubled ones.

THE SEVEN RULES FOR WHOLENESS

In the above section, the concept of wholeness was examined and studied. To recapitulate, the concept of wholeness paints broad strokes of the desired qualities in cities. Alexander's next step is to identify the essential features of wholeness. In this regard, Alexander claims that wholeness grows piecemeal, bit by bit. He also argues that the whole is unpredictable but also coherent. Drawing on these qualities, Alexander develops seven rules for wholeness. These are as follows:

1. Piecemeal Growth
2. The Growth of Larger Wholes
3. Visions
4. The basic rule of positive urban space
5. Layout of large buildings
6. Construction
7. Formation of Centers

Before discussing the rules, it is important to mention that Alexander bases most of these seven rules on his earlier works. The idea of wholeness itself, for example, is mentioned in *The Timeless Way of Building* (1979), while rule1--piecemeal

growth--is discussed in *The Oregon Experiment* (1975). At the very outset in NT, however, Alexander makes a disclaimer that, as they stand, these seven rules are 'imperfectly formulated' and that they will have to be improved considerably (1987, p. 8)--a task he gives initial attention to in the last chapter of NT. The last part of this thesis will return to Alexander's discussion relating to the relative success of each rule.

Alexander calls the seven rules intermediate rules because they are all versions of the overriding principle: every act of construction should aim at wholeness, whereby the city becomes more coherent and interconnected. These rules are conceived as gradually bringing about wholeness in an environment rather than at one full swoop, as would be the case in conventional planning where an entire city area would be worked out all at once. For example, rule 1--piecemeal growth--aims to keep the 'grain of development', in small steps, while rule 2--The growth of larger wholes--aims to keep an overall order to the piecemeal development process.

In a review of NT, Seamon (1988), discusses the seven rules in terms of how they relate to each other and to the site. He observes that "these rules have related functions: first, rules 1, 2 and 7 help the designer to recognize and understand environmental wholes; second, rules 3,4,5 and 6 help to create new parts in the whole that will lead to healing and stronger environmental order" (p. 32). These rules will now be discussed in detail, drawing on Seamon's categorization as mentioned above as one way to order the seven rules and thereby more easily draw interconnections and parallels.

RULE 1: PIECEMEAL GROWTH

The process of achieving wholeness in an urban environment is initiated by the first rule, Piecemeal Growth, which says that "The grain of development must be small

enough, so that there is room, and time, for wholeness to develop" (1987, p. 32). Three sub-rules further elucidate the concept. They are :

1. no grain of development should be too large
2. there should be a reasonable mix of sizes
3. there should be a reasonable mix of functions.

Wholeness cannot be achieved in large units or big leaps. From his study of traditional towns, Alexander observes, in *The Oregon Experiment* (1975), that all good environments are whole and alive because they have grown slowly over long periods of time, piece by piece. Traditional Italian, Greek and some North African settlements are good examples of natural piecemeal growth. In NT, Alexander draws upon the same idea.

It should be noted here that current methods of planning produce growth that is piecemeal. But the bits of growth that result are highly individualized and not necessarily related to one another. This is because different projects in the city are developed and designed by builders and designers with differing aims which, more often than not, are motivated by profit and tight budgets. Hence, though this growth is technically still piecemeal, Alexander argues that it is not the kind of piecemeal growth that brings about wholeness.

Piecemeal growth, as defined by Alexander, is growth that goes forward in small steps where each project spreads out and adapts itself to the twists and turns of function and site. For example, a small wing added to an old building, to create classrooms and a sunny open space and so forth. Since the first subrule states that no grain of development be too big, the question of size of building projects arises. Alexander breaks down building projects into small, medium and large projects. A small project, in

terms of size, would be around 1000 square feet in area whereas a medium sized project would be around 1000 to 10,000 square feet. The largest of projects would range between 10,000 to 100,000 square feet. Though Alexander initially fixed the size of the largest projects to be no more than 100,000 square feet, he does admit that, "in practice more subtle formulations would be needed." (1987, p. 32). But the main idea is to encourage smaller projects over larger ones. Thus numerically, small projects would amount to 50 per cent of all projects whereas the larger ones would amount to about 15 per cent, with medium about 35 percent.

As mentioned above, in piecemeal growth, Alexander makes the case for greater emphasis on small building projects of high density and a strong mix of functions leading to a greater variety. Alexander (1975), further, proposes that for a given budgetary period, equal sums shall be spent on large, medium and small projects so that the numerical predominance of very small buildings increases (p. 32). But in NT, he modified this idea and proposed that in practical terms, a mixed flow of small, medium and large projects in about equal quantities should be considered rather than equal sums of money.

In the *Oregon Experiment*, Alexander (1975) provided empirical proof to show that large projects cost more and do not help in the process of building wholeness in the environment as compared to small projects that cost less and work better at creating wholeness in the environment. Further, maintenance costs for large buildings are more as compared to the same costs for smaller buildings. It is also easier to repair small buildings, as the problems would be of a smaller nature (pp. 30-35). Therefore, smaller projects work well in the long run.

Piecemeal growth hinges on the assumption that the adjustment between buildings and their users is necessarily a slow and continuous business which can't under any circumstances be achieved in a single leap. To facilitate this process, Alexander also proposes the ideal distribution of funds. He observes that funds usually get tied up in new projects leaving very little for the maintenance and upkeep of the old and existing buildings. Instead Alexander proposes that available resources must be spent in such a way which distributes improvement uniformly over a project. Development goes forward on all fronts at once. Gradually various pieces will come to form a whole which is in stark contrast to the current situation where mega-building projects swallow up all the funds, yet do not contribute significantly to better quality of urban life (1975, pp. 32-35).

An important idea contained within the piecemeal process is the notion of continual growth. This means that no building should ever be considered finished. The idea is that there is a continual adjustment between the building, its program and the users, and that a building continuously evolves over a period of time. As such very few examples exist in the real world where a project was continuously worked at by a designer.

Another aspect of piecemeal growth is that it asks for a reasonable mix of functions. This is very important because there is an inherent danger that an entirely undesirable mix of functions might arise. So Alexander proposed that at any given time there must always be a balanced number of projects going forward at every scale. This 'balanced number' assumes a strong mix of functions, for example, housing, commercial, hotels and so forth. But Alexander did not explicitly provide the criteria on which to base this kind of mix, neither in NT nor in his earlier works. Gleaning from his

statements, however, one assumes that this number would come from the community which decides the kind of amenities it requires and the kind of growth it would like to encourage.

The final question that arises is who acts as a watch dog to ensure that this process will be carried out. Alexander suggests the formation of committees like the planning boards to govern the distribution of funds and permission to carry out any kind of building project. This committee should ensure that smaller projects are encouraged and funds are spread out evenly on all sizes of projects. Thus the committee becomes crucial to the implementation of the piecemeal process.

In summation, piecemeal growth governs the allocation of resources to various construction projects, dictates the size of the projects and is finally the deciding factor on the kind of projects-in the sense of mix of function-to be built. Piecemeal growth, therefore, is a first step that begins to carve out a shape to the city.

RULE 2: THE GROWTH OF LARGER WHOLES

From the above discussion, it is evident that a project that goes through the piecemeal process comes out with its size and character defined, its space roughly designed and the neighborhood mix of projects decided. But the piecemeal process by itself cannot produce wholeness. Hence, the second rule in NT, the rule of the growth of larger wholes, is the second step mechanism that helps tie the various pieces of building increments together. These larger wholes or centers that Alexander is alluding to are entities of public space in the city such as the squares, gardens, even grid streets that take shape when several buildings come together spontaneously over a period of time. The rule states that "Every building increment must help form at least one larger whole in the city, which is both larger and more significant than itself" (1987, p. 38).

Wholeness of the overall environment is formed by a very large number of such larger centers, all interwoven, in the most intricate way.

Historically, urban design in cities like Rome, started by defining and fixing public space which continues even today. But in the many towns that evolved organically and therefore, were never planned, wholes and centers came up naturally over a period of time. Alexander draws from the qualities of these towns for his ideas on larger wholes. And deviating in a major way from the current practice, Alexander, in this second rule decrees that the larger centers or wholes cannot be planned. Indeed, he is against a plan of any kind. Instead, the piecemeal increments as they develop should spontaneously produce a hierarchy of centers and not the other way round.

From the above discussion, it is evident that the rules of piecemeal growth and the growth of larger wholes are complementary. If wholeness is to be achieved at all, one cannot be without the other. Piecemeal growth, as seen earlier, is urban growth in increments. Each increment plays a complex role in the urban growth process, with respect to different larger centers. Alexander explains: each new increment X does three things. First it helps complete at least one major center which is already clearly defined. Secondly, X pins down some other less clearly defined center, which so far has only been hinted at by other increments. And thirdly, X creates a hint of some entirely new larger center, which will emerge fully, only in much later increments (1987, p. 43). The rule of the growth of larger wholes, then, explicitly states that piecemeal increments must work in tandem, that individual increments must co-operate to create larger wholes. Thus, with these two sub-rules, Alexander gives us the basic elements of the city: masses of piecemeal increments along with the voids of larger centers that weave together to form a wholesome city fabric.

Yet this seemingly simple idea is exceedingly complicated to put into practice. There are several reasons why. Firstly, in their NT experiment, Alexander and his team formed a committee that would evaluate at each stage of incremental acts of construction the larger wholes which seemed to be emerging under the surface. Through a process of continuous feedback between the individual projects and the informal process of defining larger wholes, Alexander's team managed to create larger wholes from small increments. Being a studio team that was committed to the experiment, this group could work more informally and thus have a very flexible form of control. So, in practice, this kind of flexible control needs to be established as well as a commitment from the builders and other parties to sit down and actually help identify the wholes that emerge through this process. This then implies a drastic change from the design and building practices of today, where the building codes and laws are very tight and discussion among the various parties--developers, planners, politicians, residents, and so forth--is minimal or non-existent.

Secondly, Alexander envisions that everyone managing a project must clearly identify which of the larger emerging wholes a piecemeal increment is trying to help and how it will help generate them. Once again, a participatory group is crucial to the implementation of this rule. First of all, builders and project managers have to agree upon a common platform for this rule to work which again is not the case today.

Thirdly, the mechanism of the participatory process, being very crucial to the success of the rule, is also sketchy. Not only do the rules reject most planning processes of today, but there is neither any precedent for this kind of process. Also the necessarily slow process does not reconcile with the notion of speed which is a catch phrase in the profession. All these apart, Alexander himself admits that the precise

extent of control, or coordination which needs to be imposed on the individual acts, is not clear. It is as though Alexander has an answer without a very clear method. Moreover, from the experiment, Alexander observed that recognizing the emerging whole was the greatest difficulty that the students faced. This is why, he says in his evaluation of the experiment, that this part of the rule needs greater study and refinement. Hence, further research is extremely important to provide a workable model for general use.

In summation, this rule forms the keystone of Alexander's urban design philosophy. Only with the grounding provided by the larger wholes, piecemeal increments can bring about the quality of wholeness to the city because, as Alexander says, piecemeal growth, despite all the best intentions, tends to be piecemeal in the bad sense--fragmented and chaotic (1987, p. 50). In the next section, the geometrical properties of the wholes as described in rule 7 will be discussed.

RULE 7: FORMATION OF CENTERS

The rules of piecemeal growth and formation of larger wholes form a basic structure that creates the city. Rule 7, The Formation of Centers, develops a geometric relationship between the various piecemeal increments and the large wholes. Hence, following Seamon (1988), this rule is being studied here after the first two rules rather than at the very end as Alexander did in NT. “This rule”, states Alexander, "deals with the geometric shape of all the wholes, at all scales within the process" (1987, p. 72). This rule doesn't so much specify shapes of increments in terms of squares, circles or volumes in terms of cubes and pyramids as much as it deals with the geometrical concepts of center, symmetry as the parameters that relate one increment to another.

At this point a clarification on the use of the word 'whole' is necessary. Throughout NT, Alexander uses the word 'whole', but not necessarily as an operational definition. Since this can confuse the reader, the different nuances of 'whole' will be laid out here. In the beginning of this chapter, the qualities of 'whole' and 'wholeness' were discussed. In rule 2: The Formation of Larger Wholes, however, 'whole' is an entity of public space, like a garden, square and so forth, that formed as several piecemeal increments came together (p. 39). In rule 7, however, a 'whole' pertains to 'any increment of a building, or even any small detail and the adjacent space' (p. 92). Further, Alexander introduces another concept 'center', which is an entity, or a thing as opposed to a point. Center has a basic bilateral symmetry and can be a solid or just space, as in a building, outdoor space, and so forth (p. 93). Actually, the concepts of 'center' and 'whole' seem to be interchangeable, though in the concept of 'center', Alexander tries to give a more physical expression of wholeness.

Having thus defined 'whole' and 'center', rule 7 states that, "Every whole must be a 'center' in itself, and must also produce a system of centers around it" (p. 93). There are five subrules to explain the mechanism which Alexander calls the centering process. This centering process has a basic bilateral symmetry about an axis. Perfect symmetry is not the goal, but when an asymmetrical situation occurs, the centering process generally constructs the asymmetrical entity into a product of simpler centers which are themselves symmetrical. Random asymmetrical arrangements are not permitted. Yet, even as each new center strives to introduce symmetry into the field of piecemeal increments and large wholes, Alexander says that it always fails, because a "naive insertion of a symmetrical object is dead as it does not relate to the complex field around it" (p. 94). However, a new center still contributes to the structure of centers because it

helps balance symmetry and asymmetry. This is the key to a real structure of centers which takes place at every level of scale. Thus every center is a whole in itself and made of simpler wholes along with the space or building next to it. In turn, this center is also a part of a larger whole.

The concept of center, in fact, can be traced to two of Alexander's works. The first one dealt with the theory of generativity, which explored the notion of self-generating buildings and towns. A major portion of Alexander's work involved developing a building code similar to that of a genetic code in such a manner that enables a town to generate itself, in other words grow, by its inherent laws of growth, just as any living organism grows (Grabow, 1983). This concept deems every bit of construction to assume a new level of complexity and great significance. This is because, encoded in each increment of construction is the destiny of an overall pattern that would lead to wholeness. More importantly, wholeness derives its quality not by the division of a finite sum into its parts, but little parts keep adding up to make an infinite whole. Perhaps, one can speculate that this is one of the reasons why Alexander doesn't set a maximum limit to the size of a city though he specifically set an upper limit to the size of an increment.

Second, Alexander explored the same concepts of a 'center' and 'whole' to a greater depth in his *A Foreshadowing of 21st Century Art: The Color and Geometry of Very Early Turkish Carpets* (1993). Some basic ideas of NT are echoed in this work, though, as the name of the book suggests, Alexander is exploring the connection between centers and symmetry with regard to ancient turkish carpets. Nevertheless, these concepts hold to a more lucid interpretation as compared to NT, probably because *Foreshadowing* (as will be referred to from here on) is a later work and Alexander

himself must have developed a keener insight about these concepts. Hence, it seems appropriate to discuss them here.

In *Foreshadowing*, Alexander observes that the crucial feature of a center in a carpet is that it is composed of other centers and in turn, may be an element of a bigger center(s), a feature which he described in the NT as well. This nesting possibility leads to a first central criterion for the relative force of a center: It does not get its power from its shape or elements alone but, also, from the gathering of other centers that this center contains or is part. There is a potential synergy among centers (p. 61).

Also, there is a strong connection between centers and symmetry. Similar to the concept in NT, Alexander confirms that most centers are symmetrical in the carpets, with at least one bilateral symmetry. And though certain centers are indeed asymmetrical, they are almost always composed of smaller centers that symmetrical themselves. Another quality for a strong center in a carpet is the strong use of positive and negative space. This concept will be discussed in further detail in relation to rule 4 in NT, the positive use of public space.

Two other qualities that Alexander gleans from his study of carpets is the range of scale, and the distinctness of the centers. The first idea, the range of scale, pertains to a "cascade of levels or steps in size." (p. 61) Alexander explains, ". . . the real depth of any center comes from the fact that it exists, and works, at many levels simultaneously." (p.62). The second idea, that of every center being distinct, pertains to, "a number of distinct, identifiable entities, each with its own identity." Crucial to wholeness, is the presence of many different centers of various scales, packed together to create a sense of density. However, in a review of *Foreshadowing*, Seamon (1995), comments that ". . . Alexander says little in *Foreshadowing* about how practically an

understanding of carpet geometry might contribute to better architectural design" (p. 9). Nevertheless, *Foreshadowing* throws more light on 'center' and 'wholeness' as written in NT.

Finally, it can be seen that rule 7 helps in positioning each increment in relation to the others already around it and guides the ones that are yet to come into existence. Also this rule ensures that various increments essentially behave in a similar fashion, in terms of symmetry, centering and so forth, and thus cooperate with one another.

RULE 4: POSITIVE URBAN SPACE

We next must consider the rules that help to make new parts of the city, the first of which is rule 4--positive urban space. In Alexander's process of urban design, growth is piecemeal with one building increment coming up after another slowly over a period of time. A number of these pieces come together to form public spaces. The processes that bring about this growth and the relationship of each increment to another has been discussed. Now, the relationship of a building to its adjacent space will be discussed in rule 4. This rule states that "Every building must create coherent and well-shaped public space next to it." In a sense, this rule is similar to rule 2 which says that buildings should shape public spaces as in larger wholes and not the other way around. But here the relationship of buildings to adjacent spaces that are public in character, and these need not necessarily mean only the larger wholes, but smaller public spaces like the street, small squares and gardens as well, is explicitly studied.

While this rule seems simple enough to be obvious, the trouble is that often times today, land is divided into plots and buildings built on each plot with the resulting open spaces that are merely left-overs. These left over spaces are naturally uninspiring and do not in any way contribute to the urban character of the city. Master plans make

special provisions for gardens, parks, plazas and so forth. But as William Whyte's study (Whyte, 1980), shows some of these public spaces are hardly used for they lack the character necessary to draw the public into their vortex. Yet without vibrant public spaces, the urban character of a city would appear dead. This is because the major experience a city can offer is in its street life, parks and other public spaces where the city's denizens can meet others.

Some of the most enjoyable of cities meet this essential requirement of vibrant public spaces. Alexander says that in cities like Florence or Siena in Italy, public spaces like the piazzas have been shaped by the buildings. The buildings themselves are loose and relaxed in shape and there are no left over empty spaces. Clearly the relationship between the building and space adjacent to it becomes critical. This notion can be compared to the positive and negative spaces in the carpet designs studied in *Foreshadowing*.

Several qualities of carpet design were discussed in the last section of this chapter. One of the rules that becomes relevant here is for a carpet design to be successful, Alexander observes that it is important for a design to have a strong positive and negative space. This essentially means that the background or the negative space of the carpet both in terms of color and design is equally important as the positive space or foreground. From Alexander's rule 4, if the buildings of a city were to become the positive space or the foreground design of a carpet, the public spaces of a city would be the negative space or the background design of the carpet. (Note here that by positive urban space, Alexander is not talking in terms of background and foreground as in *Foreshadowing*, but he's saying that the urban space should have a positive character like the piazzas of Florence.)

Applying the qualities of positive and negative space in *Foreshadowing* to the concept of buildings and their adjacent spaces, the public spaces in cities like the negative spaces in the carpets should be centers and whole in themselves with a clearly identifiable geometry. In rule 4, Alexander identifies five key elements in a city and then proceeds to establish the relationships necessary to create positive urban spaces in the city. These are the pedestrian space, buildings, gardens, streets and parking. In the subrules, Alexander describes how to create a positive urban space.

It is in these subrules that Alexander begins to tentatively sketch the formal geometry of the buildings in a city. Until this point in NT, it appeared that Alexander wasn't concerned with the form of the buildings in the city because he was mostly concentrating on the underlying geometrical and spatial relationships between the different piecemeal increments. But in this rule and rules 5 and 6, he lays out a precise description of the kinds of structure and design of buildings to further aid in bringing about wholeness in the city. So in the rule 4 on positive urban space, Alexander begins with the orientation of the building in relation to other buildings and states that the buildings should be shaped in such a way that they create a beautiful pedestrian space and that this choice should dominate the building design and positioning.

Next to consider is the building volume and massing. For example, the building volume is simple and compact or made up of several simple compact volumes one of which will be the major mass of the building and the rest will be the minor ones. Alexander specifies that no wing of a building be more than forty feet thick. And that buildings touch at least one other building so that together they form a continuous fabric throughout the city and also that they have one wall blank without windows so that other buildings may later touch it. Alexander also wants gardens between buildings wherever

possible and they should be facing south. All of this can be interpreted in two ways. The first is that Alexander is being very prescriptive giving very specific details of what is required. Prescriptive ideas in architecture have not really met with instant approval. A second way to interpret is to say that Alexander is clearly envisioning the kind of city that is more pedestrian oriented both in terms of distances and scale.

But more importantly, the ideas Alexander has about roads and parking is worth a discussion. In Alexander's vision of the city, at least in NT, roads grow along with the piecemeal increments, gradually, and not the other way round. While Alexander himself admits that this leads to some difficulties, he insists that his method still results in an orderly network of roads. Parking spaces too receive an unusual treatment in NT. Wherever possible Alexander envisions that the buildings should shield parking spaces, for example, " the parking lot is always buried or half buried within a building" (1987, p. 75). Yet this does not mean that Alexander considers roads and parking spaces unimportant. It is only that his approach to urban design does not start with designing roads and cutting up land into small blocks, rather it starts with piecemeal increments and gives more importance to pedestrian scale of building.

Pedestrian spaces have long been a favorite of urban designers. Numerous studies have gone into the theories of pedestrian spaces. A number of them have debated the issue of segregating vehicular traffic and pedestrian traffic on important streets. While no consensus has emerged over this issue, some designers feel that vehicular traffic should be separated from pedestrian traffic in cities and importance should be given to pedestrian spaces and streets over vehicular streets. Alexander is definitely one of these proponents. This is because it works well with his piecemeal growth idea and also fits in with the pedestrian scale of the scheme unlike Le Corbusier,

who, for instance clearly spelled out city design to symbolize the age of the automobile. Yet Alexander himself admits that this is one of the most questionable rules in NT as he foresees that this sub-rule might not work well in large urban sites.

In summation, rule 4 offers a unique perspective on the design of public urban spaces. Alexander formulates the rule in a manner as to create the much loved traditional public places like the piazzas of Italy and lively street life of traditional towns in general. Therefore, rule 4 guides the design of public places by creating symbiotic relationship between the buildings and their adjacent public spaces.

RULES 5 AND 6: LAYOUT OF LARGE BUILDINGS AND CONSTRUCTION

In this section, the two rules that deal with (as their names suggest) the layout and construction details of large buildings will be discussed. Most urban designers consider the layout of individual buildings to be beyond the scope of urban design and mostly falling into the realm of architecture. But in the words of Alexander, a city cannot be whole, "if the buildings themselves are unwhole internally" (p. 77). Design of individual buildings is as important as the design of the city itself. There is no city without buildings. More importantly each of these buildings contribute to the 'whole' character of the city. Hence through these two rules, Alexander clearly spells out the formal character of the buildings in a city.

The very precise nature of the rules specified might raise questions about the resulting architecture. Some designers may argue that the resulting buildings will be very similar to the mass produced buildings of the modern era which is exactly what Alexander is trying to oppose in all his works. Actually studying the various subrules, one realizes that Alexander is not trying to provide a formula but he is trying to provide essential features that are common to all buildings in a city. These essential features

relate to the internal layout, the massing and volume, the division of various storeys, and the structural systems.

This is very similar to the qualities of vernacular architectures around the world as also the chief traits of historical styles. But the commonalities end with the above mentioned features and, depending on individual situations, a whole lot of permutations and combinations within the given frame work result. More importantly a clearly identifiable architecture results which further helps in creating wholeness to a city.

One of the main reasons why Alexander chose to propose these two rules is explained by Grabow (1983), who quotes Alexander saying that he was totally disappointed with the architecture that resulted from using *Pattern Language*. He was not so much disappointed with the patterns themselves as much as he was with the formal geometry of the resulting architecture. Alexander didn't find these buildings any different from the modern style of architecture, though the clients who used patterns from the Pattern Language thought they got a very different kind of building. This is supposed to have prompted Alexander to come up with a more specific formal geometry to augment his theories on underlying spatial patterns and later on, the concepts of wholeness in *Oregon Experiment* and NT.

Coming to the rules themselves, there are twenty five sub-rules to rule 5, Layout of Large Buildings and eleven to rule 6, Construction. They are fairly simple rules that are easy to follow and construct. As Alexander says in rule 5, "The entrances, the main circulation, the main division of the building into parts, its interior open spaces, its daylight, and the movement within the building, are all coherent and consistent with the position of the building in the street and in the neighborhood" (p. 77). With these rules,

Alexander gets the message across loud and clear that he does not advocate mega construction projects.

Thus the architecture resulting from these rules would be simple: small in scale (the maximum building size already fixed in rule 1, piecemeal growth), and natural lighting and internal courts, and so forth. The construction methods, too, are simple using reinforced concrete or masonry, painted or plastered, or left natural. Again the idea is to "guarantee that the physical structure will be in harmony with the volumes and spaces of the building. . . that the exterior of the building will be in harmony with the exterior public space" (p. 85).

To achieve this, Alexander proposes the concept of a global structure for each building at three levels of scale: structural bays, primary structure and secondary structure. A structural bay is a structural entity by itself which may be several storeys high and bounded by major columns, beams and walls. The primary structure defines the largest rooms and spaces within the building. Finally the secondary structure defines the minor rooms and passages. Within this structural system Alexander provides for flexibility wherever possible. This global structure provides a common thread that runs throughout the city fabric. Thus altogether these rules can be seen as molding the individual buildings in a city that further contribute to the wholeness of a city.

RULE 3: VISIONS

There is no art without a vision. In the context of art, *vision* implies a certain moment of knowing, a coming together of various pieces of a jigsaw puzzle to form a recognizable or a perceivable entity. Vision can also be described as a very exciting moment when the person who experienced the vision creates a piece of art with total knowledge of that which he set out to create rather than taking a hike expecting to get

somewhere without really knowing where or what the final destination is. Exemplary works of art are often regarded to possess a sublime quality that is the product of a vision. In architecture, there are so many examples of vision that can take your breath away. The pyramids, the Taj Mahal, the Sydney Opera House and so many others have beautiful tales to tell of the vision of their creators and continue to awe inspire everybody long after the creators turned into dust.

Alexander, in the third rule in NT talks exactly of this kind of 'vision'. He firmly believes that great architecture can only come from a genuine creative impulse. And Alexander, like so many other artists and designers, is not merely content at letting the matter rest at that statement. The big question to him is how can this vision be interpreted and understood so that it becomes a tool that can be used to create beautiful cities that are whole. Many artists worth their salt have provided their own interpretations; from the surrealists like Dali who used drugs to enhance his vision for his extraordinary paintings to others who attribute a great vision to religion, love and other sometimes strange sources.

Nevertheless, Alexander provides his own interpretation. In rule 3 in NT, Alexander states that, "every project must first be experienced, and then expressed, as a vision which can be seen in the inner eye (literally). It must have this quality so strongly that it can also be communicated to others, and felt by others, as a vision" (p. 50). This vision must come from a sublime human feeling and not governed by economy, profit or other gains. The character of wholeness can only come from this sublime human feeling according to Alexander. It's not just the great examples of the past that contain this quality, any architecture of modern day that is a vision of value and betterment falls into this category.

Alexander describes various qualities of this vision. One of the qualities of this vision is that "it has a[n] intensely personal feeling" (p. 57). By this Alexander means that the simple question of what to build and where must not be the product of a detailed survey or a public water works department study. It should be the product of a personal vision. Though this rule raises many questions like whose personal vision should it be and how can this be practically achieved, the quality of vision that Alexander describes has nonetheless been advocated by almost every designer not necessarily in agreement with Alexander.

Hence Alexander interprets the age-old question of vision as originating from an intensely personal feeling that relates deep down to the existing structure of the world itself. It cannot be the product of a calculated and premeditated process. And in the process of analyzing the notion of vision, Alexander takes the help of mathematical notation. "At any given moment in the evolution of the site, there is a certain configuration there. It consists of everything that has been built, up to that moment. If we are now going to try to make a "next" proposal, we must ask ourselves, "what proposal, and where placed, and how formed, will now do the most to make the whole area more complete, more whole, as a totality" (p. 57). The point he is trying to make here is that any building proposal should be sensitive to the exact moment in sequence when it comes. Here it is important to note that while Alexander is trying to analyze the idea of vision, he himself is not trying to convert it into an 'industrial' process which can be mass produced by everybody. Rather Alexander is trying to help an average person understand what vision means.

Unfortunately vision is an abstract concept very much similar to the concept of god. One can only explain what god is or what He is not. It is for everybody to believe,

understand and experience on a personal basis. And not only is Alexander's aim to help understand but also emphasize the importance of vision in creating wholeness in a city. Vision gives a human quality to a city, ties its piecemeal increments together and acts as binding force that naturally produces a wholeness to the city. "Vision is the answer to the fundamental question: What shall we build in a given place, where a project is to be undertaken?" (p. 51).

The main criticism Alexander has against modern architecture is that this question was answered only in terms of money and profit. In the introductory passages of NT, Alexander criticized modern architecture as dehumanized. Throughout NT as well as his other works, Alexander strives to make his architecture as one that humans can relate to. In the eyes of Alexander, urban design is an exalted art and by extrapolation, the urban designer has an extremely important task to fulfill. Indeed, it is this reverence towards the art and science of building that has led Alexander to research and experiment for years. No other architect or designer has tried to do what Alexander has done. In that sense, Alexander's work itself is a product of a personal vision.

In summation, the seven rules of NT are formulated to work at different levels and at varying scales to achieve wholeness in an urban environment. All the seven rules together provide an organizational framework to direct an unique design process from conception to implementation. Thus, *A New Theory of Urban Design* shows a way to create growing wholes in a city that embody the organic beauty of traditional towns.

Chapter 3

REVIEW OF RESPONSIVE ENVIRONMENTS

Responsive Environments starts with the concept of 'responsiveness' of an environment. It argues that the built environment should provide its users with an essentially democratic setting, enriching their opportunities by maximizing the degree of choice available to them within walkable distances form their homes and workplaces. Places that exhibit this quality are 'responsive'.

Responsiveness as a concept has been derived from the works of such socially-conscious designers and writers as Bill Hillier, Jane Jacobs, Kevin Lynch and even Christopher Alexander. For example, the concept of permeability--the number of alternative ways through an environment--and the variety of use and the emphasis on lively streets are all ideas that owe their origins to Jane Jacobs' *The Death and Life of Great American Cities* (1961). Similarly, the concept of legibility--how easily people can understand the layout of a place--is derived from Kevin Lynch's *The Image of the City* (1960). What RE argues is that having ideas about permeability and legibility is not enough; these ideas need to be linked to physical space and design directives. Only then are these ideas of use to the designer (Bentley, et al., 1985, p. 9). Hence the primary agenda of RE is to show how ideas can be used for practical design and policy.

People living in any place make choices at many different levels as to where they can or cannot go, the range of uses that they can make use of and so forth. These choices depend on the accessibility and physical proximity of the needed amenities. RE's stand is that the built environment should provide for these choices, particularly at a pedestrian scale. The user should have flexibility--for example in terms of the number

of routes he can take to get to places, close physical proximity to a variety of uses, walkable accessibility to a variety of places for the elderly and so forth--in other words, a wide variety of uses to a wide variety of people. This is the idea behind a democratic setting. RE proposes that catering to such diversity will help weave rich patterns and textures into the city fabric fostering a vibrant city life.

This idea becomes important if one were to look at today's cities that are planned--neatly divided residential or commercial blocks that do not support a wide variety of uses. Because they are so monotonously homogeneous, they cannot sustain other kinds of activities. The quiet residential neighborhoods with empty streets and public places like parks and plazas that don't draw enough people are all intrinsically destructive, killing the basic qualities of urban life. This situation is a result of segregation and oversimplified designs. Responsiveness attacks this kind of segregation, simplicity and stripped-down geometry. RE suggests that "It is . . . important to understand why the qualities which support responsiveness are so often difficult to achieve in modern designs. In the end, this is largely due to the operations of the powerful economic interests which fund the property development industry" (ibid., p. 144).

More often designers work for clients who are builders and not the end users. Hence designers end up catering to the needs and projected profits of these clients rather than concentrating on the user needs. One of the major criticisms in the example of Yerba Buena Gardens in San Francisco (Woodbridge, *Progressive Architecture*, Dec 1995) was that the whole complex turns its back to the surroundings. People have to park and take a long circuitous route to get into the gardens, which cover three blocks. Bad decision making on the part of the designers has left users, the common people,

with no choice. They have to either travel the inconvenient distances by foot or not use the gardens at all (p. 32). Considering the importance of the project in terms of scale, time and money, it is a sad waste of resources and a bad commentary on urban design.

More importantly, however, these kind of examples allude to a lack of understanding of the basic character of city life. Enough has been written about the dreariness, monotony and lack of life in public places despite these places being designed and planned. But the key to urban life is not a geometrical order imposed from without; it is a vibrancy that comes from within--the richness and variety of things going on that draws people, chance meetings on the streets and so forth. As Jane Jacobs (1961, p. 448) rightly concludes in "lively, diverse, intense cities contain the seeds of their own regeneration, with energy enough to carry over for problems and needs outside themselves." Thus, RE translates these concepts into the theme of responsiveness and attempts to show that responsiveness can be achieved through a set of seven qualities in spite of all the inherent problems in current planning processes.

THE SEVEN QUALITIES OF RESPONSIVENESS

Responsiveness deals with the issue of providing choice to the end users of a built environment. At the very outset, RE claims that "this is a practical book about architecture and urban design. . . . As a starting point, we are interested in why modern architecture and urban design are so often criticized as inhuman and repressive, despite the high social and political ideals shared by . . . . designers" (p. 9). With this concern in mind, RE attempt to show how ideals can be linked to design through the earlier mentioned seven qualities of responsiveness. Each quality builds on the ones before it—for example, the first three qualities of permeability, variety and legibility deal with the

urban site as a whole whereas the remaining four qualities deal with individual buildings. Since 'choice' is the key to responsive environments, this governs all the seven qualities in their ability to provide for the end users.

The concept of choice to the user is nothing new. To make a design more efficient in catering to the needs of the end users, several architects used behavioral studies to come up with typical user patterns and design accordingly. And several others have involved the end users in a participatory process where the users, through surveys, reveal what they expect from the built environment (e.g. Cooper-Marcus, 1984). Using these cues, designers have produced plans. But these methods have traditionally applied to individual buildings rather than urban design. Further these methods are only partially similar to the kind of choice RE is talking about.

Behavioral design and user-oriented approaches have the user as the priority, yet they still often design and build an environment that doesn't give the user enough control to adapt the environment to his needs. Hence, while the design may cater to the many needs of the user, it still doesn't leave enough scope for the user to change it in small ways without too much cost and effort. Once built, however, the physical environment is not easy to change. Hence RE proposes to give more choice and thereby, more control to the end user beginning with the larger urban scale to the personalization of a smaller office space. Therefore, RE aims for a built-in flexibility in the physical environment which can be used by a wide variety of users including adults, the elderly, and children through the medium of the seven qualities of responsiveness. These seven qualities are:

1. Permeability
2. Variety
3. Legibility
4. Robustness

5. Visual Appropriateness
6. Richness
7. Personalization

In the following sections of this chapter, the seven qualities of responsiveness will be studied one by one, starting with permeability.

PERMEABILITY

"Think of a city and what comes to mind? Its streets" says Jacobs (1961, p. 29). In her book, Jacobs discusses in great detail the important role of city streets in enhancing (or killing) city life. One of the most important features of a street, according to Jacobs, is that it is a medium of mobility and transport. Similarly, the primary quality that RE is looking for in a street is the ease with which people can get from one place to another. They call this quality *permeability*. It is defined as the extent to which an environment allows people a choice of access through it--in other words the number of alternative routes through an environment--which, in turn, requires smaller blocks in lieu of larger ones. A higher degree of *permeability*, therefore, means more physical accessibility to people going through the site. Thus, RE identifies *permeability* as a key quality that is an extremely important first-step in design, because it is not easy to create in the later stages of urban design.

Much of the discussion in permeability, as mentioned earlier, is based on the works of Jane Jacobs and Bill Hillier. Jacobs studied several issues directly bearing upon the street like the intensity of use of sidewalks, street safety, issues of privacy and so forth, while Hillier, in *The Social Logic of Space* (1984), studied and identified the street network that supports a lively public life--pedestrian movement, chance encounters, informal sociability and formal social structures. RE addresses these

various issues through the quality of permeability and provides links to design, which in turn begin to define, tentatively, the morphology of the city.

Higher accessibility which relates to the physical permeability of the site, however, is not the only goal. First of all, the limits of accessibility needs to be defined because of the very public nature of the streets. As Jacobs (1961) states: "Privacy is precious in cities. It is indispensable" (p. 58), which similarly, RE echoes: "If everywhere were accessible to everybody, physically or visually, there would be no privacy" (1985, p. 12). Therefore, RE strives to provide for a clear distinction between public and private parts of every building and the interface between them which gives rise to the concept of visual permeability.

Specifically, visual permeability pertains to a clear distinction between the public and private parts of a building which requires that "all buildings need two faces: a *front* onto public space, for entrances and the most public activities, and a *back* where the most private activities can go" (ibid., p. 14). If the private solid barrier overlooks a street then it would destroy the public character of the street and thus, gives a dead effect. RE believes that this is one of the several reasons why the urban environment that owes its existence to the modern-architecture movement often times has a dreary, monotonous and dead character to it.

To counter this monotony, RE develops an interesting and innovative concept called the 'perimeter block'. The *perimeter block* is essentially a block layout with a consistent front/back distinction with private open space at the back, and public open space at the front. This block is small in size—around 200 ft. to 400 ft. in length. Coming to the shape of the block, unlike the cookie cutter rectangular blocks dished out by the master plans, *perimeter blocks* may assume any shape provided they are still

within the permeability criteria. Mostly the block shape depends on the number of routes passing through a large urban site. Consequently, the *perimeter block* contributes to both physical and visual permeability of the site.

Another issue that RE deals with in this section is the issue of pedestrian and vehicular segregation. This has been one ongoing debate in the field of urban design. There are many proponents and opponents to this view. But RE is clearly against segregation, for they feel this adversely affects permeability. Therefore, by not segregating, future users will have control over how they want to use the place, because they can de-segregate if circumstances change.

Up to this point, having provided the user a certain degree of flexibility in using his environment, RE next sets out to arm the user with elements of control to adapt his environment to suit his needs. RE realizes the importance between providing for every need of the user, and giving him choice to change his environment without simultaneously affecting the surrounding environment. Thus, RE reflects a better understanding of the concept of choice, which has an inherent dilemma--providing too much versus providing too little.

In summation, RE retains the essential street and block structure of the master plans though with a lot of improvements and innovations. Further, at every step of design, RE tries bring the necessary balance to all their proposals laying out in detail both the pros and cons. Hence the quality of permeability—both physical and visual--etches the first lines of city's morphology, while simultaneously providing the user with more flexibility and control to use his environment.

VARIETY

Permeability leads to greater accessibility and mobility for different kinds of people, which, however, raises a key question--namely, where will people go with all this accessibility and mobility? People make use of the opportunity of permeability to further make a choice as to possible destinations and routes. The answer to this question is the quality of *variety*, which RE defines as the quality of a place that has different uses resulting in different building types and therefore attracts different people at different times of the day and night. Variety is the spice of life and certainly is necessary to urban life. Variety of use, however, is seen as the key feature which brings about other kinds of variety. Further, this kind of variety needs to be 'close grained'--different needs in a given place that are mostly accessible by walking--to be enjoyed by all kinds of people. Further, all this diversity allows for a rich mix of urban life and provides broad choices to the urbanite.

Variety in urban design has been considered in many studies. Mixed use development is an example that expresses a similar idea. While many studies have concentrated on creating a design that has different kind of uses and buildings, RE goes beyond the apparent physical-design implications of variety. Even though the final design may incorporate variety in function that leads to varied building types, bringing in different people, when it comes to implementing the notion of variety, initially however, questions as to what kind of functions to mix and what criteria to base such decisions, arise. In discussing the quality of variety, RE shows that the underlying factors for variety are neither spatial nor purely architectural; they are more a function of economics of supply and demand (ibid., p. 28).

But firstly, it is important to address how to bring about variety through a harmonious and viable mix of functions. RE bases its design hypothesis on Jacobs' (1961, p. 161) concepts of *primary uses* and *secondary uses.* Primary uses attract people to a site. They are anchors drawing people into their vortex, because people have to go to these activities and uses--for example, residences and offices. Secondary uses are enterprises which themselves lack the pulling-power to attract people, but which live off the people drawn to the place by its primary uses, example of which are restaurants, theaters and small businesses. Jacobs suggests that any primary use by itself is ineffectual as a creator of city diversity (ibid., p. 163). However, when a primary use is combined effectively with another that puts people on the street at different times, certain enterprises grow to serve the people the primary uses draw.

Without the virtuous circle that forms from judicious mix of primary and secondary uses, the whole concept of variety of function would die an instant death. Hence, designers cannot do away from planning for primary and secondary uses at this point in design. Therefore, in design sheets 2.2 and 2.4, RE discuss in detail how to position primary and secondary uses in relation to one another so that these uses feed off one another(1985, pp. 33-34). For example, secondary uses such as shops need concentrated pedestrian flows to survive which are provided by large stores, car parks and so forth that act as magnets to draw people. RE suggests that " the magnets must be located at such a distance from each other, and from any existing pedestrian concentrations, to make the flow between them available to other uses which need it" (ibid., p. 33).

Further, RE argues that unless it can be shown that there is a *demand* for a range of activities to be located on a site and that affordable space can be *supplied* to

house these activities, in today's building industry urban design projects will not be funded. This is because most builders and developers neglect variety in pursuit of higher profits generated by amalgamation of smaller blocks into specialized zones of single use that are easy to manage. Yet variety should not be sacrificed as it provides a very important choice to the people. So, "To draw developers beyond obvious uses, towards greater variety, designers *must* produce a convincing analysis of demand" (ibid., p. 28). What this means to the designer is that his role is expanding to include knowledge of economics of building where "the key design question is 'what uses can be found for this piece of land?"(ibid., p. 32). The urban designer also dons a dynamic role of a negotiator and project initiator apart from the traditional role of a designer. RE discusses different ways of how the new urban designer can achieve more variety, beating the current planning and zoning constraints.

While decisions on the kind of uses are made by studying the demands for such uses--methods for which are discussed in worksheets (ibid., pp. 31-32), RE makes a very interesting point on providing affordable space to attract a wide variety of users which pertains to the role of old buildings. Old buildings have the potential to provide affordable space for a wide variety of users. However, this doesn't make every old building important because such buildings have to be suitable for modern use. Therefore, as suitable old buildings are gradually developed and repaired, others age and decline, getting ready in turn to be developed and repaired to incorporate new uses. Thus, there is a continuous rebuilding of aging buildings. RE argues that this will generate a variety of rents supporting a variety of uses rather than total redevelopment wherein old buildings are completely demolished to make way for newer buildings which being expensive to build, lead to higher rents and thus, are unaffordable. RE suggests a

mix of the old and new buildings by retaining the old and building new ones as required. This concept is also directly derived from Jacobs' discussion of 'the need for aged buildings' (1961, pp. 187-199).

In summation, in the earlier phases of urban design, the quality of variety not only creates more choice to the users in terms of different functions, it also carves out a new role for the designer. Further, at this point in design, the quality of variety can be seen as more of a design program generating tool in terms of aiding in decisions concerning mix of functions and types of buildings, rather than a physical design generating tool. Thus variety is a complex equation of economics, uses and viability that further aids in creating responsive environments.

LEGIBILITY

The third quality that aids in building responsive environments is 'Legibility'. The quality of legibility aids in forming a mental picture of a place and thus "is the quality that makes a place graspable" (ibid., p. 42). Why is legibility important? One reason is that it helps in using a place to its fullest potential by creating an awareness to the user of the choices (s)he has in making use of the different activities in a city. For an outsider too, a city has to be legible enough to quickly grasp the layout and get a feel of the place. Legibility is, therefore, important at two levels: physical form and activity patterns. Through this quality, RE discusses the importance of legibility and also suggests how to create legibility.

There are several reasons why some places are more confusing than they are legible. One reason, as RE rightly criticizes modern designers, is their tendency to treat all projects as though they were of equal importance. The result can be seen in the

downtown areas of modern cities where one after another of huge imposing buildings are privately owned offices of corporate powers. Their public relevance is rather questionable in an overall urban context. They stand as symbols of corporate ego and do not really represent anything related to the common man. Another reason is the segregation of pedestrian and vehicular traffic. This kind of segregation works against legibility because it results in poor pedestrian routes--back alleys, subways, walkways under imposing roadways--and therefore, offers little for the pedestrian to remember or experience. This point was also discussed earlier as inhibiting permeability. RE, thus, is clearly against vehicular and pedestrian segregation.

In order to understand what fosters legibility, RE uses the study of Kevin Lynch (1960), who suggests five key elements that aid in remembering a place, which in order of importance are paths, nodes, landmarks, edges and districts. *Paths* are the most important and they are the alleys, streets, motorways and the like. *Nodes* are focal places such as junctions like market squares. *Landmarks* are point references like the Statue of Liberty in New York. *Edges* are linear elements which are either not used as paths, or which are usually seen from positions where their path nature is obscured. All these together constitute the elements of *districts*. RE uses these five elements in urban design to foster the legibility of a place as "a designer aware of their importance for legibility is helped to focus on the kinds of physical forms worth taking as models for legible new layouts" (ibid., p.45).

Not only does the use of the five elements mentioned above make places more legible, it reveals the potential of existing buildings on an urban site in becoming one of these five elements. Already in the discussion on the quality of variety, existing old buildings were seen as having the potential for repair and upgradation which results in

lower rents for space, bringing in a variety of users. In *legibility* too, instead of tearing down the old buildings in a site, RE makes the case for leaving them intact. RE says, "because they [existing elements] cannot be moved, they must be taken as fixes for developing the design" (ibid., p.45). This is a wonderful way of integrating existing old, and upcoming new buildings. Also, RE ask for assessing a site for useful existing buildings and site character, and the consequent design implications.

As for the five elements themselves, RE emphasizes the importance of *paths.* Lynch (1960) suggested that a path was the most important feature in people's image of a place. RE asks that each path be given a strong character so that it is easily distinguished by users and also the relative importance of each path be emphasized. In other words, not all paths are equally important which translated into actual design is in terms of width of the street, enclosure and so forth. RE uses the technique of hierarchy in according to importance to all the five elements. Thus depending on the situation each element assumes its place of importance in the scheme.

One feature that stands out as a key criterion in all of RE's work is the recognition of the pedestrian as an important end user of any given urban situation. Hence, each decision on urban design is ultimately geared to the needs of the pedestrian. Already in the discussion on permeability, the concept of physical and visual permeability was developed in terms of a strong path network. In fact, legibility and permeability work together. Consequently, from the above discussions, it can be seen that legibility enhances both physical and visual permeability. Therefore, when designing for legibility, the designer should be careful not to work against permeability but should enhance it.

ROBUSTNESS

In its attempt to build on the theme of providing choice to the user, RE discusses the fourth quality of responsive environments, which is *robustness*. In the quality of robustness, the argument centers around specialized versus multi-use spaces, with RE favoring multi-use spaces. Multi-use spaces are those which can accommodate varying functions with changing activities, users and ownership as time progresses—for example, in interiors, rooms that can be used for different purposes, and in outdoors, public spaces like plazas that have a variety of activities occuring like, street vendors selling their wares, performers displaying their skills, onlookers and so forth. Thus, RE defines robustness as the quality of a place which can be used for many different purposes thus offering its users more choice than places whose design limits them to a single fixed use.

Designing for multiple use concerns every aspect of urban space--public, private and the interface between the public and private spaces. Through robustness, therefore, RE attempt to design every level of space into a multi-use space. This means that no building can ever be considered finished. All buildings are in a continuous state of change, adjustment and repair with changing conditions of ownership, activity patterns and the users themselves. Hence, the basic premise around which design decisions need to be made for robustness is the ease with which the physical fabric of the building can be altered, to house changing uses.

It has already been noted that robustness can be incorporated into the design at every level of urban space -- public, private and the interface between them. RE argues that "in urban situations, the activities in outdoor places are strongly influenced by what goes on in the buildings round their edges" (1985, p. 56). In other words, the interiors

affect the exteriors. In the field of urban design, this kind of integration of interiors and exteriors at the design level is rather unusual. Traditionally, urban designers do not concern themselves with the design of the interior space to be an important part of urban design. In this sense, RE takes a unique stand that makes its approach to urban design very comprehensive.

Before discussing ways to achieve robustness by design, it is important here to mention that the design implications for buildings are different from public spaces, and within different kinds of buildings too. Therefore, robustness must be achieved by different approaches. Within buildings, the implications of designing for robustness is different for dwelling units when compared to other building types. Further, in the overall building context, again there is a difference between *large-scale* robustness and *small-scale* robustness: "Large-scale robustness concerns the ability of the building as a whole, or large parts of it, to be changed in use" (p. 57), whereas "small scale robustness concerns the ability of *particular spaces* within the building to be used in a wide range of ways" (p. 57). Also, RE discusses the implications of designing the edges between buildings and public space to support as wide a range of likely uses as possible and finally the discussion centers around robustness for public spaces. Consequently, robustness is directly concerned with the urban-design process at all levels of design. In the following paragraphs, the design implications of robustness will be discussed starting with *large-scale* robustness.

As mentioned earlier, large-scale robustness concerns itself with the ability of either the building as a whole or large parts of it to be changed in use. Since large-scale robustness deals with the whole building, it should be considered at a very early stage in the design program. For buildings to be robust at this level, RE suggests a preferred

building configuration that is shallow in plan, with many access points and an optimum height. Here RE clearly makes the case--based on empirical studies--for small naturally lit and ventilated buildings with the maximum depth of the building not exceeding 40ft in depth and four stories in height.

At the public realm, RE continues the theme introduced in the quality of permeability--active building fronts. RE feels that "the public edge of buildings should house activities which benefit from interaction with the public realm and can contribute to the life of the public space itself" (ibid., p. 63). Translated into design, this means that the ground floors of the public fronts of the buildings should be able to provide uses that will spill out into the sidewalks. The key is to enable a range of indoor private activities to coexist in close physical proximity with a range of outdoor public activities (ibid., p. 69).

Here the issue of vehicular and pedestrian activities competing with each other crops up once again. Instead of segregating vehicular and pedestrian routes, RE explores design ideas which can enhance the robustness of unified vehicular and pedestrian routes--for example encouraging pedestrians to use vehicular streets by making it easy for them to cross the streets; or, in noisy vehicular streets, achieving seclusion and quiet by providing relatively small spaces, set back from the building line, and so forth. RE provides a treasure-trove of ideas regarding robustness to make the public realm much more experiential.

Next, concerning large-scale robustness inside buildings, RE suggest hard and soft areas in the building. The functional core consisting of elevators, stairs, columns and the outer skin are 'hard', that is they are likely to remain unchanged during the life of a building. But the rest of the areas can be designed to be 'soft', and thus be more flexible and easy to change as the situation arises. Finally, at the interior level,

robustness becomes a matter of detailed design, which RE argues is relevant to most ordinary users as this affects their day-to-day choices. To achieve small-scale robustness for interiors, RE suggests in design sheets 4.3 (p. 63), that it is a matter of room size and shape. From empirical studies, the optimum size of a room is suggested at 14 sq. m. Rectangular rooms of 1:1 or 1:2 length to width ratios are considered effective.

In summation, robustness is an important quality for responsiveness to develop at the smaller scale of buildings or building parts. Through this quality, RE presents ideas on the physical structure of the urban fabric. This is a very detailed discussion of the physical structure at all scales and levels of urban design. Ultimately, however, as RE points out, it is the client who has the power to decide on what to build as he pays for the project. Thus, once again, RE suggests that design itself is not the issue. It is the urban designer's ability to maneuver around client bias and convince him or her into letting the designer build robust structures. As RE says, "Designers cannot change the way patronage works but they do not need to make the problem worse by the way they design" (p. 56).

VISUAL APPROPRIATENESS

Having dealt with the general layout and planning of an urban site, RE turns our attention to the details of appearances of buildings. For RE, people's interpretation of the appearance of a place affects its responsiveness because people interpret places as having meanings. When these meanings support responsiveness, the place has a quality of 'visual appropriateness' which is said to be more important in the public

spaces of a scheme, particularly in places which are most likely to be frequented by people from a wide variety of backgrounds.

This is an interesting approach to urban design. Traditionally, urban designers have sought to create a particular style of building in urban schemes. But cities are rarely homogeneous--that is more of the character of small towns or even villages. While there have been many studies that have explored people's interpretation of places--the memories and feelings places evoke--few researches have approached urban design with the idea of making different people relate to the city through design. Hence, for places to be visually appropriate, RE suggests that the detailed appearance of the place must help people read the pattern of uses it contains and that this further reinforces responsiveness at three other levels: legibility, variety and robustness.

However, there are certain problems in making places visually appropriate. While people interpret places as having meanings, different groups of users may have different opinions about whether two given buildings share a similar character--for example, a building facade that looks very important and official to a certain group of users may look intimidating to another group. Also, different groups of people may invest a building with negative meanings thereby reducing its responsiveness—for example, a town hall may be interpreted as a town hall but one that is more bureaucratic than democratic. This problem is further compounded by modern designers who have "a tendency to design every building as the most important one" (p. 45), thus effectively obscuring its readability of the larger district of which the building is a part. Therefore, the problem can be framed as "how can buildings be designed so that people from a wide range of different backgrounds will see it as appropriate?" (p. 77).

The answer to this question is, however, to actually ask another question, which is how people interpret places. As mentioned earlier, a whole set of studies have been done in this direction—for example, Lynch's image studies of cities (1960). One point emphasized in RE is that people interpret places as having certain meanings because they have learned to do so. Hence, members of the same group usually tend to make similar interpretations for a given place, while different groups interpret it differently. RE develops two broad categories of visual cues that identify the kind of interpretations people are likely to make, in order to create a framework through which visual appropriateness can be achieved. These are the *contextual* cues that support legibility and *use* cues that support variety and robustness.

Contextual cues are those that are interpreted as relating the building to its context: either reinforcing or standing out from the surrounding paths, nodes, landmarks, edges or districts concerned. *Use* cues are those that will be interpreted as appropriate to the various uses concerned—for example, a city hall that looks like a city hall, or a library that looks like a library. But these cues can be read only from the elevations of the buildings. Designing for visual appropriateness, therefore, is to design elevations judiciously and not just for the sake of esthetics though it is still important. RE says, "the idea that elevations have specific tasks to perform is an unfamiliar concept to most designers" (p. 76). In the design worksheets 5.1-5.6, RE sets out to show how the elevation can be designed to take the use and contextual cues into account.

Throughout these design worksheets, the most singular aspect of design that is studied is the facade of a building. RE lists noticeable visual features that recur (based on studies from many different cultures): vertical rhythms, horizontal rhythms, skylines, wall details in terms of materiality, patterns and so forth, windows, doors and finally

ground level details. RE suggests that to include cues relevant to a wide range of groups, as many as possible of the above features should be used in design. Another approach is to take in the opinions of interest groups concerning the appropriateness of certain elements in the facades. Finally, the design should incorporate both contextual and use cues to bring about visual appropriateness.

In the following sections of the chapter, the last two qualities of responsiveness--richness and personalization--as set forth by RE are presented. While these do not directly aid in the design of urban environments, they do enhance the other qualities already studied and hence, need some discussion.

RICHNESS

In further enhancing the responsiveness of a built environment, RE explores the design implications of sensory experience--the sense of sight, motion, smell, hearing and touch. This is achieved through the quality of environmental *richness*, which is defined as increasing the variety of sense experiences which users can enjoy. This forms a part of the detailed design. From RE's discussion of the topic, it becomes apparent that designing for sensory experience is limited in scope, mostly because it is still a sea of unchartered waters and therefore, cannot be incorporated at all scales of design. Nevertheless, including sensory experience in design always enhances its quality in a pleasantly subtle way by setting of a mood that is worth all the extra effort.

Since the built environment is mostly fixed, designers must provide different sense experiences for users to choose from a fixed environment. When the built environment is fixed, users have two ways of choosing: firstly by focusing their attention on different sources, which is the case with sense of sight; and secondly, through the

choice of changing position which is the case with smell and motion. In turn, the senses of touch and hearing fall somewhere in between. The senses of motion, smell and hearing can enhance the quality of large public spaces for reasons mentioned above and similarly the sense of touch can be packed into the smallest of spaces. Some examples of non-visual richness include floor finishes designed to make different sounds underfoot enhancing the sense of touch and hearing, formal herb gardens with highly scented plants to increase the aural richness, and so forth.

On the other hand, visual richness is still the most important aspect of providing variety to a scheme simply because vision is the dominant sense with the most control. A user only has to move his/her eyes to look at what (s)he wants. Visual richness was often a dominant feature of the architectures of the past. Fine detailing coupled with highly creative craftsmanship created gems of architecture which still delight all classes of people even today. Modern architecture effectively dealt a death blow to richness with its stripped down sense of geometry and bare facades which have resulted in the much complained monotonous look to cities. But RE cautions against using the rich motifs of the past. The idea is not to recreate a similar kind of richness as it would only result in pastiche, and furthermore, the building materials of today are vastly different. But RE does suggest using very similar methods of composition and lay out detailed specification of how visual richness can be achieved in today's environment.

Visual richness, suggests RE, depends on the presence of visual contrasts in the surfaces concerned. The most effective contrasts depends on the orientation and the materiality of the surface of the facade and the likely positions from which it will be viewed. For a given surface, for example, as the number of elements increase, its richness increases too. But when the number of elements exceeds a certain level,

usually around nine elements, the various elements begin to be read together as a single element. In this situation, richness can be increased by making larger-scale subdivisions of the surface concerned.

The next step in designing for richness involves the likely range of distances from which the surface concerned will be viewed and the length of time during which each view will be experienced. RE suggests that where the surface will be seen at long range, large-scale richness is necessary, while at close range, small-scale elements and subdivisions enhance richness. Where a particular surface will be viewed for a longer time, this surface should continue to look rich for a longer time. This is achieved by very fine detailing so that every time people look at it, they will discover something new, thereby sustaining an interest in the facade.

PERSONALIZATION

The final quality for responsive environments is the quality of *personalization*, which describes how people can personalize existing environments. RE suggests that even with the highest level of public participation in a building project, most people still have to live and work in places designed by others. Hence, people like to make environments their own. It is also particularly valuable in robust environments, accommodating a wide variety of uses that change over time. Through this quality, RE explores how people can add their own stamp of personality and taste to a place.

According to RE, people personalize their places to improve the facilities provided (discussed in the quality of robustness) or to change the image of the place. But there are several constraints--for example, personalization is unlikely to happen unless the user of a place has a claim to its occupation. People mainly personalize

places they regularly use for long periods, mostly homes and workplaces. Further, in personalizing a place, users not only affirm their tastes and values, but they also communicate them to others. In interiors, users affirm personal tastes and values whereas people communicate in the public domain—for example, the facade of the building. These two ways can be categorized as private personalization and public personalization.

First, private personalization is largely a matter of using the internal walls as display settings and by decorating internal surfaces. In contrast, public personalization occurs at the thresholds--windows, entrances, and external surfaces. A threshold is a physical link between different people's domains. People can personalize front gardens, porches which can stand out as unique or shade objects for display. RE suggest that these places should be made easy to 'fix up'. Windows offer more potential for display. Further, external surfaces should also be designed to encourage personalization. But RE cautions that personalization should be handled carefully due to the public nature of external surfaces, lest it destroys the visual appropriateness and richness of a surface.

Personalization is important and appreciated because it helps people relate to their surroundings where they spend most of their time. Designing in such a way as to encourage personalization is quite tricky for the designer and, (s)he must find ways to help the user pick out spaces to personalize.

In summation, the seven qualities of responsiveness are designed to provide maximum number of choices to the users of an environment. All the seven qualities together furnish an organizational framework to direct the urban design process from conception to implementation. The design sheets at the end of the discussion for every quality provide detailed information for designers to achieve each of these qualities in

design practice. Thus, *Responsive Environments* shows a way to design urban environments that are responsive to the user's needs. It can be seen that both NT and RE, each discuss a unique urban design process. In order to juxtapose these two works, in the next chapter, a framework for comparing the seven rules of NT and seven qualities of RE, based on the tetrad model, will be laid out.

Chapter 4

FRAMEWORK FOR COMPARISON: THE TETRAD

The two preceding chapters were a study of the seven rules of NT and the seven qualities of RE. As the study progressed, not only did the conceptual constructs become clearer, but also certain similarities and differences between the two works became clearer. This chapter initiates a discussion of these similarities and contrasts between the two works. Since the goal of this thesis is a comparative study, the question of a basis for comparison arises.

At this point it is evident from the discussions in the two previous chapters that the seven rules and seven qualities cannot be compared on a one-to-one basis. This is because the manner in which the rules in NT are structured is vastly different from the organization of the seven qualities in RE (the number seven in each case is a mere coincidence). Hence in order to anchor the comparison and contrast and better organize various observations and points for discussion, a new and different structure or framework is required.

Such a framework, therefore, has been developed for the purposes of this thesis in order to analyze each work's underlying patterns. As mentioned earlier, it is evident from the overviews of the two works that the way each work is structured--essentially how each theme relates to others and to the overriding theme, wholeness or responsiveness as the case maybe--has a lot to do with the approach to the problem of urban design in each case. A useful tool to provide a common point of departure for comparative study was identified in the '*tetrad model*' used by David Seamon (1988) and based on the work of British philosopher J.G.Bennett (1963/1993). In a review of

NT, Seamon (1988) explains that "The tetrad allows one to understand the underlying order of a particular activity or method" (p. 32).

A *tetrad* is a set of four elements each of which contributes to the understanding of an activity as a whole and can be graphically represented as a diamond or tetradic shape as shown in figure 4.1, left. Philosopher J.G.Bennett (1993, pp. 63-73) says that "the *tetrad* has four terms, which are called **sources** . . . . In every activity there are elements that correspond more or less to these four sources or dimensions." He further explains that, in order to understand these four sources and the way they mark out activity, the purpose of an activity (**ends** as represented by the vertical line of the tetrad) and the knowledge available for bringing it out (**means** as represented by the horizontal line of the tetrad) need to be examined (fig. 4.1). As a whole, the tetrad represents an action involved in an aim. Thus, the tetrad can be used to analyze the underlying patterns for any given activity--in the present case, the activity of urban design as it is understood by NT and RE respectively.

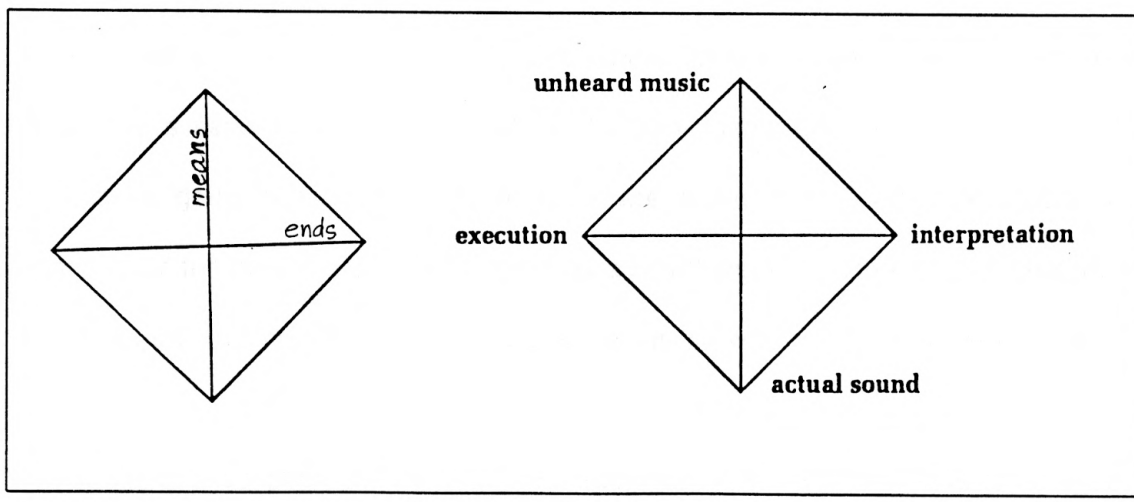


Fig 4.1 A tetrad for musical activity

Among the examples that Bennett provides, a tetradic analysis for one activity--a musical performance--which is presented in fig. 4.1, right. The four sources of a musical performance are identified as *actual sound, unheard music, interpretation* and

execution. The starting point for music is the actual sounds which the performer creates. The means to do so involves the musician's musical understanding, which can be termed *interpretation*, and his (her) training and skill, which can be termed *execution*. The goal is a performance that produces pleasing music. And this pleasing music does not come from "sounds produced by physical action on the instrument." Rather it comes from a sense of perfection which makes the music communicate to the audience: "In these special moments, the sound seems to come from beyond the sensual, and the instrument is but an occasion for music to enter manifestation" (ibid., p. 73).

Because they both describe the activity of urban design, NT and RE too can be analyzed and more importantly compared using the four sources of the *tetrad.* From his review of NT, Seamon (1988) identified the four sources of the *tetrad* for Alexander's approach to urban design as *site, wholeness, rules* and *dialogue* (*Unis,* 1988, pp. 32-33*)*. He writes, "The *ground* of Alexander's design process is the **site**, which is without order and in need of development. The *goal* for the site is **wholeness**, marked by beauty and a sense of place. The *instrument* for the actualization of wholeness is Alexander's seven **rules**, through which the participants gain understanding and the waterfront gains realization. These rules are given *direction* by the students and teachers of the design studio, who role-play a developer/committee relationship founded in **dialogue** and continual group awareness as to who is planning what where and when."

This description can be easily extrapolated to RE: the *ground* is once again the **site**; the *goal* is **responsiveness**; the *instrument* is the seven **qualities** and the *direction* can be described as the designer's **effort** and **negotiation** with regard to clients, builders and users. As was mentioned above, the four sources of the tetrad for

a comparative study are said by Bennett to be: *ground, goal, instrument* and *direction* (fig. 4.2). Besides setting the underlying patterns of the two works on a common platform, the four sources also provide a multi-point perspective of urban design itself, different aspects of which are emphasized or ignored in NT and RE.

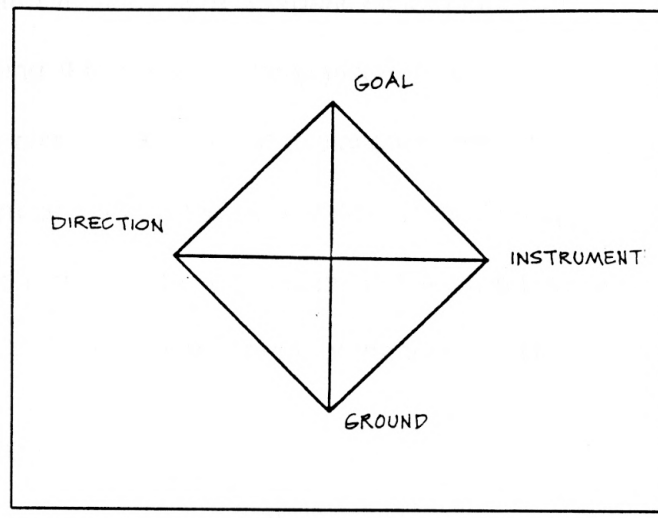


Fig 4.2 A tetrad for urban design activity

In summation, the tetrad offers a descriptive platform for analyzing the activity of urban design because urban design is not only about developing plans for urban sites in remote planning and design offices; it is also a dynamic equation that involves the site, the buildings, the developers, builders, people, relationship between buildings and the people who use them, building laws, finance and so forth. Using the tetrad, therefore, these various issues can be studied in a structured manner. Further, the four sources of the tetrad easily lend themselves as anchors for comparative study of the two design processes--NT and RE.

The comparative study here uses the two sites--the waterfront site of San Francisco (NT), and the downtown site of Reading, England (RE)--as examples for anchoring the discussion. While the designs developed by the NT team for the San

Francisco site were never actually built, the Reading site was later developed partially along the lines suggested by the RE team (*Architects' Journal*, 1986, pp. 38-42). This thesis nevertheless uses the two examples from NT and RE, as they are the closest to worked-out projects provided by the two works.

The comparative study here is organized into four chapters, with each one of the four sources forming the basis for comparison in each chapter. In this chapter, the comparative study commences with an explanation of the four sources for urban design activity and then proceeds with the comparison of the first source--**ground**--to initiate a discussion in which NT will be discussed first followed by RE. Like this chapter, chapters 5, 6, and 7 follow the same order of the four sources presented below.

THE FOUR SOURCES

Ground is the raw material or the basis for a given activity. In the case of any urban design project, the **ground** is the city or parts of the city that need to be restored to a state of well being. Hence the **ground** provides a platform for discussing the physical attributes of the site to be designed, which in the case of this thesis are the San Francisco site and the Reading site (the sites will henceforth be referred to as such). A detailed study of each site is presented in this section of the chapter. Key questions include: what is the site (city or its part) like, what is its overall shape, dimensions, and area? What are the site's natural features--for example, is there a water body present? and so forth.

The **instrument** is the knowledge required for actualizing the goal of an activity (the goal in this case is the site that needs to be restored to a desired state of well being). In Alexander's design process the **Instrument** that helps the actualization of the goal is the seven rules, and in RE it is the seven qualities. The **Instrument** is used as

a channel to discuss the design methodology implemented by NT and RE. Through **instrument**, the physical fabric developed on the two sites at their various stages of development, and the seven rules and seven qualities that helped these various developmental stages are examined. Thus **instrument** traces the design process performed on the two sites in an attempt to bring out the link between conceptual ideas in the two works and their transformation into actual design on the two sites. So the key focus will be the rules and qualities that have contributed to various aspects of the physical fabric. Key questions include: what are the basic layouts, the three-dimensional forms, scale, public spaces, circulation and movement, variety of buildings, style of architecture and integration with the surrounding areas.

The **direction** is the force that guides the **instrument**, a source that motivates and sustains the process. For example, Alexander visualizes a committee in active dialogue with users, builders and designers as the sustaining force that helps translate his rules into a three-dimensional reality. On the other hand, RE offers a much less clear picture of what direction is to be. To a certain extent, RE follows the traditional planning principles that involve developers, builders, clients and users. In large measure, however, the designer himself is the guiding force in the realization of a project. Thus **direction** provides a platform to discuss and compare these issues in detail.

Finally, the **goal** is the end result of an activity—its final aims and accomplishments, which in the urban design process is *wholeness* in the case of NT and *responsiveness* in the case of RE. The **goal** provides a platform to discuss whether NT and RE really achieved their goals of wholeness and responsiveness. Both NT and RE ultimately describe urban environments that echo Jane Jacobs' (1961) ideas of an

ideal urban environment. Therefore, using her four conditions--mixed primary uses, small blocks, aged buildings, and concentration--necessary for healthy urban environments as the criteria for evaluation, and further drawing on the discoveries highlighted in the comparisons of ground, instrument, and direction, the overall merits and weaknesses of the two sites will be examined.

Having thus defined the four sources of the tetrad for the urban design process and how they will be used in the comparative study, it is time to commence the comparative study itself. At this point the reader is familiar with the concepts of wholeness and responsiveness from the study of the previous chapters. Hence the comparison and contrast will start, as mentioned above, with the discussion of the first source--**ground**--i.e., the two sites as they were before development.

Chapter 5

GROUND

The NT site is located along the southwestern edge of the downtown commercial district on the San Francisco waterfront. Important buildings in San Francisco located in the downtown close to this site include the TransAmercia Pyramid, World Trade Center, Embarcedaro Center and so forth. The San Francisco-Oakland Bay Bridge touches the southern edge of the site. The southeastern edge of the site faces *Spear Street,* while *Mission Street* runs along the northeastern edge. The Embarcedaro Freeway at one time passed over the site (this freeway was razed after the October 1989 earthquake subsequent to the publication of NT in 1987). The San Francisco site measures about 30 acres in area. The entire northeastern edge faces the San Francisco bay which is the most prominent natural feature of the site. The only other significant natural quality of the site is its relative flatness when compared to the undulating terrain of a major part of San Francisco (fig. 5.1).

The RE site is located in close proximity to the thriving central city area of Reading, England, a prosperous town on the London-Bristol M4 motor way forty miles south of London. The site itself is a road locked island with a major inner distribution road running along the southwestern edge of the site. To the west of the site is Castle Street to the other side of which the civic center is located. The River Kennet flows through the site close to the southeastern edge. The Reading site measures approximately 13.8 acres, a size which is roughly half the area of the San Francisco site. The River Kennet flows close to the southeastern edge of the site and is the most prominent natural feature. The river creates an island towards the south-east up to

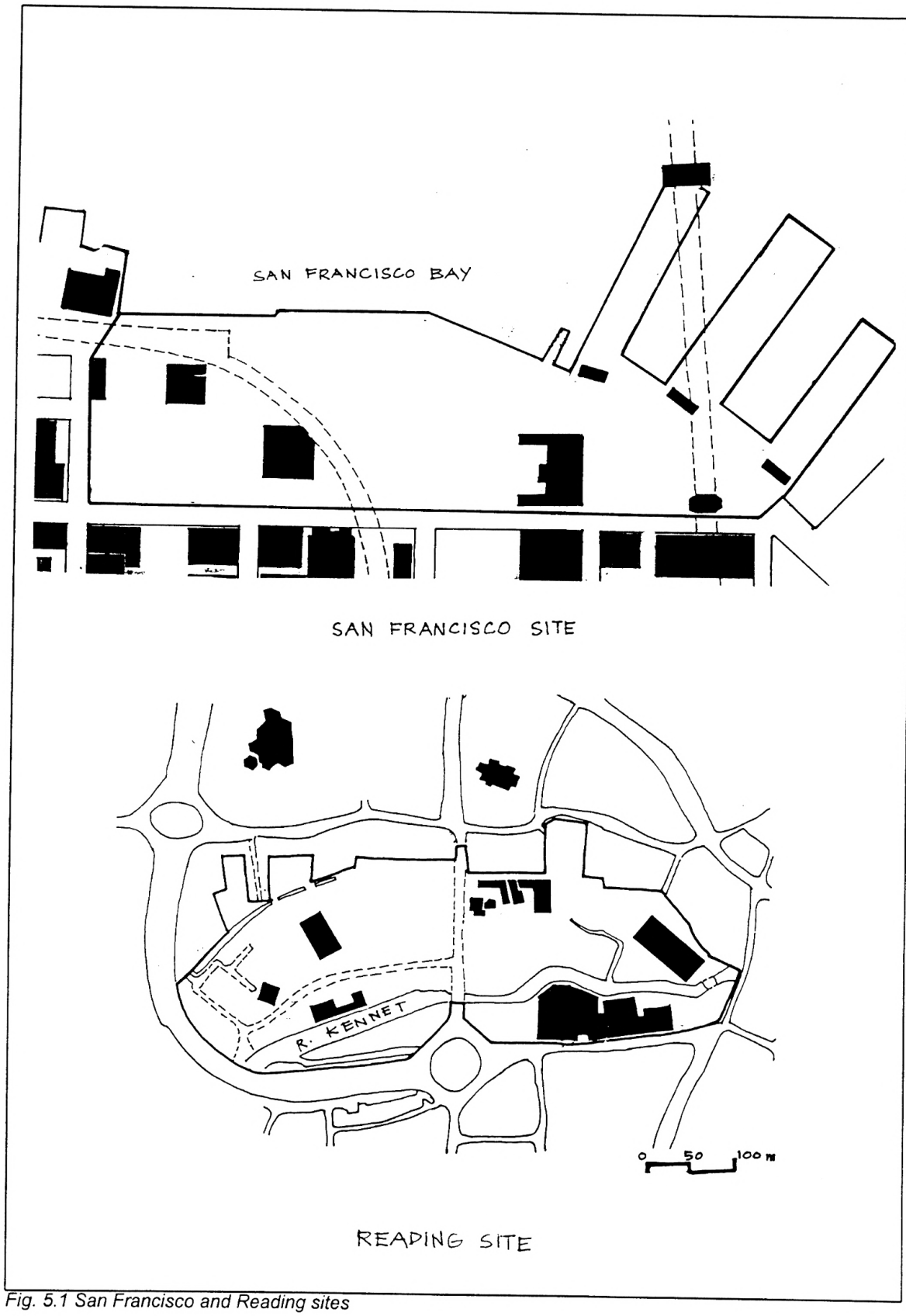


Fig. 5.1 San Francisco and Reading sites

Bridge Street. The Bridge Street bisects the site into two separate parts rising over the River Kennet. Similar to the San Francisco site, the Reading site is also fairly flat (fig. 5.1).

EXISTING BUILDINGS, STREETS AND LAND USES

The San Francisco site had a considerable number of existing buildings at the time of the NT project as shown in fig. 5.2. The buildings Alexander mentions include a coffee factory, nightclub, an old YMCA, warehouses, factories, an abandoned chocolate factory and three piers. The pylons of the Bay Bridge rest on pier 24. Curiously enough, Alexander doesn't mention the well known Rincon Annex Post Office built in 1940 on the site. This building still exists, though it is no longer used as a post office. Recently it has been incorporated into a high-rise development with the front facade still intact. At the time of NT however, the major part of the San Francisco site was vacant.

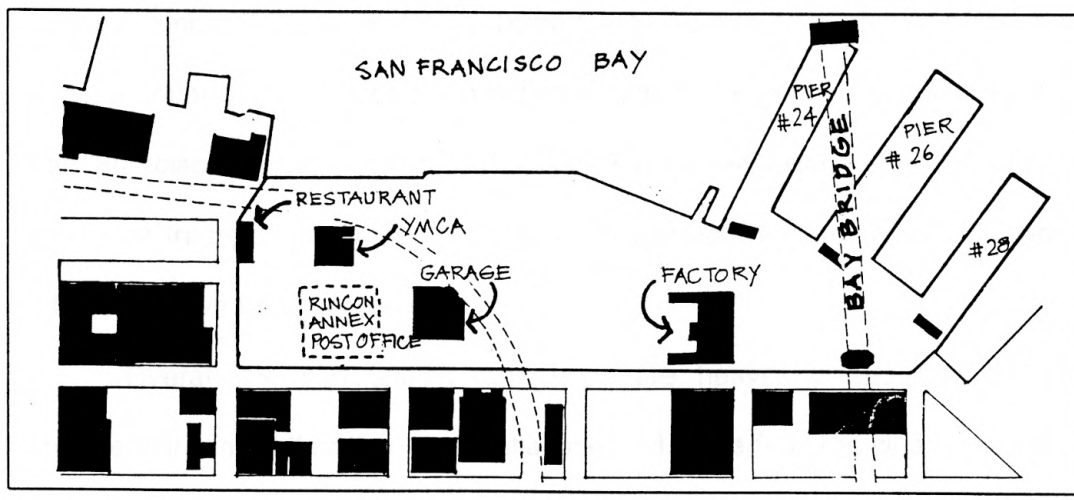


Fig 5.2 Existing buildings on the San Francisco site

Apart from the existing buildings, the San Francisco site has several existing streets as well (fig. 5.3): Mission street which runs along the northeastern edge, Howard street, Folsom street, Harrison street and Bryant street all of which together form a uniform grid with Stuart and Spear streets, dividing the site into several blocks. There is no evidence

of any exclusive pedestrian paths from or into the site. All the streets are high intensity vehicular streets.

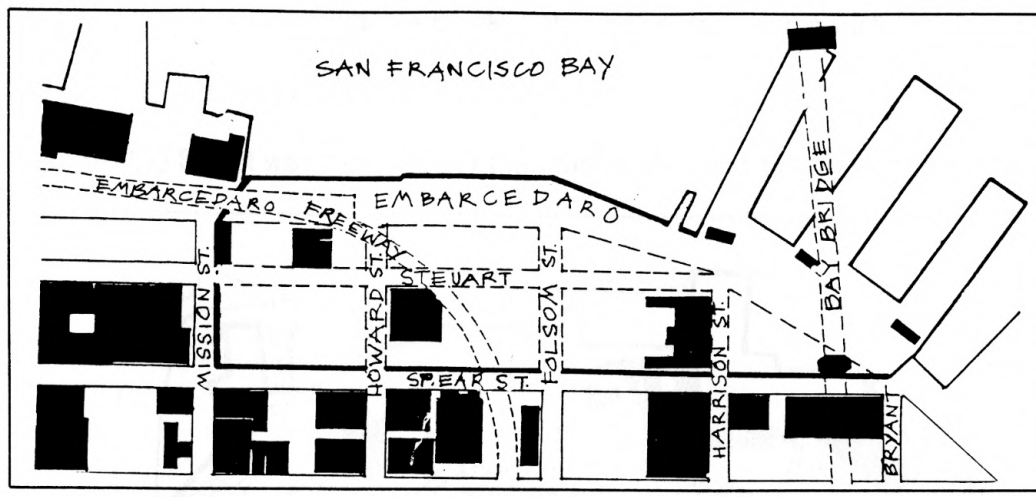


Fig 5.3 Existing streets on the San Francisco site

The San Francisco site lies in the prime downtown district of metropolitan San Francisco suggesting very high land values. To the northwest lies the heart of the downtown with an imposing skyline of well known buildings such as the TransAmerica Pyramid, Union Square, the World Trade Center and so forth all occupying neat blocks within a uniform grid of streets. In fact, the rectangular grid is the dominating pattern of San Francisco's urban design. The San Francisco-Oakland Bay Bridge which is a lifeline for transport, itself touches one of the piers of the site. The San Francisco Bay adds to the dynamism of the site.

Overall the surrounding land uses are heavily biased towards office and commercial uses rather than residential use. All these features clearly indicate that this site lies in an extremely important location in San Francisco with high land values. Combined together all these facts provide clues to the kind of urban development that might be considered appropriate to the San Francisco site.The Reading site, too, had several existing buildings at the time the site came up for development as shown in fig.

5.4. Three buildings were identified to be historically and architecturally significant. These include a house whose design is attributed to prominent architect Sir John Soane, a brewery, and a stable block. Other extant structures include a multi-story car park and a Corporation Transport depot building. Overall, the portion of the site to the left of Bridge Street was more empty than that to the right side of Bridge Street.

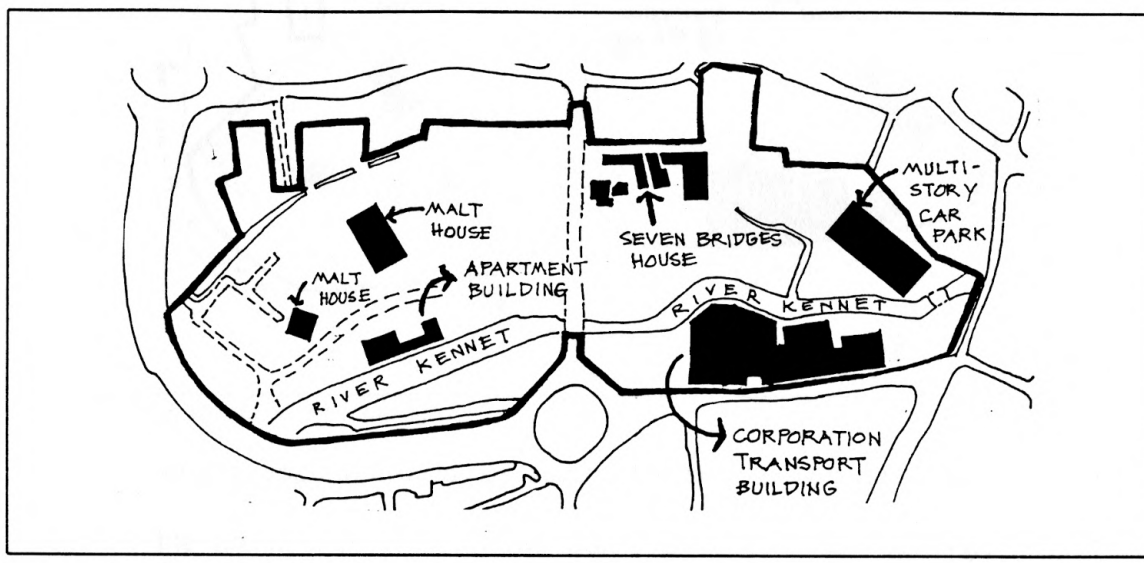


Fig 5.4 Existing buildings on the Reading site

The Reading site is bisected by Bridge Street. Within the site, Fobney Street is the only noteworthy street which forms a cul-de-sac in the site. Unlike the San Francisco site however, the streets do not divide the site into any recognizable blocks. The Reading site is, as mentioned earlier, a road-locked island with an inner distribution road running along the southwest edge of the site and the Castle Street along the northwestern edge (fig. 5.5).

Like the San Francisco site, the Reading site is also located near the central commercial district of the city of Reading. While Reading is by no means the metropolitan city that San Francisco is, it is nevertheless a bustling town set in the heart of England's Silicon Valley. It is also the county town of the Royal Berkshire County.

Since it is in southern England and very close to London the land values and house prices are high.

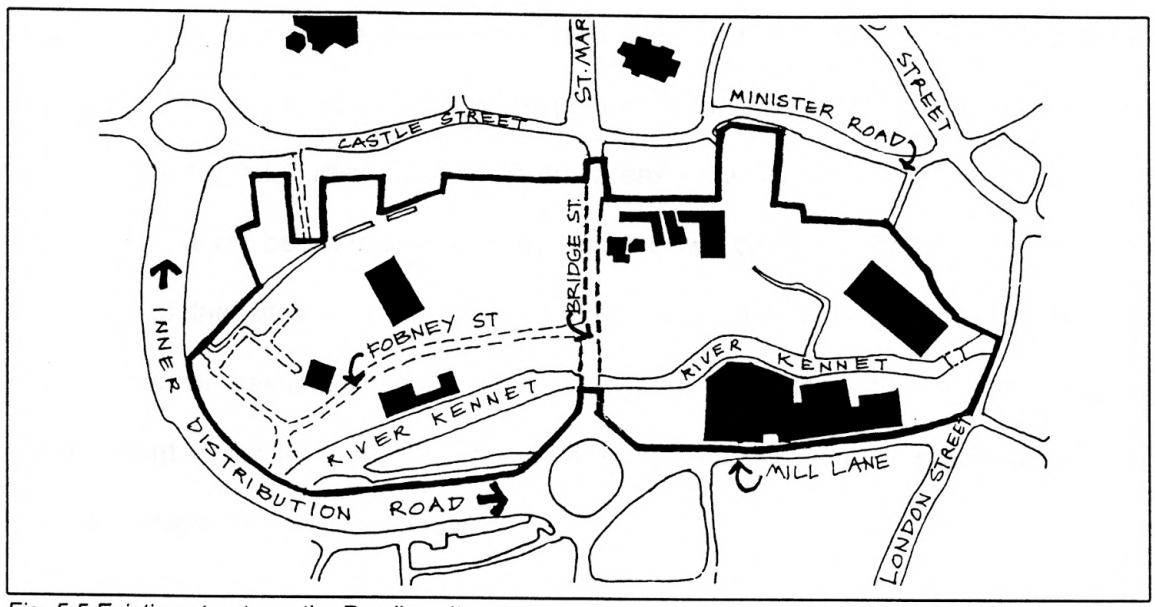


Fig. 5.5 Existing streets on the Reading site

There are several important buildings around the site, though again not in the same league as the architecture of downtown San Francisco. These buildings include the Civic Center, St. Mary's church and so forth as shown in fig. 5.6 below.

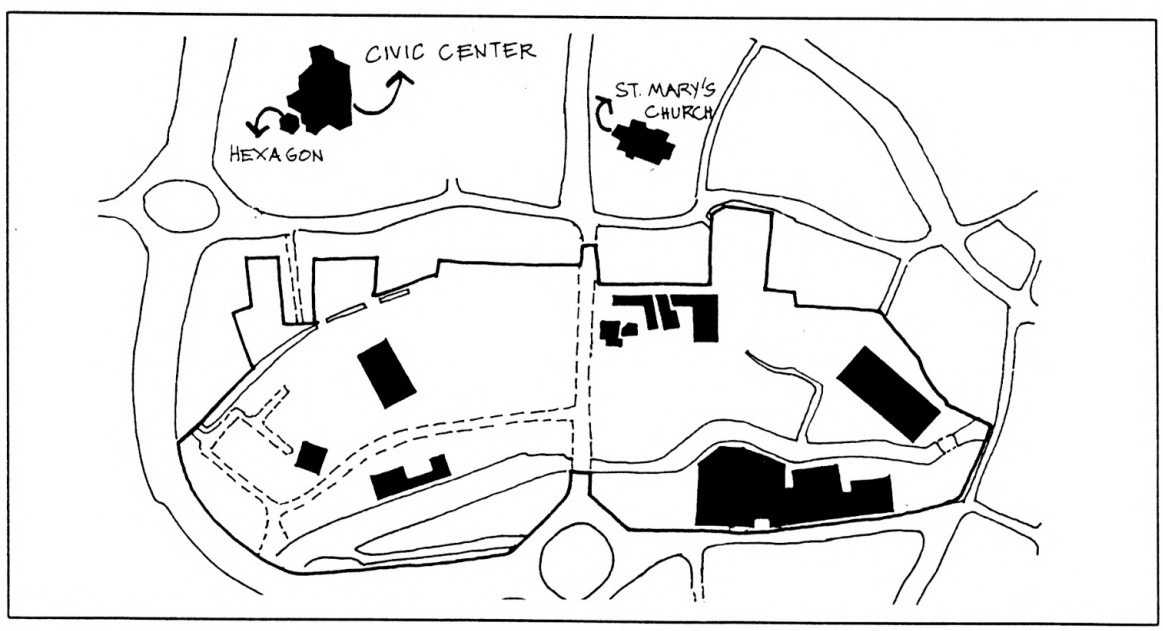


Fig. 5.6 Important buildings around the Reading site

From the above discussion of the two sites, it is evident that both are located in extremely important parts of the respective cities. Their location and the physical features will influence the design of the two sites. It is the goal of both NT and RE to design the sites for wholeness or responsiveness, and in a manner that positively contributes to the urban quality of the areas in which they are located. In later discussion, it will be important to study how the two design processes use the natural qualities of the sites and at the same time, apply the rules and qualities to create wholeness or responsiveness. First, however, we need to consider what the **instrument** is for NT and RE, and show how it applies to their processes of urban design. This is the focus of chapter 6.

Chapter 6

INSTRUMENT

The **instrument** is the knowledge and tools required for actualizing the goal of an activity. The goal in this case is the restoration of the San Francisco site and the Reading sites to a desired state of well being. In other words, the **instrument** is the practical means whereby the design process can go forward on each of the two sites. Through the **instrument**, the physical fabric of the two sites develop. In this sense, the **instrument** works to hold the design process together to give it form materially. Therefore, in this chapter, the seven rules of NT and the seven qualities of RE that contributed to the creation of urban form on the respective sites are examined. Thus, this discussion of the **instrument** traces the design process performed on the San Francisco site and the Reading site in an attempt to bring out the link between conceptual ideas in the two works and their transformation into actual design on the two sites. Therefore, the crux of the discussion will be on which rules and qualities contributed to which features of the physical fabric.

From the discussion in chapters 2 and 3, the seven rules of NT and the seven qualities of RE can be seen as contributing to several broad, commonly-shared categories of the urban-design process, and to both physical and qualitative features of the urban form. Five such categories were identified. These are:

1. Initiation of the design process and basic layout;
2. Mix of land uses and activities;
3. Public spaces and their character;
4. Street systems and parking;
5. Scale and style of architecture.

For each category, the San Francisco site will be discussed first, followed by the Reading site. Firstly, the design projects and processes from each of the sites that are relevant to each category will be highlighted, followed by a discussion of the relevant rules/qualities that influenced these projects. Finally, for each category, the observations and inferences from the above discussions will be compared and contrasted between the two sites.

INITIATION OF THE DESIGN PROCESS AND THE BASIC LAYOUT

The design process on the San Francisco site began with developing a sensitivity to the site: understanding the qualities of the site and visualizing what was to be built on it. The team of students toured the site and made a decision to first define the entrance. The first building that was designed was thus a *gateway* to the north of the site, which the team felt was a natural entrance to the site. A manifestation of the vision of one of the students, the *gateway* not only defined the site but also hinted at a pedestrian mall which was then followed by a hotel, a cafe, a fishing pier and so forth as shown in fig 6.1, right.

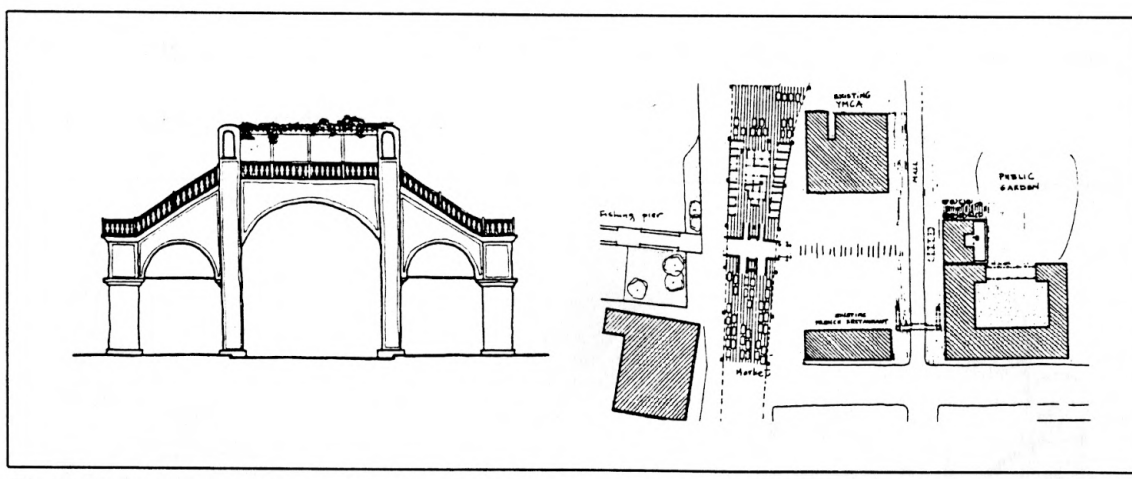


Fig 6.1 Gateway and piecemeal development of projects near the gateway

Unlike a conventional design process, there was no master plan for development, intentionally so because Alexander's theory argues that design should take place in small increments slowly over a period of time. This is in keeping with the idea of organic growth which is not artificially predetermined, thus rejecting the idea of block development of the entire site in one swoop, as is elucidated in rule 1--piecemeal growth. Each increment is related to the preceding increments while at the same time it also hints at a future project (rule 2--Growth of Larger Wholes). For example, the gateway hinted at the mall and the hotel near the gateway hinted at a garden and so forth.

The piecemeal growth, however, was not just a continuous formation of structures touching previous ones. As shown in fig. 6.2, the Bath project (#13), for example, developed at a distance away on the far side of the site from all the projects thus far on the site. This project suggested a new whole--once again on the vision of one of the team members. This 'leapfrogging'--a jump into an unexplored territory--paved the way for other projects to follow around this building. For the entire site to develop into a site that was satisfactorily whole with about ninety building projects, it took five years of graduate studio time.

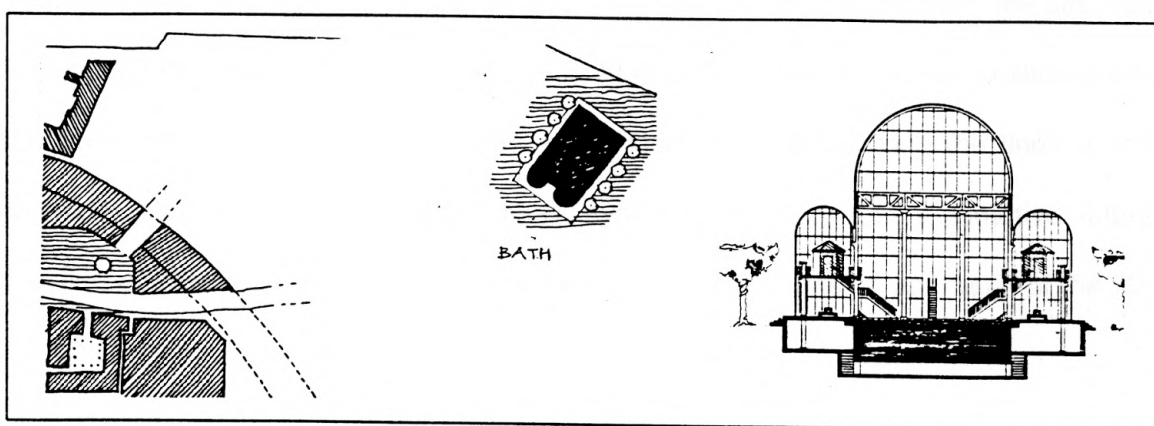


Fig 6.2 Bath: plan and elevation

Another feature of the piecemeal increments is that every increment is a product of a *vision* (rule 3--Vision)--a building project first seen and experienced in the mind's eye; an answer to the question, "What shall we build in any given place?" Thus, every project comes out of a feeling, meaning, and intuition which essentially is a *vision*. The Bath project, the garden--Alice's park, the kindergarten with a pagoda and so forth are some strong examples of *vision*. Refusing to develop building projects based just on land value, profit and viability, NT sees *vision* as the primary force in developing a building project on the site.

Finally, the design process on the San Francisco site was initiated by the piecemeal process where growth takes places in small increments. Each of these increments was a product of a vision and developed into a whole. From the San Francisco site, it is clear that wholeness and order is a progression from small increments to a larger urban fabric.

In contrast, the design process on the Reading site was initiated with an analysis of the surrounding street network in order to link the site to its surroundings and to the city as a whole, and to create a good street network within the site itself. Also at this stage, a decision was made to maintain and develop pedestrian connections through the south and west edges of the site. Based on the results from the analysis, the site was developed into a network of streets (fig. 6.3). Also at this initial stage, the existing fronts and backs were identified. The blocks would later on develop along the lines of the perimeter block concept. The street/block system thus maps out a tentative future direction of growth for the site. This was the first step in the design approach of the RE team as they sought to achieve the quality of *permeability* on the site.

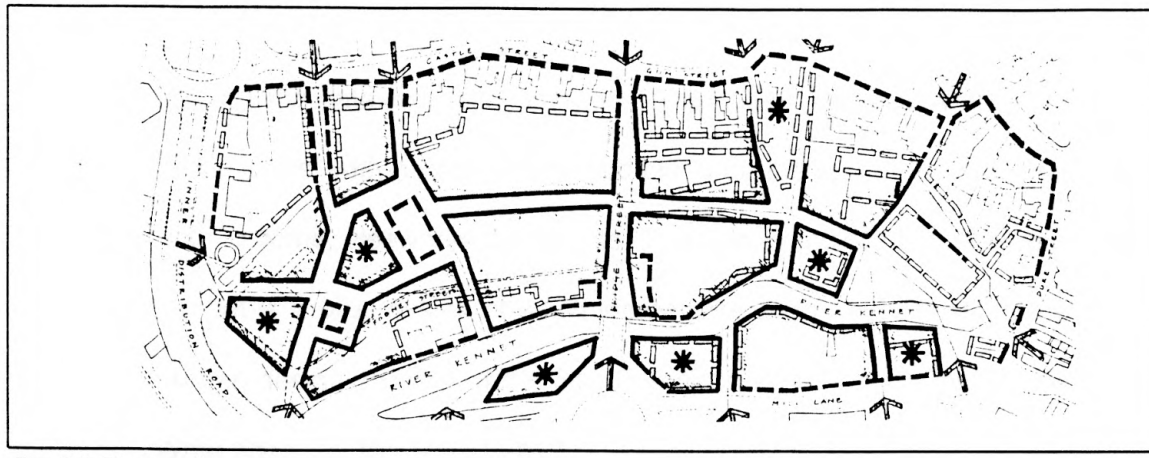


Fig. 6.3 Block patterns

The RE team followed a very structured sequential design process in which one design step follows another and includes the entire site at every stage--for example, *variety* was the quality that was worked out after *permeability* and followed by *legibility* and so forth. Each process thus builds upon the previous process until the design for the entire site is considered to have reached an agreeable final stage.

For the Reading site, every project--its conception, location and design--is the result of an objective study--feasibility study, demand/supply study, viability and compatibility study and so forth. For example, the blocks and streets were developed on the basis of traffic intensity and land-use studies, while different uses for buildings were based upon a demand/supply study and so forth. Finally, the design of the Reading site can be seen as a progression from large to small--the design process taking off on the entire site and slowly coming down to specific areas of the site with fine details designed at the end of developmental process.

From the above discussion, it is evident that the initiation of the design process is very different for NT and RE. While piecemeal increments and occasional leapfrogging are the chief characteristic of NT, developing a rudimentary street/block system is the

chief characteristic of RE. For example, in the early phase of design initiation, the San Francisco site has the gateway, hotel, cafe and a few other buildings which occupy only a small part of the site, with no pre-determined plans for the rest of the site except for a hint of projects to come, elsewhere on the site. The San Francisco site is an example of development that is a progression of small increments which, over time, forms a large whole. The urban design process of the San Francisco site is an attempt to answer the question, "What does this site want to be?"

On the other hand, at the very beginning, the entire Reading site was broken into small blocks and a network of streets. At every stage that followed, the entire site was developed for qualities like variety, legibility, richness and so forth. Again with the San Francisco site, a number of rules (3,1,5,6,2) operated at any given time throughout the process, while the RE site developed in a layering process in which each of the seven qualities--permeability, variety and so forth--followed one another in sequence. Hence the design development on the Reading site is a progression of large to small. The urban design process of the Reading site is an attempt to answer the question, What uses will be found for this piece of land and how can access to these uses be as permeable and varied as possible?

MIX OF LAND USES AND ACTIVITIES

In NT, Rule 1--piecemeal growth ensures a reasonable mix of functions. This mix is based on an ideal distribution index which varies from community to community, depending on the needs of each community. During the design process on the San Francisco site, new projects were allowed in a manner to support the ideal distribution. This ideal distribution of functions is the guiding factor which helps determine the kind of

buildings that might be built next in the piecemeal pattern of development in order to avoid an 'undesirable mix of functions' which might impede wholeness. Thus, the San Francisco site incorporated into its design a strong mix of functions. The mix of uses that the NT team established were as follows: 26% housing, 7% shops and restaurants, 15% community functions, 5% hotels, 16% offices, 12% manufacturing and 19% parking (Alexander, 1987, p. 35) as shown in the graph in fig. 6.4.

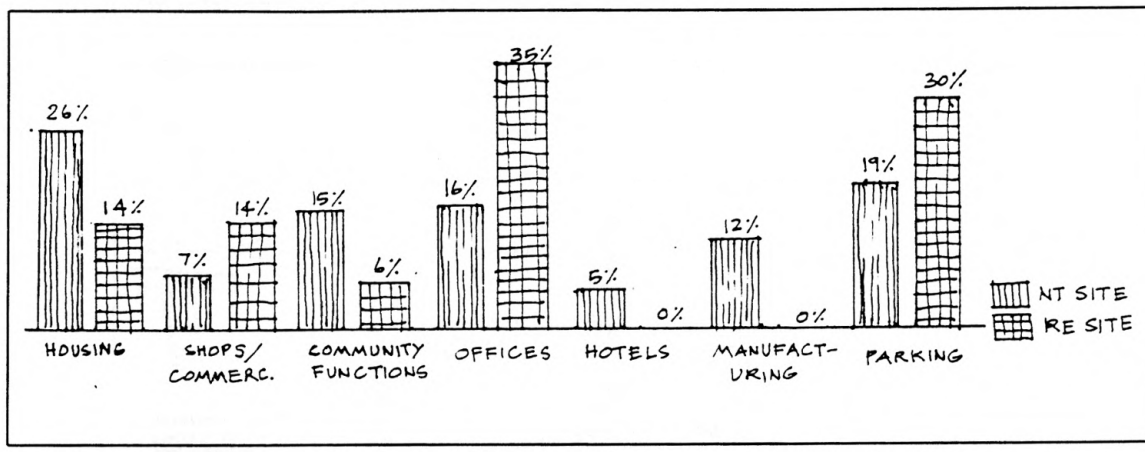


Fig. 6.4 Graph showing percentage mix of uses for the San Franscisco and Reading sites

Finally, while there was a mix of uses, the site, however, was not divided into zones of pre-determined uses. This was also not possible because of the piecemeal pattern of development. Since there was no strategic allocation of uses within the site, the land uses were widely dispersed with no specialized zones of single use.

The Reading site provided for a mix of uses, albeit in a different manner. A number of feasibility studies were conducted to ensure the viability of the building projects and return of good yields on the investments for the given land values of the site. To this end, builders and developers knowledgeable with the Reading site were interviewed and a list of possible uses for incorporating into the site were developed (graph in fig.6.4). The mix of uses established were as follows: 13.7% housing, 14% pubs/shopping, 6% indoor leisure/TV studio, 35% offices and 30% parking (Bentley et

al., 1985, p. 118). Once the mix of uses were established, the site was analyzed for strategic allocation of uses--placing specific functions in specific areas of the site for better compatibility of these functions. The design work sheets 2.2, 2.3, 2.4 and 2.5, based on the quality of *variety*, show analyses and the results from which various parts of the site were allocated various functions (fig. 6.5). Further, some buildings were designed for multi-purpose use. Thus the Reading site used a rigorous method to establish the allocation of broad uses to broad areas of the site. But the RE team did avoid creating specialized zones of single use. Instead, they worked to create variety that in turn brings a richness to urban life.

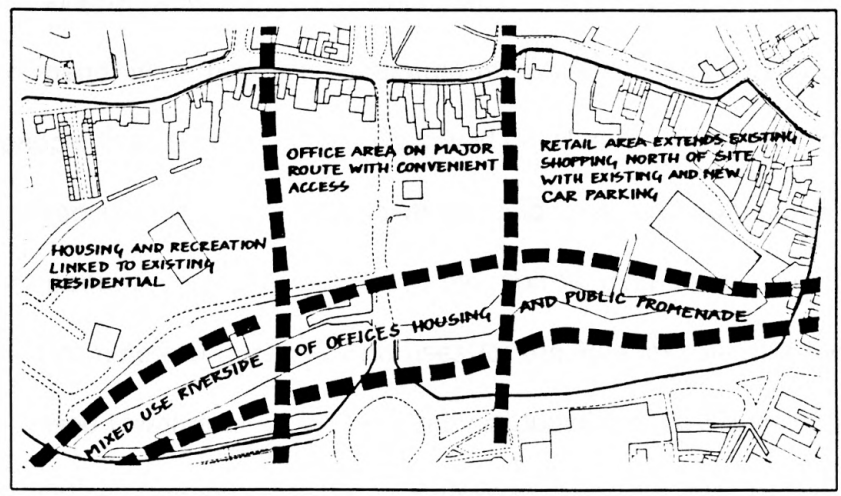


Fig. 6.5 Allocation of uses in the Reading site

From the above discussion, it is evident that the San Francisco site, while having a good distribution of uses throughout, did not allocate any specific uses to specific areas of the site. The NT team did not develop the site for land values or viability of built spaces. The underlying idea for a strong mix of functions within an ideal distribution was to avoid an undesirable mix of functions that will impede the creation of wholeness. On the other hand, the RE team allocated uses based on detailed analyses of viability and profit. But profit is not the only motive. The underlying idea is that viable and profitable

spaces can sustain the quality of variety over a long period of time and thus draw people into the area creating a rich urban mix.

While NT and RE have different rationale for supporting a mix of functions, a study of the prime uses marked out for the two sites reveals that, for both the San Francisco site and the Reading site, the functions are very similar--housing, offices, shops and restaurants, parking and community functions. While the NT team did not explicitly provide the criteria on which to base an ideal distribution of functions, they state that it depends on the community which decides the kind of amenities it requires and what kind of growth it likes to encourage. The mix of uses for the Reading site, on the other hand, were based on elaborate feasibility studies which ultimately draw in a mix of people that forms a community based on what the site has to offer. The uses for the San Francisco site lean more towards residential, and community-related functions (41%)--a pattern very different from the surrounding land uses (San Francisco's downtown commercial district). The uses for the Reading site, on the other hand, are heavily biased towards office and commercial functions (50 %) which is in keeping with the surrounding commercial district of Reading.

PUBLIC SPACES AND THEIR CHARACTER

The San Francisco site, as completed, incorporates many public spaces of varying scale. All urban public spaces were shaped by the gradual and spontaneous coming together of different buildings. For example, the main square, towards the north of the site, was first hinted at the end of the first stage in the design process. After a series of design projects, it manifested with the gestalt created by the political meeting hall, theater and newspaper building, and the bath (fig.6.6). The small square--beyond

the second gateway on the mall street--was defined by the coming together of the community bank, apartments, the mall street and the educational center. Smaller public spaces like gardens (projects 18 and 28), kiosk (project 84) and so forth developed from the adjacent buildings shaping those spaces. The cafe, for example, extended the public garden that was in turn shaped by the hotel near the gateway. The site is interspersed with small public nodes of interest like the Alice's park, the kiosk and the fountain. Streets were created as the buildings sprang up on the site and were not pre-determined.

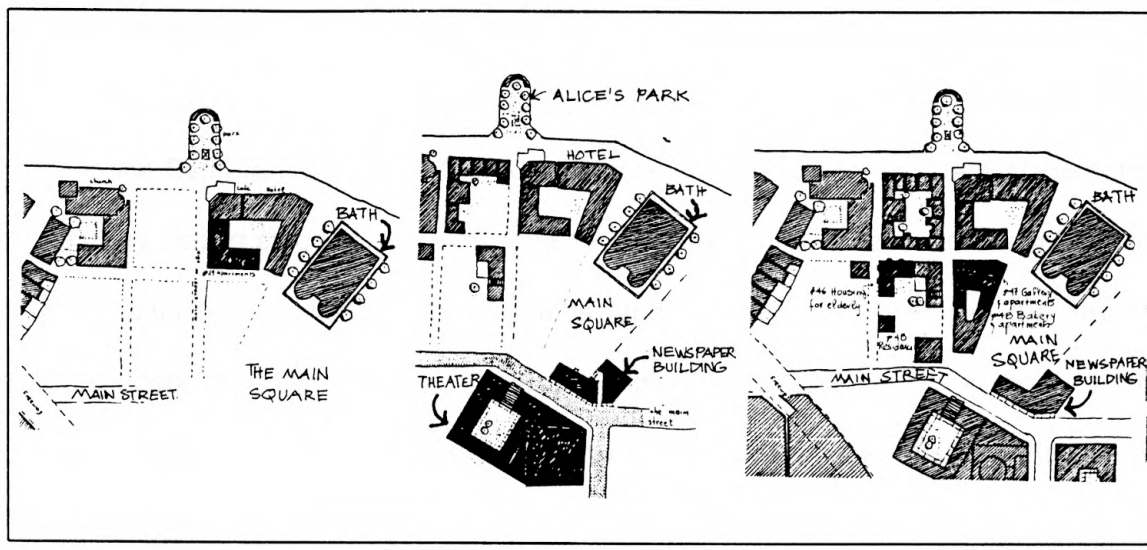


Fig 6.6 Evolution of the main square

The public spaces of the San Francisco site can be distinctly categorized as squares, gardens, nodes, pedestrian spaces, streets and parking (parking will be discussed in the next section--Street systems and parking). These public spaces in the San Francisco site were designed based on rule 4--Positive Urban Space. This rule argues for a public space that is shaped by buildings and not from leftover urban space. Further, every building should be oriented in such a way as to create a good pedestrian and public space around it. The volume of buildings is explicitly laid out and it was

prescribed that adjacent buildings touch at least one other wall to form a continuous urban fabric. The public spaces also arise out of the piecemeal process that progresses in an organic geometry described in the centering process (rule 7--Formation of Centers).

The roads and streets on the San Francisco site were treated as public spaces, which is why they are highly pedestrian in character. Further, pedestrian space was accorded the greatest importance in the public spatial realm. Hence, even though buildings shaped both pedestrian spaces and the streets adjacent to them, the streets were subordinate to pedestrian spaces.

The nature of public spaces in the Reading site design is very different from those in the San Francisco site. The public places in the Reading site were planned for in the early design stage. After Lynch (1961), potential public spaces were identified to be developed with landmarks, nodes, paths, and so forth. For example, the largest public outdoor space in the design was the Maltings Place, a square in front of the Leisure Center on New Fobney Street. In the design process, the Maltings Place was considered weakly enclosed by two-story housing on two sides. So the sense of enclosure was increased by large-scale tree planting (fig. 6.7, left). Entrances of public

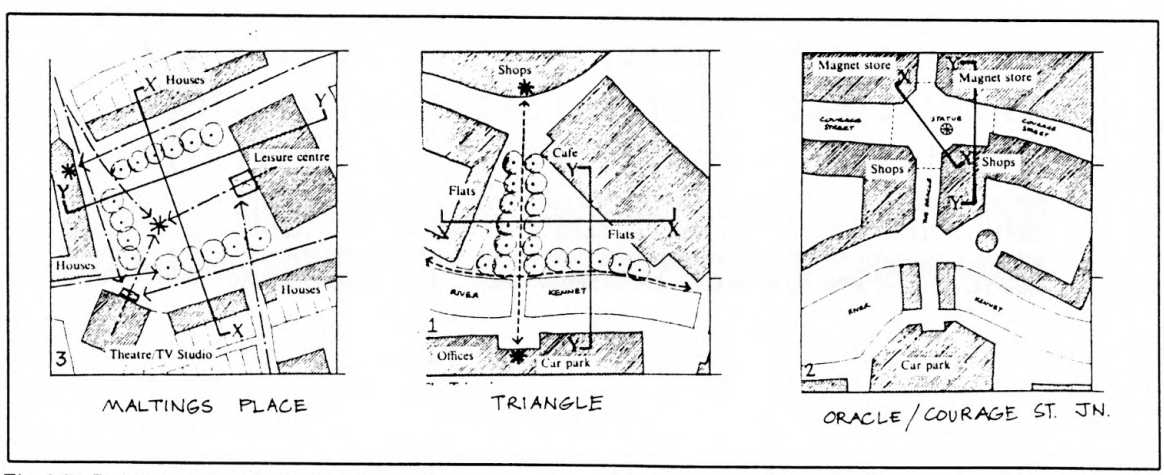


Fig 6.7 Public spaces in the Reading site

buildings were focused directly into this space and a landmark monument was placed within the space to reinforce its public relevance.

On the other hand, the design of the Triangle--an triangular open area in front of the multi-story car park--was toned down because it was not considered to be publicly significant. Consequently, the large area was sub-divided with paths through it and it was animated by designing a cafe. The Oracle/Courage Street intersection was another small but significant public space to shoppers. To increase its relevance, corners were splayed and shops were set back with store-fronts opening directly into the space.

The public spaces in the Reading site include squares or nodes, paths, landmarks, and, interestingly, the street fronts, which are categorized as *interfaces* between private and public realms, and need to be strongly public in character. Thus, street fronts throughout the site were designed to retain public facades. Almost all the buildings fall within the perimeter block theme, where no building has its back to a public street, in keeping with the quality of permeability. Visual cues were used for certain street fronts to convey the primary function of their buildings. For example, so that they would be interpreted by the widest possible public as a part of Reading's established

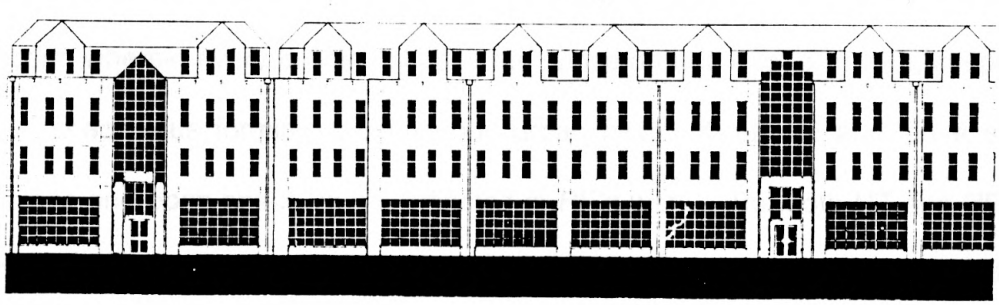


Fig. 6.8 Bridge Street elevations

commercial area, the Bridge Street building fronts were analyzed and various visual cues were used to create a commercial look (fig. 6.8).

Finally, almost every quality of the *Responsive Environments* is geared towards enhancing the vitality of public spaces with respect to the pedestrian--pedestrian paths along the river side, creation of landmarks for more legibility (detailed in design sheets 3.7 and 3.8 and based on the quality of legibility), visual cues for appropriateness (design sheet 6.3), and so forth. These examples also attribute a strong pedestrian character to the streets achieved by applying the qualities of permeability, variety, legibility, visual appropriateness and richness. Thus, the strength of the public spaces in the Reading site lies in the street design.

From the above discussion, it is evident that, while the public spaces in the San Francisco site evolved spontaneously and gradually over a period of time, the public spaces of the Reading site were designed in a more premeditated fashion. The public spaces of the San Francisco site can be distinctly categorized as squares, gardens, nodes, pedestrian spaces and streets with decreasing importance in that order. The public spaces in the Reading site, based on Lynch's visual analysis of the city (1961), are nodes, paths, edges, districts and landmarks, and also street fronts. However, NT's concept, wherein every building shapes the space around it to form beautiful pedestrian urban space thus forming a continuous urban fabric of relaxed and loose shapes of buildings and open space, is not reflected in RE's work. But both NT and RE develop public spaces that are strongly oriented to the pedestrian, as reflected in the street character of both the sites. Both also encourage small urban public spaces designed to draw in people and thereby lend a richness and vitality to the city as a whole.

STREET SYSTEM AND PARKING

The San Francisco site is an example of a very unusual pattern of street development. As each new building increment was added, the nearby streets were extended incrementally to give these buildings vehicular access. For example, Mall Street evolved as new building projects defined it (fig. 6.9). In the case of the Bath project (#13), which developed away from the initial cluster of projects, there was no street access to that area at the project's inception. The Mall Street was envisioned to continue towards the Bath over a period of time as other projects developed. Thus, as there was no pre-determined network of streets designed based on traffic patterns and need, the San Francisco site's street system reflects an organic pattern of development.

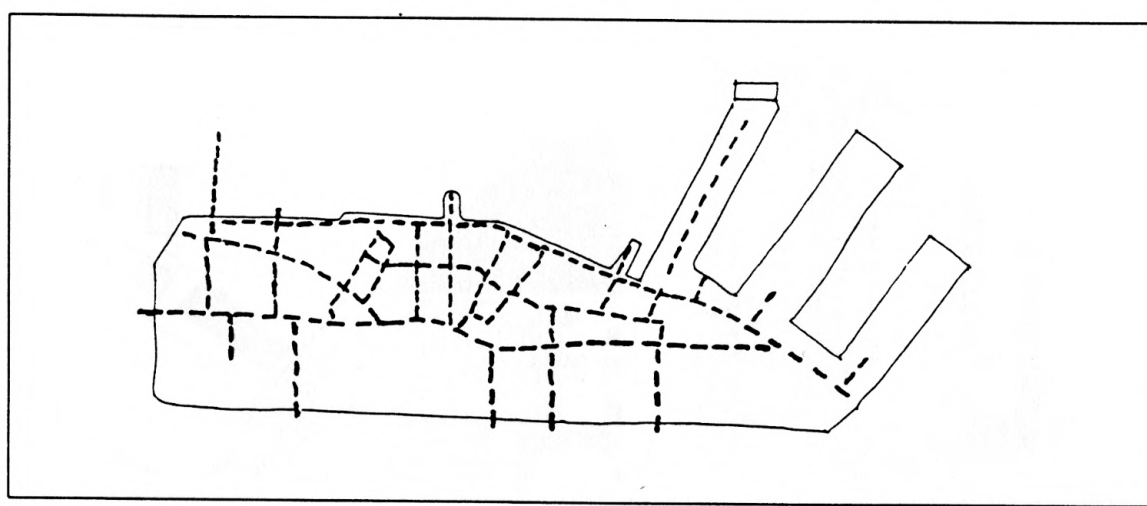


Fig. 6.9 Street patterns in the San Francisco site

Further, most streets were designed for pedestrian use. Some examples include the path leading to the market and the fishing pier, and the path to the waterfront front the small square and so forth. Also most streets were designed by segregating pedestrians and vehicles. The small grid of streets near the Main Square and the Bath were designed as pedestrian streets with access to a vehicular street--Main Street, and

leading to the water front. The Mall Street too, though a vehicular street, was designed with wide sidewalks to inject a strong pedestrian character.

Coming to the aspect of parking, the San Francisco site provided for a parking garage on the west of the public garden to meet the parking needs of the structures that were built thus far on the site. Another parking area was provided near the small square and partly under the freeway as shown in fig. 6.10 left. For a total commercial and office area of 28% and residential area of 26%, a parking area of 19% of the total built area was provided. Rule 4--Positive Urban Space--lays out the basis for designing parking areas and seeks to shield parking spaces for public view as far as possible. The second example of the parking lot mentioned above was also designed in such a manner.

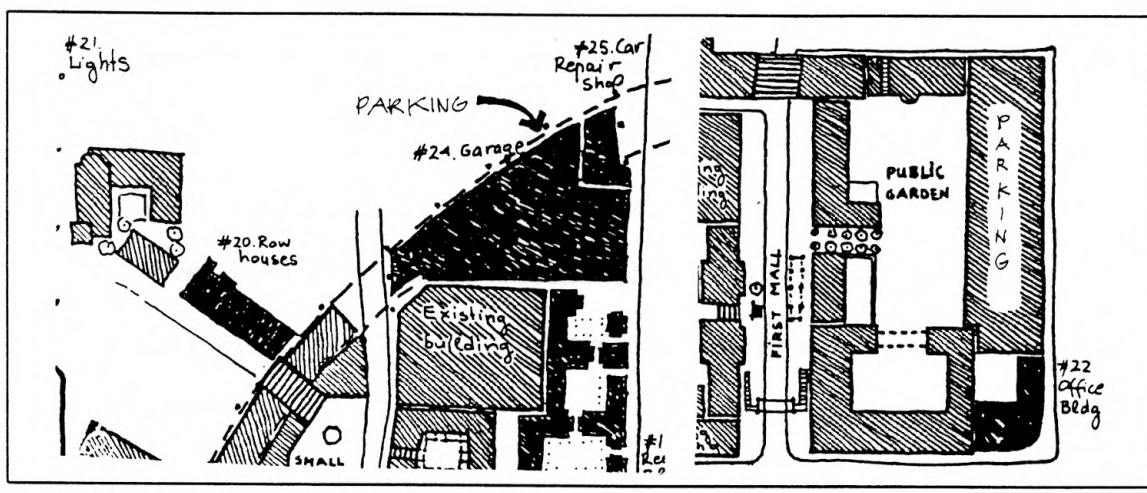


Fig. 6.10 Parking spaces in the San Francisco site

The Reading site, on the other hand, developed a very clearly defined street design. It should be noted that the initiation of the design process on the Reading site began with an analysis of street links and designing a rudimentary street/block system to connect the site to nearby areas as well as to the city as a whole. The streets formed a relaxed grid. Each street was designed for the intensity of vehicular use while at the same

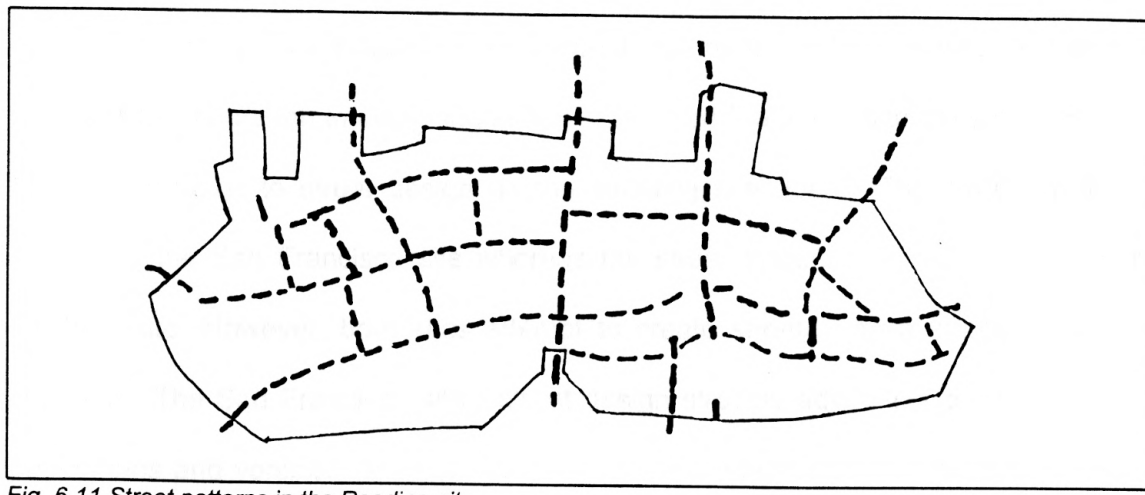


Fig. 6.11 Street patterns in the Reading site

time the pedestrian needs were accounted for in the design of sidewalks (fig. 6.11). Detailed street designs for street widths, carriage ways, junctions and so forth were laid out in the reference design sheet 1.3.

The street design in the Reading site encouraged a mix of pedestrian and vehicular traffic wherever possible, as this was seen to contribute to the positive qualities of permeability and legibility. But in the shopping areas and at points along the banks of River Kennet, exclusive pedestrian paths were designed, as these were seen to contribute positively and functionally to the street character.

Finally, unlike the San Francisco site, the design of parking is not explicitly discussed. However, design sheets 1.3 and 1.4 outline in detail as to how to arrive at the areas required for parking. Consequently, the Reading site has a multi-story park to the southeastern corner and one more in the Corporation Transport Depot building to meet the projected parking needs of the site. Therefore, for a total commercial and office area of 50%, and residential area of 14%, a parking area of 30% of the total built area was provided.

From the above discussion, it is evident that there is a fundamental difference in the two sites' approach to designing streets. The San Francisco site does not award as much importance to street design as the Reading site does. The street system is organic in the San Francisco site whereas the street system is a relaxed grid in the Reading site. However, both sites attempt to create streets with a strong pedestrian character. The San Francisco site's street design strongly advocates a segregation of pedestrians and vehicles whereas the Reading site's street design advocates a mix of pedestrian and vehicular traffic. Both sites, however, design parking spaces based on similar demand statistics except for the fact that the NT team seeks to shield parking spaces from public view as much as possible. While the RE team does not touch this issue, from the facts provided thus far, one can guess that they would not prefer to shield parking spaces, as this would mean the user will not know where a parking space is, if it is shielded. This in turn goes against the qualities of permeability and legibility.

SCALE AND STYLE OF ARCHITECTURE

The buildings on the San Francisco site have a controlled scale. The scale can be gauged from the size distribution of the ninety odd buildings into small, medium and large-scale buildings. The smallest buildings were less than 1000 sq. ft. in area, medium around 1000 to 10,000 sq. ft. while the largest buildings did not exceed 100,000 sq. ft in area. Thus the buildings on the San Francisco site conformed to an upper limit which implies that resulting scale of the urban fabric was controlled. The number of small buildings on this site was around 50% of the total number of buildings, while medium sized buildings were around 35% and the remaining 15% accounted for large buildings (see actual sequence of projects by size in the fig. 6.12 below). Smaller-sized

buildings were encouraged over medium and large-sized as they were considered to be more economical and conducive to the growth of wholeness.

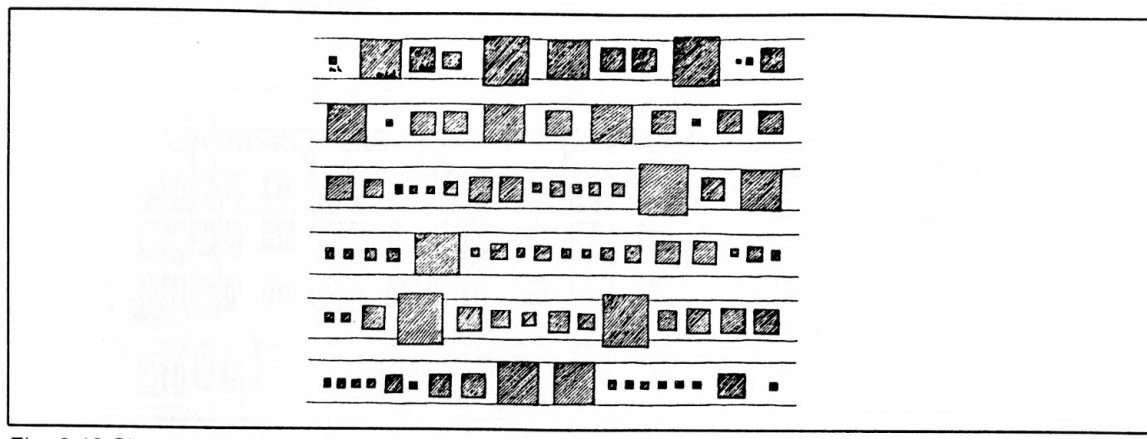


Fig. 6.12 Size distribution of the projects in the San Francisco site

The physical form of the buildings on the San Francisco site alludes to a particular style of architecture which the NT team "jokingly" referred to as '19th century renaissance style'; which is revealed by the elevations of some of the projects. These elevations and building volumes resulted from rule 5--Layout of Large Buildings--and rule 6--Construction. Natural lighting and ventilation was encouraged over mechanical systems. The building depth was not to exceed 40 ft. As illustrated in fig. 6.13 below, a good example is the Education Center that incorporates all the qualities described above.

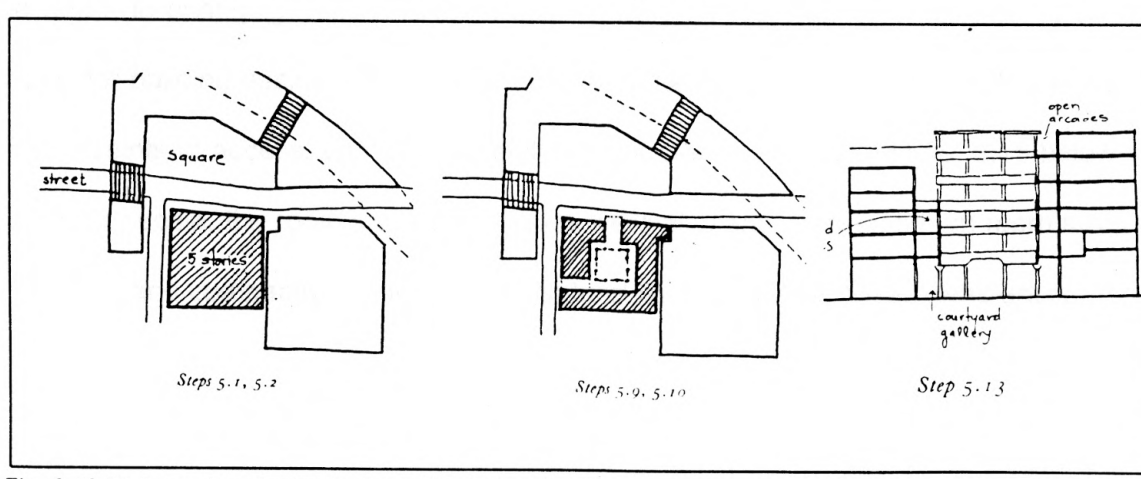


Fig. 6.13 Various steps in the design of the Education Center

Finally, it can be said that the end designs that resulted in the San Francisco site were really post-modern in style as far as architecture is concerned (see elevations of buildings in fig. 6.14 below).

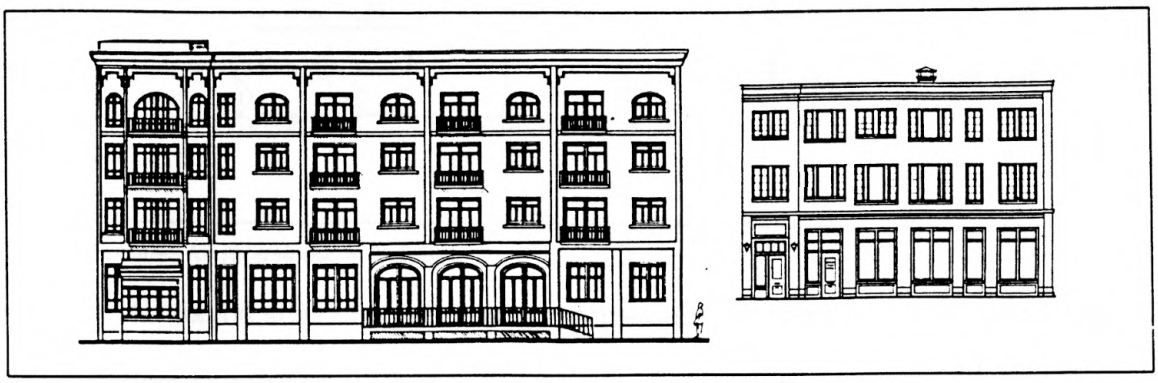


Fig 6.14 Building elevations in the San Francisco site

The scale of the Reading site resulted from the block sizes and the buildings in these blocks. The size and shape of the blocks were based on the primary uses of the buildings of these blocks. For example, the block size and configuration for family houses is different from those with non-residential uses. But smaller blocks--200 ft. to 400 ft. in length--were encouraged as they were considered to be more conducive to creating permeability. As for the buildings themselves, the volume and internal organization was designed to promote the quality of *robustness*--the ability of buildings to adapt to changing uses and functions. Three qualities that were considered as the basis for building design were: building depth in the range of 9m to 13m (18 ft to 40 ft), many points of access, and limited height of four stories as shown in fig. 6.15 below. At a smaller scale, the room sizes and shapes were also specified--optimum room sizes of 14 sq. ft. and compactly shaped rooms. Natural lighting and ventilation was encouraged.

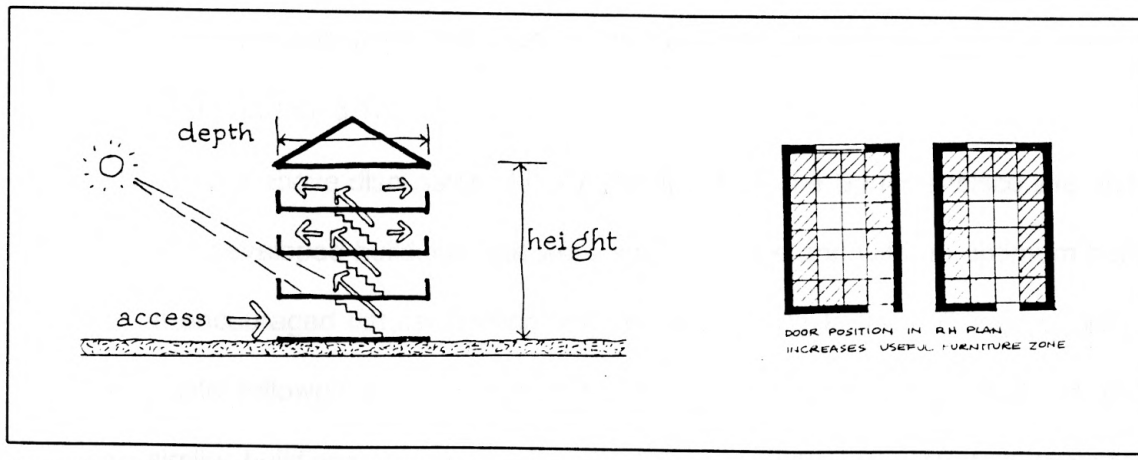


Fig 6.15 Qualities for robustness in buildings

As far as the style of architecture is concerned, the buildings on the Reading site did not adhere to any particular style of architecture though it can be said that similar to the San Francisco site, the Reading site too ended up with a post-modern style of architecture. Most elevations were developed based on the cues from neighboring areas. Detailed appearance specifications, like all other aspects of RE's urban design, was a result of detailed studies, of contextual and visual cues--elaborate studies of surrounding architectural styles and perception of local citizens as to the meanings of different elements of building elevations. Hence, the noticeable features of buildings that were studied by the RE team to be used in elevation design were: vertical rhythms, horizontal rhythms, skylines, wall details, windows and doors, and ground level details.

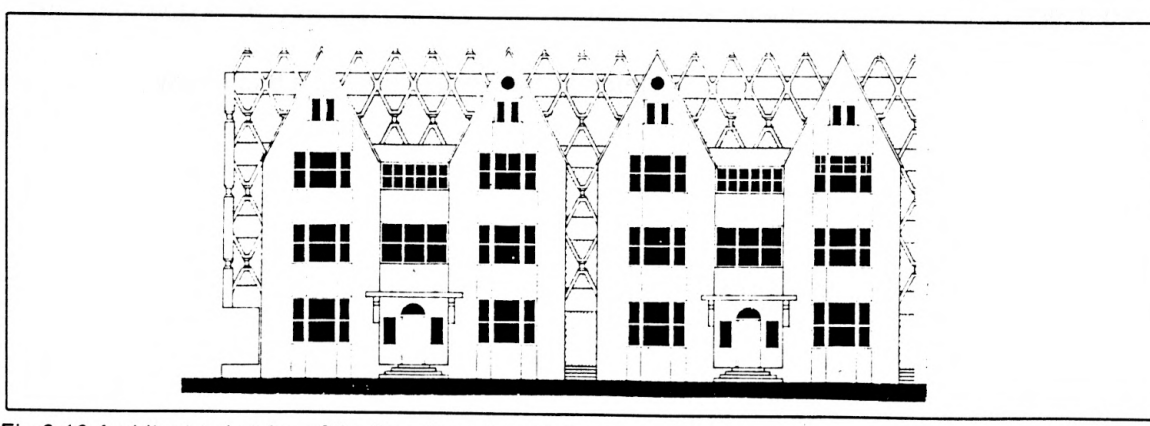


Fig.6.16 Architectural styles of the Reading site buildings

Further most buildings were designed for visual contrasts and also for the effects on viewing distances (fig. 6.16).

From the above discussion, it is evident that both the San Francisco site and the Reading site developed buildings that were small in scale and with an optimum building depth that encouraged natural lighting and ventilation. While the buildings on the San Francisco site followed a more prescriptive style of building design that resulted in strongly similar buildings on the site, the Reading site had a more studied approach to aid in establishing specific looks for the primary uses of buildings and to help create the qualities of visual appropriateness and richness.

Finally, it can be seen that the seven rules and the seven qualities helped create a physical urban fabric on the two sites that conformed to most of the rationale required by these rules and qualities. While these projects exemplify the fact that these rules and qualities are implementable as far as design terms are concerned, urban design does not just deal with design and drawings created in an office. The real test as to whether these rules and qualities can be implemented would depend on the various people--whether the designers, developers, builders and so forth, can agree to the rules and qualities, and who or what guides and lawfully controls the process of implementation to the satisfaction of various parties concerned. These issues move us into the topic of *Direction*, which is discussed in the next chapter.

Chapter 7

DIRECTION

The **direction** is the force that guides the **instrument.** It is a source that motivates and sustains the process. While **instrument** was defined as the knowledge and the tools required for actualizing the goal, evidenced from the contribution of the seven rules of NT and the seven qualities of RE, **direction** is the means to operationalize and implement the design process in the real world. **Direction** relates to the participants in the design process and the ways they work to move that process toward completion. In urban design, implementation deals with urban planning, administration, financing, economics and so forth--factors that influence the design and development of an urban area. Like ground and site, **direction** is an integral part of any activity.

The importance of implementation in urban design cannot be understated. More often than not, implementation directly affects a design that seeks to manifest into a tangible reality. The design process and the implementation process must work in tandem for the final built environment to closely resemble its conceptual ideal. This coordination becomes particularly relevant in the case of new design theories. Seeking to change the status quo, new theories build a strong concept which may work very well in a theoretical framework. But if they cannot withstand the tests of the real world, then these theories will not contribute to better designs. Thus, it is not only important to develop the knowledge and tools to actualize a goal, but design theories should also develop, or at least have a fair idea of how to implement, their designs. Therefore, in this section, NT and RE will be examined for their methods of implementation.

Before discussing how NT and RE implemented the design processes in the San Francisco and the Reading site, it is worth considering current practices in the field of urban design and planning. Given the way the system works today, designers along with urban developers and builders, develop designs for urban sites and make proposals to urban development authorities. These authorities are invested with power to make decisions on development, to allot financial resources, and to approve design schemes based on an elaborate system of land and building by-laws which were originally designed to protect the interests of all parties involved, most importantly the urban environment. Thus, the urban-development authorities direct the design process so that it eventually manifests as a concrete reality.

Despite the fact that such a system of planning exists to direct the design process, practitioners in the field often voice dissatisfaction with the methods of implementation and the bureaucracy that directs it. This dissatisfaction stems from several common perceptions: the current rules and by-laws are outdated; the suggested methods of implementation do not effectively actualize the urban designer's goals; there is a lack of coordination among developers, planners and designers, builders and so forth; and in the end, the users of an urban environment have a minimal or no role to play in this process. Against this background, it is crucial to examine the attitudes and ideas of NT and RE toward implementation.

To create whole or responsive urban environments, NT and RE claim to have delineated rules and qualities that work for any urban design project. The two works, however, only hint at the methods for carrying out these rules and qualities in the real world. They do not explicitly lay out practical procedures for implementation. Nevertheless, several steps in implementation can be gleaned from examining how the

two works operationalized the rules and the qualities for the San Francisco and the Reading projects. Because the San Francisco and the Reading projects were conceptual exercises, the steps used to implement design were geared to the requirements of these exercises. Whether these steps can be implemented in real world designs will be analyzed at the end of this section.

But first, the various steps in operationalizing the rules of NT and the qualities of RE for the San Francisco and the Reading sites were juxtaposed in a table (fig. 7.1). This table identifies the various steps in implementing the designs in the San Francisco and the Reading projects. Using this table as a foundation, I next discuss the methods of implementation in NT and RE.

From the table of fig. 7.1, one sees that the steps in implementing the design processes for the two sites illustrate fundamental differences in the two methods of implementation. The table also reveals several themes underlying the implementation process. Four such themes were identified for a useful discussion on implementation and direction. These are:

1. Phases of implementation
2. Framework for implementation
3. Redefining the urban designer's role
4. Two built projects.

These four themes are the organizational framework for the following discussion. Throughout, the four themes will be discussed, analyzed, evaluated, and compared, drawing on evidence from the San Francisco project first, followed by the Reading project.

THE PHASES OF IMPLEMENTATION

The San Francisco site design is an attempt to demonstrate an alternate method of design implementation. The design process is very different from the conventional design. In addition, the table of fig 7.1 shows that the method for implementing this unique design process is also unique.

As the table indicates, the nine steps of NT's implementation process fall into three phases: (1) the prelude, (2) design proposals and approval, and (3) active dialogue. The first phase (steps 1-4) is really a pre-organizing stage of the implementation process. In this phase, all participants become familiar with the design philosophy and learn the seven rules in achieving wholeness before they get involved in design implementation. There would be two key groups of participants in the building process--one, a planning committee that directs, oversees and administers the design process; and a second group that includes designers, developers, community and other groups interested in developing and building a particular urban site. In the simulation, the planning committee (as compared to the student team) was clearly the major force in directing the design process. NT, however, does not explicitly define the framework within which such a committee can operate in the real world. It merely mentions that such a committee is similar to a planning board or council (Alexander, 1987, p. 111).

The second phase (steps 6-8) deals with design proposals and approval. In NT's design process, the builders, developers or any other party interested in developing a site, first sensitize themselves to the qualities of the site, asking the question, "what does this site want to be?" They must then propose the designs for the site and present it to the planning committee. NT emphasizes that these proposals should be the result of a vision of what may arise from the site, and should not be based on land values and

Fig. 7.1 THE PROCEDURAL STEPS OF NTUD AND RE

SAN FRANCISCO PROJECT

1. The directors of the San Francisco project (C.Alexander, I.King & H.Davis) familiarized all participants (18 graduate students) with the urban design philosophy and the seven rules as embodied in NTUD.

At the very start, therefore, all parties involved in the building process must be familiar with the urban design philosophy of wholeness and the seven rules that help create it.

2. Participants broke into two teams. One was a planning committee (CA, Ingrid King & Howard Davis), directing and evaluating the design process and guiding all parties in the building process. The second team was the 18 graduate students, representing design developers, city officials, residents, and other groups interested in developing the site.

In the real-world, a similar categorization of groups would work to achieve wholeness for the district under development.

3. For the purposes of the studio simulation, each student developer was required to build six projects, taking the total number projects on the site to about 90.

In a real-world situation, as long as urban sites come up for development, the number of building projects a builder or a designer could build would depend on the specific qualities of the site under development.

4. Each project for the simulation fell into small, medium and large categories as specified in rule1, piecemeal growth. For the purposes of simulation, each student did 2 projects in each category.

In a real world design, projects would similarly fall into the same three categories, though specific needs and qualities of the site would determine specific numbers and sizes.

5. The teams visited the site several times to understand the qualities of the site.

READING SITE

1. The RE team toured and mapped the surrounding areas of the site to analyze the links to the site, the traffic patterns, and the intensity of vehicular use in the streets to design street widths.

In an actual project, the designer and his team would begin by finding all the links to the site. The designer would carry out traffic surveys, obtain data from highway authorities, or work in consultation with traffic engineers.

2. Based on the data, the RE team designed a preliminary system of streets and blocks.

In an actual project, the design team would begin to align the system of streets and blocks within the site itself, from the data obtained from the studies in step 1.

3. The RE team consulted estate agents and realtors, public officials and policy makers to list possible uses for the site.

In an actual project, the design team would talk to local authorities, neighbourhood groups and estate agents to investigate demand. At this stage, the team must also discuss their proposals with the local planning authorities.

4. Based on these suggestions, the RE team mapped the site for a mix of uses to achieve the quality of variety.

In an actual project, the design team would place uses strategically and encourage pedestrian flows where necessary--e.g., in front of shops.

5. After analyzing the site for permeability and variety, the RE team developed a rough schematic plan for the site.

In an actual project, at the end of this stage, the design team would try to generate as much variety on the site as possible, and locate uses within the blocks.

6. The RE team themselves analyzed the legibility of the site using Lynch's ideas. They

In a real world design, anybody involved in the building process should attune himself to the natural qualities of the site, asking the question, "what does this site want to be?"

6. To initiate and continue the design process, the committee directed students to examine the conditions of the area at every stage of design. The committee asked the students to propose projects whenever they felt stimulated to do so by the needs of the emerging whole.

In a real-world project, developers and community groups would similarly propose their ideas and designs, and present it to the committee.

7. The student team built a working model to simulate the design at various stages of development on the site.

In an actual project, designers would build models to help in visualization. The model would also provide a 3-d picture of the direction of growth.

8. The planning committee scrutinized every proposal and either approved, recommended changes, or rejected the proposal based on whether or not it conformed to the seven rules.

A real-life planning committee would direct the design process in a similar way, guiding every design proposal in achieving wholeness.

9. The two teams were involved in an active dialogue for every project, and at every major stage of development. They periodically discussed an emerging project, evaluated the design unto that point, or agreed on possible future projects.

In a real-world design, the committee administering and overseeing the process, and the parties involved in building, would, similarly, communicate with one another to coordinate the design process.

conducted interviews with the local residents and merchants to determine their ideas on legibility and checked it against their own findings.

In an actual design, the design team would use Lynch's checklist of urban elements for a legiblity analysis and check it against the views of the wider public to get a clear picture of the legibility potential of a site.

7. Based on the results from the legibility analysis, the RE team developed nodes and markers for the site.

In an actual project, the design team would consider how existing buildings in and around site could be used as potential landmarks and nodes.

8. The RE team then adjusted the layout for legibility.

In an actual project, the designers would coordinate the site design and adjust it with potential landmarks and nodes on the site.

9. The RE team built a scale model to evaluate and view the emerging design from a variety of angles.

In an actual project, designers would also build models to help in visualization.

10. Having designed for the site as a whole until this point, the RE team turned to designing details. They studied possibilities for robustness, listed objectives for visual appropriateness, identified external surfaces to be treated for richness and personalization.

In an actual project, designers would similarly study potential possibilities for robustness in layouts, gather data for visual cues, identify possibilities for enriching and personalizing exterior surfaces.

11. In the final part of the project, the RE team made detailed drawings to achieve robustness, visual appropriateness, richness and personalization
In a real-world project too, designers would make detailed drawings to provide for the qualities of robustness, visual appropriateness, richness and personalization.

profits. On receiving the proposals, the planning committee processes every design proposal--either approving or rejecting it, or if necessary, recommending changes.

The third phase (step 9) deals with active dialogue. Active dialogue is crucial to the implementation of NT's design philosophy. All parties involved in the building process (including the committee), are involved in a discussion regarding design proposals at major stages of development and come to agreement on these proposals. NT states that every building increment should aim to be a whole and for this to work, various processes connected with building and construction activity should work in tandem (ibid., p. 22). For this to happen, all these processes should communicate effectively with one another. Thus for the process of wholeness to work, communication among the various parties is the key.

In contrast, the RE team begins with a knowledge of the seven qualities and the design philosophy of responsiveness. The eleven steps for design implementation for the Reading site, fall into four phases: (1) design initiation, (2) mix of uses (3) legibility, and (4) detail design. Each succeeding phase helps in designing and implementing each of the seven qualities for responsiveness. Each phase has two steps that reflect a typical pattern: one is study and analysis for a given quality, and the second step is to design for the quality. Further, the first three phases deal with the site as whole. The fourth and final phase deals with specific design details for various buildings in the site.

In the first phase (steps 1-2), the design process is initiated on the site. As a first step to implementation, a designer and his team, either conduct their own traffic surveys and study the links to the site or gather data from highway authorities. Otherwise, they consult traffic engineers to help them design a preliminary street system. In the second

step, using information in step 1, the team of designers make design decisions to develop a preliminary street/block system.

In the second phase (steps 3-4), designers investigate the potential to design for variety of uses. They talk to a number of professionals--local authorities, estate agents, interest groups and so forth--to list out the best possible uses for a given site. They also consult planning authorities to check prevailing laws and restrictions, for certain kinds of development, which provide them with a clear idea on the kind of uses to develop in the site. Similar to the first phase, using information in step 3, the designers proceed to make design decisions in step 4. At the end of two phases, the designers coordinate the results from the first four steps (step 5). Thus, in RE's method of implementation, this is a typical pattern at work.

In the third phase of design (steps 6-8), the design team works with local residents and merchants around the site, taking in their views on the important features of the surrounding area. This is the only phase where the design team works directly with potential end-users of the environment. This is, however, done to gather data and does not include design input from the end-users. Also until this phase, the designers work toward developing the site as a whole.

Further, in the initial phases of implementation (steps 1-5), the design team works in consultation with a number of professionals in related fields--architects, quantity surveyors, service engineers, estate agents, legal advisors, district valuers and so forth. These professionals provide valuable information with which the design team makes informed decisions on design. Obviously, consulting so many professionals is expensive. Therefore, in the very second phase of implementation, the design team calculates the cost of fees for various professionals and works out the economic

feasibility of the whole scheme. From then on, "at every stage, the design is checked for physical and financial feasibility." (Bentley et al., 1985, p. 32).

In the latter phases of design (steps 9-18), however, the design team works within the team, because designing for the qualities--robustness, visual appropriateness, richness, and personalization--does not require input from other professionals. Further, in this final stage, designers focus on detailed designs of the project.

It is evident from the above discussion, that the NT method of implementation is an intuitive and interactive process. It is intuitive because there is no pre-determined course of growth, only a general consensus on its direction. It is interactive because the implementation requires communication among various groups. As compared to the NT method, RE's method of implementation is rigorously methodical and non-interactive process. It is methodical because the designer accounts for every design decision with physical and financial feasibility reports. It is non-interactive because the designers work only with related professionals, but not with potential end-users of the site. Further, the various professionals do not engage in an active dialogue as in the case of NT. Thus the two methods of implementation are fundamentally different, which is evident from the polarities: **intuitive vs. methodical** and **interactive vs. non-interactive**.

FRAMEWORK FOR IMPLEMENTATION

The NT framework for implementation is built on one rule of wholeness: every building and construction activity should aim to be a whole (Alexander, 1987, p. 21). At the design level, this was achieved by piecemeal growth, where several piecemeal increments came together to form larger wholes, positive urban spaces and so forth. At the implementation level, for all this to happen, it is possible for anyone to participate

and propose design. These participants, however, should be familiar with the seven rules and the philosophy of wholeness. Further, to develop a coherent urban fabric from the design proposals, the various parties should coordinate their efforts. Coordination implies communication, interaction and consensus among all these parties.

To provide coordination and check the direction of growth, however, there is a planning committee. The committee draws together all the parties involved in the building process and familiarizes new participants with the rules, and processes design proposals. It can approve or reject proposals. Combined together, the two groups forward the design process as was seen in the simulation. Thus, NT's method of implementation is highly innovative and unconventional.

On the other hand, the RE team operates within the broad framework of the conventional planning model for implementation, but with some significant changes. The RE team's method of implementation is built around the one goal of responsiveness: the design process should respond to the user's needs and provide him with choices in the urban environment. The main deterrents to implementing responsive designs in the conventional planning process are developers and planning authorities. This is because developers and authorities typically want profits for given land values. They do not unduly concern themselves with the quality of design, much less think about the choices and comforts of the end-user of an environment. Consequently, they may not fund design projects which may be strongly responsive to the user's needs, but may not come across as financially sound investments.

At the implementation level, therefore, designers need to take care of the user's needs, and at the same time, prevail upon the developers and planning authorities to

approve responsive designs. Operating within the traditional framework of implementation, the designers can still achieve this goal by:

1. taking into account the user's needs at every stage of design and translating those needs into design,

2. providing strong empirical evidence that convinces developers and the authorities on the financial soundness of the user-oriented schemes, so that the designs will be approved and thus implemented.

This two-step effort entails analytical studies for design and generating financial feasibility reports for empirical evidence. Thus, RE's method of implementation seeks to achieve responsive environments by addressing the problem areas in the conventional planning and implementation process.

From the above discussion, it is evident that NT's framework for implementation is a process of interaction and involves anyone interested in the building activity. At least at the theoretical level, the approach is democratic and community-oriented in nature. Since this method of implementation is entirely different from what is practiced today, however, current methods of planning cannot support it. Moreover, NT rejects the current methods of planning and design. It proposes to change the current system of design implementation and opines that for this to happen, the existing social systems must change too.

While NT should be commended for demonstrating that a new design process can be actualized with new methods of implementation (albeit in a simulation), in any capitalist society where profits are prime motive for business, NT's method of implementation, which seeks to emphasize the ideal of wholeness in an urban environment over profit for the developers might indeed face difficulties. However, there

is a better chance that this process can be implemented in nations where participation in community activities is common, for example, India. Further, similar community-oriented building activities taken up by Alexander in his earlier projects like the Mexicali project, the New Eishin University and so forth were implemented, with moderate successes, outside North America. In fact, the Mexicali project will be discussed in the last part of this section.

In contrast to NT, RE's method of implementation involves only the designer and his team. The design team works independently of the community for which it designs. The end-user does not partake in the implementation process. This is ironic, as the central issue is responsiveness, which at heart involves user's choices and comforts. Yet RE's design process can be easily implemented since it conforms to the conventional planning model. Unlike NT, RE does not seek to change the existing methods of implementation or social systems. As long as the designer can convince the developers and planning authorities on the profitability and viability of his schemes, his designs can be actualized. This was demonstrated in the Fobney Street development which was a part of the original Reading site discussed here. The Fobney Street project has actually been constructed and will be discussed in the final part of this section.

REDEFINING THE URBAN DESIGNER'S ROLE

In the preceding themes, the NT implementation process was defined as an interactive process where a planning committee guides and directs the growth process. In addition, anybody interested in building activity can participate in the design process. Thus, it is clear that the key players in the design and implementation process are the planning committee and a broad group of participants in building. Following is a discussion on the nature of the committee and the participants in the building process.

First, the planning committee, according to NT, is similar to the current planning board. Unfortunately, however, NT does not clarify the committee's constitution, reach and authority in directing the urban design process. The table of fig 7.1 indicates that this planning committee is an informal body--most likely, a voluntary organization whose goal is to: (1) coordinate the various parties involved in the building process, (2) educate them on the rules and philosophy of wholeness, and (3) guide design proposals in achieving the quality of wholeness. Consequently, the members constituting this committee would have to be well versed and experienced in the design philosophy of wholeness, if they are to direct the process of growth. Thus, the committee teaches, mediates and directs to implement the design process.

In the conventional set up, the role of the urban designer is well defined. In the NT process, however, anybody who is interested in building, and can learn the rules, can involve themselves in the building process. Consequently, parties involved in building activity should envision, participate, propose and design, and interact to implement the design process. NT contends that as people involved in the building process build more projects, they learn and absorb the rules better. In fact, the fundamental concept underlying this whole exercise is that over a period of time, the design philosophy of wholeness will percolate into the masses and thus, wholeness will become self-sustaining and self generating process. In this sense, there is no need for an urban designer as such. His role would probably be transformed into that of a community leader or an active volunteer in the planning committee that has achieving wholeness in the built environment as its primary agenda.

In contrast, in the RE team's method of implementation, the old relationships between the urban development authorities, and the developers, builders and designers

remain the same. The urban designer is well versed with the seven qualities that contribute to responsive environments. The designer works with a team of designers like himself. But together, as they progress through various stages of the project, they come in contact with or hire a variety of professionals--architects, quantity surveyors, estate agents, service engineers and so forth. They meet and interview local authorities, city and planning officials and hold discussions with neighborhood and interest groups. Thus, in the initial phases to half way through the implementation process, the designer and his team would deal with professionals other than themselves. Otherwise, they mostly work within their team.

In RE's method of implementation, the urban designer has to acquire a new set of skills other than designing on the drawing board or participating in routine site visits. He would have to conduct analytical studies and base his decisions on these studies. He must negotiate with the developers and convince them that designs with the end-users' choices and comforts can still be profitable and so forth. Thus the designer is an expert, who analyzes, infers, designs and negotiates. He knows how to design for the end-user and, at the same time, get the design implemented. Thus, the urban designer is the unifying force in the process of implementation.

From the above discussion, it is evident that in the NT method of implementation, the urban designer's role as it is practiced today would vanish. It would, instead, be performed by trained lay people themselves. The role of formal institutions of planning and urban design authorities would diminish. NT's planning committee would be an informal body that directs the growth of cities into achieving wholeness. In contrast, in the RE's method, the formal institutions and the old equations among the various professionals related to the building process would remain the same.

The urban designer's role is much more strongly defined than before. He plays an important role in design and implementation.

THE MEXICALI AND FOBNEY STREET PROJECTS

The San Francisco project, as mentioned several times, was a simulation of a unique urban design process. In the above discussion, the process of design implementation based on this simulation was studied. It would be interesting to compare the inferences based on this simulation to an actual project which, though at a much smaller scale, was actualized based on similar ideas as in the San Francisco project. This was the Mexicali Project led by Alexander, in northern Mexico.

Begun in 1975, the Mexicali project was a government-sponsored housing project with an initial plan to build thirty houses in one year, using innovative and low-cost construction techniques. Several of Alexander's ideas underlying this project are similar to the NT's participation-oriented urban design. The houses were to be small, each sixty to seventy square meters in area. The families for whom the houses were being built were to participate in the design and building process. Each family had to contribute some physical labor for their house. There was to be a builder's yard which was to be "understood as a new social institution with an important function in the neighborhood." (Alexander, 1985, p. 24).

Alexander's aim in the Mexicali project was to replace the mechanical building operation of conventional systems of production with a more humane operation in which the joy of building becomes paramount, in which the families themselves could enter the process. To this end, five families initially came forward to help in building their own houses. Using patterns from *The Pattern Language* (Alexander, 1977)--patterns like half-hidden garden, couple's realm, children's realm and so forth--the five families

designed the layout of their own homes. The families contributed more than half of the physical labor of construction and the five houses were finally built (see fig. 7.2 below). Five months after the houses were built, the new inhabitants of these houses expressed their satisfaction and happiness with the designs (p. 187).

Seven years later, two members of the design team--D. Fromm and P. Bosselmann--revisited the site to evaluate the extent to which the project was a

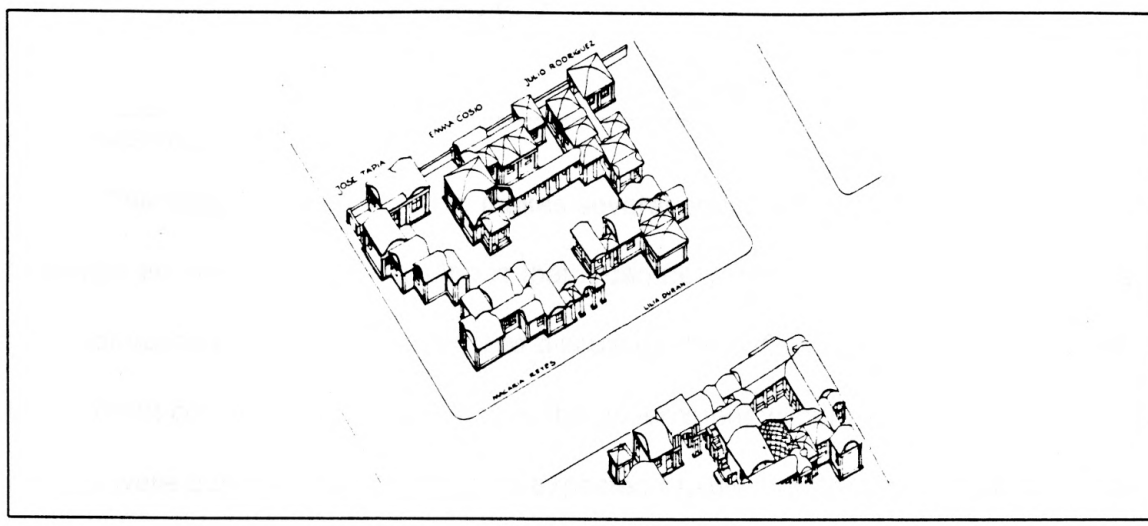


Fig. 7.2 Mexicali Project

success. They interviewed the five families, who all continued to live in the same houses, and studied changes and additions in the design. From the interviews, it was clear that these families were still happy and satisfied with the original design. Some of them made changes to the houses as part of changes in their personal lives. For example, some rooms were changed and the entrances which originally opened into the community space were changed to face the street (fig 7.3). But the interesting fact is that all the families believed that they could physically make the changes in the buildings themselves. This was because all these families took part in the design and building process. This can be seen as a major success in the community participation. On the other hand, thecommunity space around which the five houses were clustered

disintegrated because of a perceived lack of privacy and also due to breaches in security for the residents.

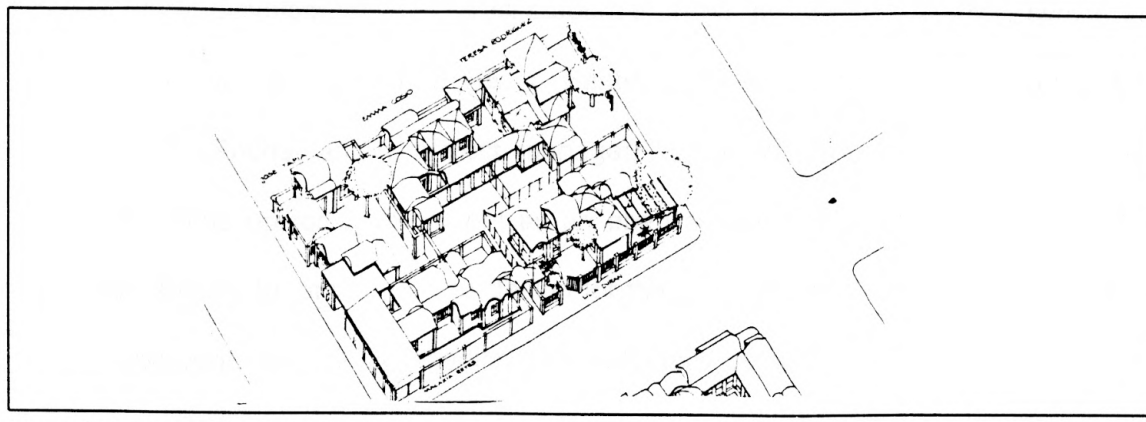


Fig. 7.3 Mexicali project, 7 years later

The Mexicali example, thus, makes several points about community participation in design and implementation. One is that it can be done. The five houses stand as a token of success. But, Alexander also discusses the difficulties in implementing ideas that are not conventional. For example, the government withdrew support after the five houses were built because the officials expected rapidly constructable modular houses. The slow and unconventional process of construction dissuaded government authorities from further supporting the scheme. Alexander says, "a new process when it begins to show itself, is irritating . . ." (1985, p. 358). This is because the new process of design and implementation is a shift in paradigm--a shift in the world-view of how people see things. This is very difficult to accept and also difficult to change overnight. Thus, while its moderate success is encouraging, the Mexicali project shows the potential problems that the NT method of design and implementation might encounter in the real-world because of the approach's uniqueness and incompatibility with present systems.

Similar to the San Francisco project, the Reading site too was a conceptual exercise. But a portion of this downtown Reading site later developed into a real-world

project based on the qualities of RE. This portion, with an area of five-and-a-half acres (as compared to the thirteen and odd acre downtown Reading site), was called the New Fobney Street Development (*Architect's Journal*, 1986, pp. 38-42). Earlier, two of the original team of five authors of RE, I. Bentley and P. Murrain, teamed up with a developer, C. Roche, and a project manager, H. Heron. When the smaller Fobney Street site came up for development as an open architect/developer competition, this new team seized the opportunity to design for the site. The team won the competition, and the borough council of Reading granted them detail planning permission for a housing development (fig 7.4).

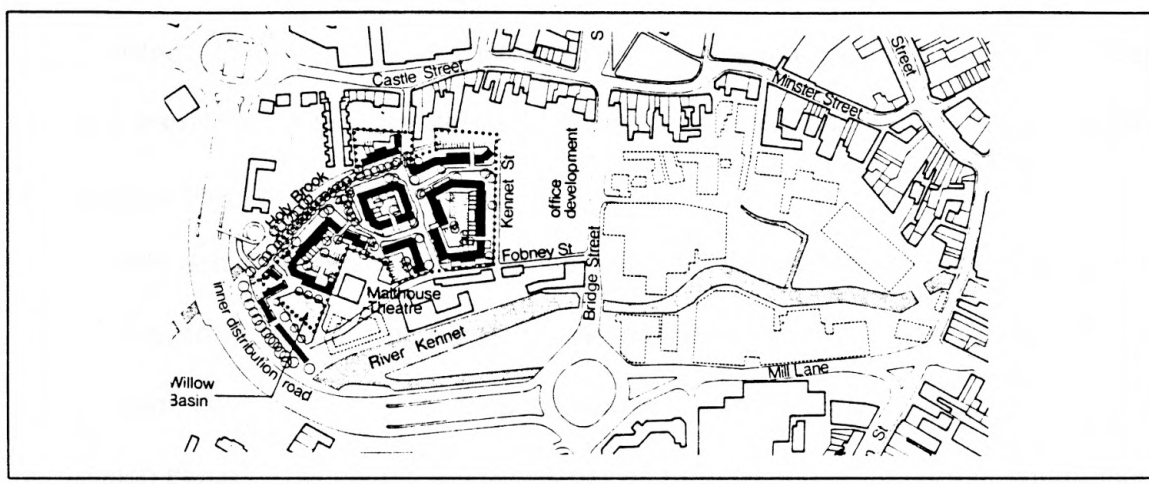


Fig. 7.4 New Fobney Street project

As mentioned above, the team used ideas in RE as the basis for the winning design. Thus, using an approach similar to the original Reading proposal, the design team first developed a permeable street and perimeter block system. The Reading borough council of engineers for the first time agreed to a street system that was different from the traditional cul-de-sac and mew system. The 179 houses and flats in the scheme formed 45 m- and 90 m-sided perimeter blocks. While the bigger Reading site had a design program which comprised a much larger development of offices,

shops, housing and leisure uses, the Fobney Street site didn't have such a rich mix of uses that create variety; it was a housing-only site (p. 38). While it is not clear why the competition brief called for only housing, the team still tried to create 'deliberate variety' by distributing various dwelling types throughout the terraces and varying building heights and elevational detail.

Since there was no variety in function, however, the floor space per dwelling unit had to be reduced in order to cope with development costs and developer's profit. At the same time, the design tried to provide good site value. Thus, robustness in the design was compromised because the possibility of future expansion of the dwelling units was marginalised. While there is little information about legibility in the scheme, it is clear that the visual character was derived from a 'very direct and explicit re-use of local architectural themes' (p. 38).

Although the designers--I. Bentley and P. Murrain--developed the scheme design, the drawings were produced by the developer--Roche. One success for the design team, however, was its continued involvement in the project beyond the planning permission stage. This helped the developer and the designers to correct each other's mistakes. For example, the design team came up with some ideas that were impractical, while the developer failed to apply enough richness in the design details, and so forth. Finally, though several compromises were made in the qualities that contribute to responsive designs, the Fobney Street development is nevertheless a successful project because it translates several ideas of RE into reality. The fact that it was implemented is proof that RE's ideas on design and implementation can indeed be carried out in a real-world project.

In conclusion, even though the NT and the RE teams fundamentally differ in their methods of implementation, both show certain strengths and weaknesses as discussed above. Discounting the practical problems, these methods, nevertheless, provide valuable insights into the workings of the urban design process. But it must be remembered that, overall, site, instrument and direction together contribute to actualization of the **Goal**, which is ultimately most important and the topic of the next chapter.

Chapter 8

THE GOAL OF NT AND RE

The **Goal** is the end result of an activity--its final aims and accomplishments. Moreover, the goal also relates to how the end result compares to the original vision. In that sense, the **goal** comes full circle. The process of urban design starts with a **goal**--a vision of what the ground should ultimately be. Through instrument and direction, the ground achieves that vision--a realization of the **goal**, which is the physical fabric reflecting the vision. Thus, in any urban design succesfully accomplished, the physical fabric is, at least ideally, the concrete manifestation of the **goal**.

NT set out to achieve the goal of *wholeness* in the San Francisco project. RE aimed for *responsiveness* in the Reading project. Since the physical fabric is the manifestation of the goal, the final designs of the two projects can reveal whether NT and RE in fact, achieved the goals--wholeness or responsiveness--set in the two projects, even though the projects were only conceptual exercises. Before discussing this however, it is useful at this point, to briefly recapitulate the qualities of urban environments that are either *whole* or *responsive*, in order to understand what NT and RE set out to achieve at the start.

Wholeness pertains to the harmonious integration of the various elements and processes in the city. That is, every act of construction and design should aim to produce *wholeness* in the city. Hence *wholeness* is the overriding principle, and the seven rules for producing it are derived from this understanding. These seven rules furnish the spatial and formal conditions required for *wholeness* to develop in urban environments. But in NT, Alexander is more absorbed with exploring the underlying spatial geometry of urban environments and hence, he is not explicit in describing the

human and experiential character of the urban environments that are whole--for example, the kind of streets, the activities, the uses and so forth.

Many ideas in NT, including the concept of wholeness itself, are however, recurring themes in CA's other books which explain these concepts in detail. In this regard, the first 94 patterns in *A Pattern Language* (1977), explicitly deal with cities and towns. Some of these patterns, like mosaic of subcultures (#8), scattered work (#9), web of shopping (#19), four-story limit(#21) and so forth, help in imagining the character of the urban environment that the San Francisco project would facilitate, at least ideally. They point to lively and dynamic urban areas where streets and public places are scenes of an ever unfolding drama of urban life, of informal social contact, of a rich mix of various cultures and so forth. Thus the patterns provide clues to the character of Alexander's vision of the urban environment

If we turn to RE, we note that Responsiveness in a city pertains to maximizing the degree of choices available to the users of an urban environment. For example, accessibility and physical proximity to needed amenities and so forth. The built environment should provide for these choices, particularly at a pedestrian scale--for example in the number of routes the resident or the user can take to get to places, close physical proximity to a variety of uses and so forth--in other words, a wide variety of uses to a wide variety of people.

Hence, multiplicity of choice to the user should dominate the design process, which is guided by the seven qualities that aid in developing responsiveness in an environment. These seven qualities clearly delineate the character of the physical environment that is responsive. For example, permeability, variety and legibility describe the nature of the streets and blocks, mix of uses and important landmarks in

the city and so forth. Consequently, a design that is responsive will help weave rich patterns and textures into the city fabric and will foster a vibrant city life. Thus, the key to urban life is not a geometrical order imposed from without, but a vibrancy that comes from within--the richness and variety of things going on that draws people, chance meetings on the streets and so forth.

From this discussion, it is evident that both wholeness and responsiveness, when translated in terms of the character of the urban fabric, speak of dynamic street life, activities on the sidewalks, rich mix of uses that draw in people during different times of the day, and so forth. Moreover, the character of the urban environment that these two works allude to is not only similar to each other's but is also remarkably similar to that of Jane Jacobs' influential characterization of the city (1960). Therefore, in this context, it is important to examine Jacobs' ideas of a dynamic city.

Jacobs observed that cities thrive on intricate economic and social concerns which are possible through close-grained diversity of uses that give each other constant mutual support. The components of diversity may vary, but they must support each other in concrete ways. This close-grained diversity is the life-force of cities and is clearly reflected in the dynamism of its streets: "Streets and sidewalks, the main public places of a city are its vital organs"(p. 37). Jacobs likened the intricacy of sidewalk use to the intricacy of a ballet where the individual dancers and ensembles with distinctive parts miraculously reinforce each other and compose an orderly whole.

The above discussion demonstrates that NT and RE too seek similar qualities in the physical fabric of cities. Further, as discussed earlier in Chapter 1, the introduction to this thesis, many of NT's concepts are similar and compatible to those of Jacobs', while RE's ideas on street life, providing choices to the users and so forth, are directly

adapted from Jacobs. Because Jacobs' ideas are an important set of common threads running through the two works, her four criteria for establishing a lively city can provide a framework for evaluating the goals of NT and RE. These four criteria, or "conditions" as she calls them, combine together into a dynamic city fabric. These conditions are:

1. **Mixed primary uses:** Primary uses are those which themselves bring people to a specific place because they are anchorages. Every urban district should have at least two or more primary functions so that different businesses can sustain each other and draw people onto the streets at different times of the day ensuring continuous activity on the streets. Primary uses further generate secondary uses which are the enterprises that grow in response to primary uses and the people that primary uses draw. Together these generate diversity in cities.
2. **Small blocks:** Blocks must be short and should range between 200 ft to 400 ft. Short blocks provide opportunities for frequent streets and corners in streets. Further short blocks with good street frontages will increase feasible spots for commerce, thus, generating secondary uses. Like mixtures of primary use, frequent streets are effective in generating diversity. Thus, short blocks are valuable because of the fabric of intricate cross-use that they permit among the users of city neighborhood.
3. **Aged buildings:** There should be a good mix of buildings in urban districts that vary in age and condition, including plain, ordinary, low-value, old and even rundown buildings. This is because, if a city area has only new buildings, the enterprises that can exist there are automatically limited to those that can support the high costs of new construction. Hence every district needs buildings with high, middling, low and even no yield to support diversity.

4. **Concentration:** The presence of large numbers of people gathered together in cities is a source of immense vitality. While proper densities cannot be abstracted into numbers, densities are too low, or too high, when they frustrate city diversity instead of abetting it. Densities can, however, be gauged in number of dwellings per acre. An average of less than 100 dwellings per acre leads to a fall in the vitality of a district. Jacobs suggests that 125 to 200 dwellings per acre is good density, but more than 275 dwellings per acre would be too high.

In summation, these four criteria together are crucial to the growth of dynamic urban environments. Since the goal of both the San Francisco and the Reading projects is to achieve dynamic and well balanced urban environments that are whole or responsive, Jacobs' four criteria can help evaluate whether these two projects succeeded or failed in achieving a desired physical fabric of the city. Therefore, the two projects will be examined and compared using Jacobs' four criteria. In the following section, the San Francisco project will be discussed first, followed by the Reading project.

MIXED PRIMARY USES

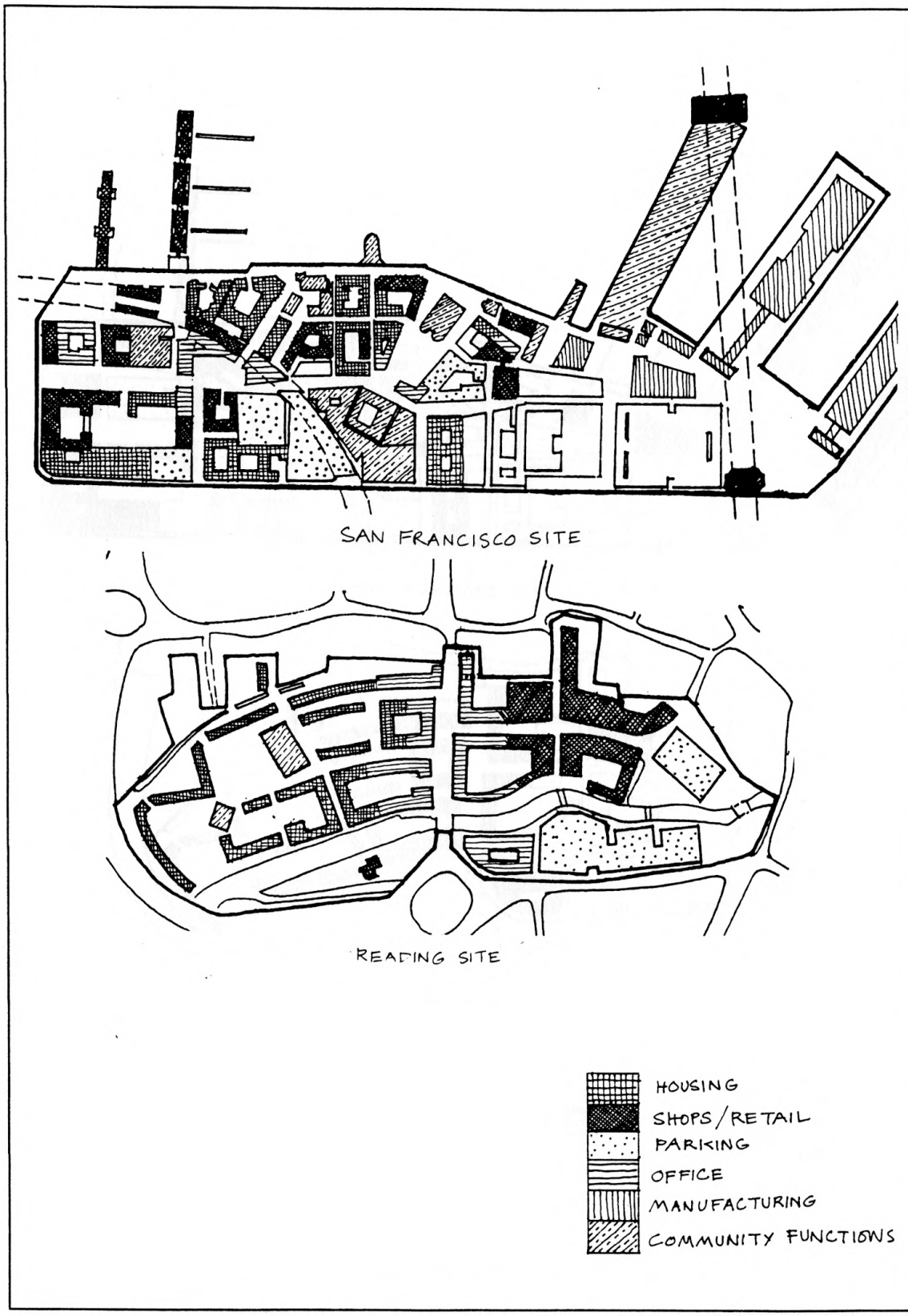
As a first step in studying the mix of primary uses in the two projects, three maps each were drawn for the San Francisco and the Reading layouts (maps 1-3). Map 1 shows the distribution of various categories of uses such as housing, offices, shops and so forth. Map 2 shows the distribution of overall primary versus overall secondary uses for the layout as a whole. Finally Map 3 shows each of the primary uses by specific functions and overall secondary uses together. These three maps furnish the basis for the following discussion of the mix of uses in the two projects.

Maps 1 and 3 indicate that the San Francisco project has four clearly identifiable primary uses: housing, offices, hotels and manufacturing. These four primary uses are

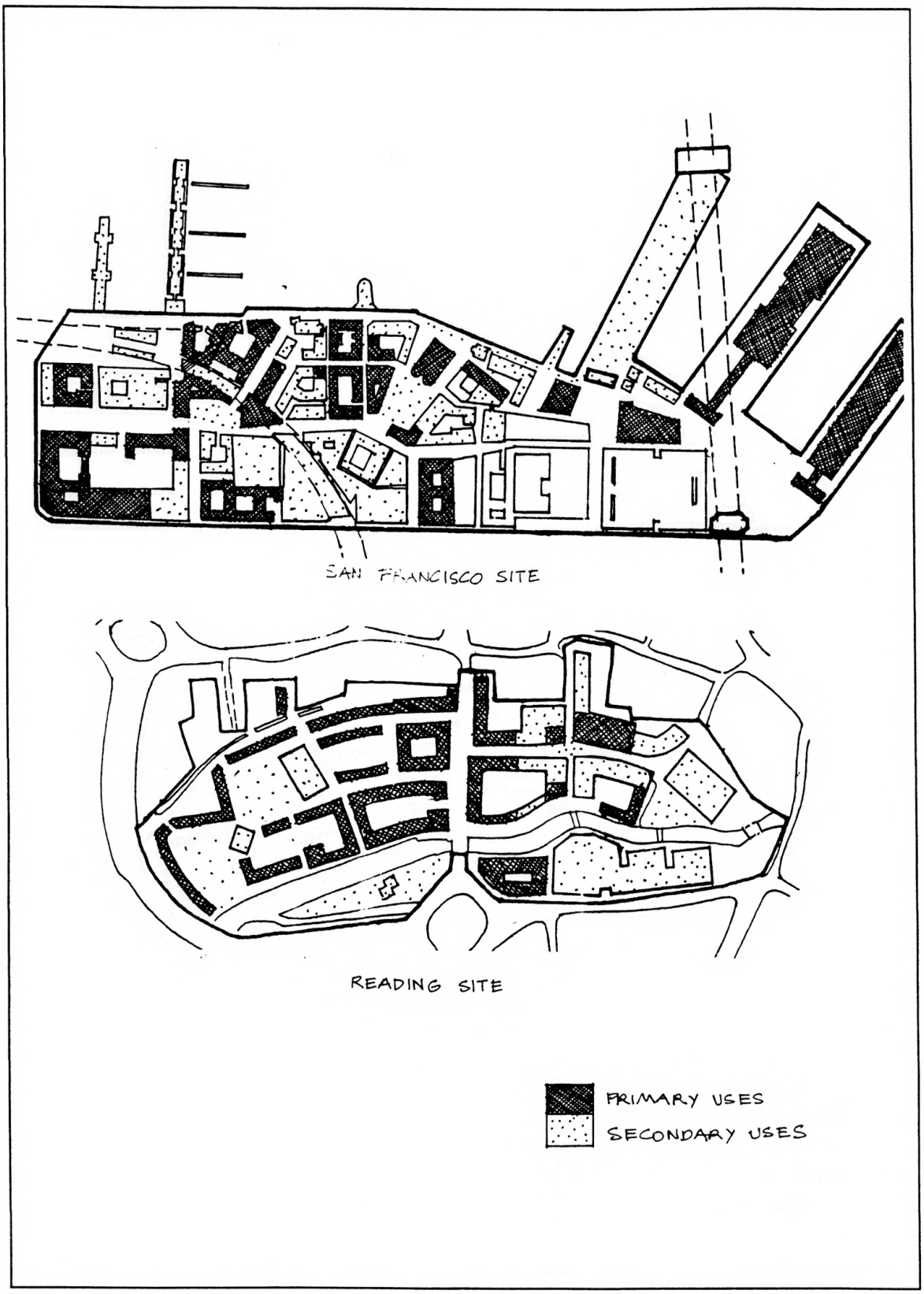
supported by a wide variety of secondary uses like a cafe, restaurant, bakery, car repair shop, gallery, gymnasium, and so forth. Overall, the various land uses are categorized as follows: primary uses--housing 26%, offices 16%, hotels 5% and manufacturing 12%; secondary uses--shops and restaurants 7%, parking 19%, and community functions 15%. Housing, which is a primary use, accounts for the highest land use in the project. Further, housing, offices, hotels and manufacturing--the four primary uses--combined together account for 59% of the total land uses.

These figures indicate that the San Francisco project has more than one primary use to generate diversity within the urban district that it seeks to create. But as Jacobs emphasizes, mere presence of primary uses does not guarantee diversity. These primary uses need to ensure the presence of maximum numbers of persons at different times on the streets to sustain the diversity of the district. In the San Francisco project, several streets and the uses located on these streets in the site were studied to check for the presence of people at different times. Map 1, for example, indicates that the major street running to the main square has commercial, housing, offices, parking, and community functions; there is even manufacturing at the far end of the site. The housing, offices and the hotel act as primary anchors drawing people to this street, which is further enlivened by secondary uses like parking, car repair shop, a theater, and so forth. Together, these different functions would ensure the presence of office and manufacturing workers in mid-afternoons and residents and shoppers in the evenings, Saturdays and Sundays. Thus, the uses along the major street running up to the main square qualifies as a generator of diversity.

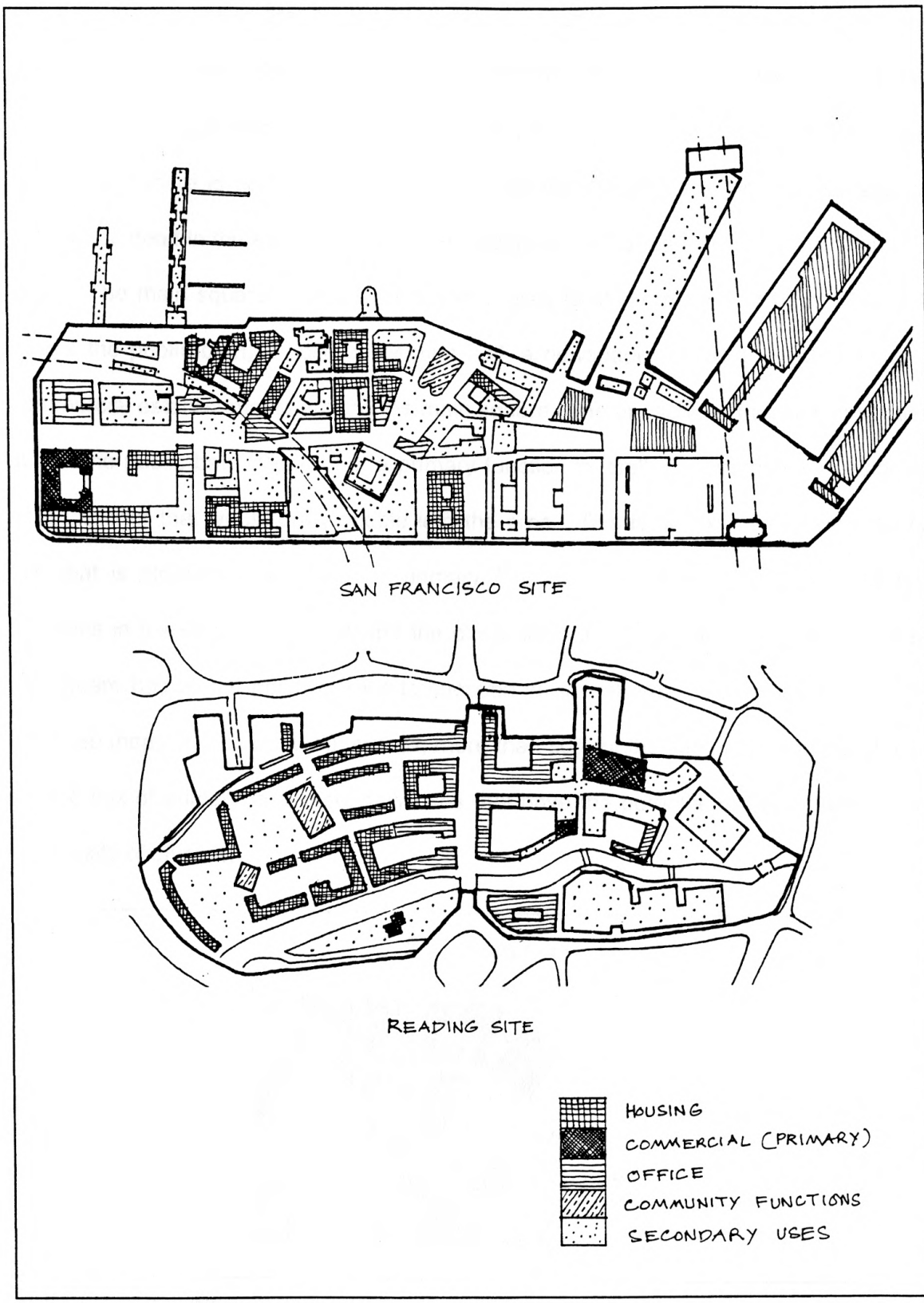
Yet this cannot be said of the far end of the same street beyond the Main Square because the design mix is less well worked out in this part of the site. This



Map 1 Distribution of various uses



Map 2 Overall primary uses vs. overall secondary uses



Map 3 Primary uses by specific functions vs. overall secondary uses

can turn into a problem area because there is an insufficient mix of functions. There are a few manufacturing units scattered here and there, away from the street, but without the presence of any other primary or secondary use (see Map 2.). Once the units close for the day, there is no other activity to draw people to this area. Hence this area is likely to be dead in the evenings, nights and weekends as far as activity is concerned.

The main square, however, is a useful area to study the mix of uses. Fig. 8.1 shows the public bath, a political meeting hall, a newspaper building, residences and commercial establishments around the main square. One unusual feature of this square is that the public bath, though not a primary function in itself, is nevertheless designed as an anchor that would draw people into the area. This is an example of secondary use that is strong enough to be a primary function in itself. Together, the different functions in the square ensure round the clock presence of people in the area. Thus, the square has all the positive traits to succeed as a vital urban district. In short, from the three maps, it is evident that overall, more than 80% of the site is well balanced with a good mix of primary and secondary uses that have the potential to generate enough complexity of diversity.

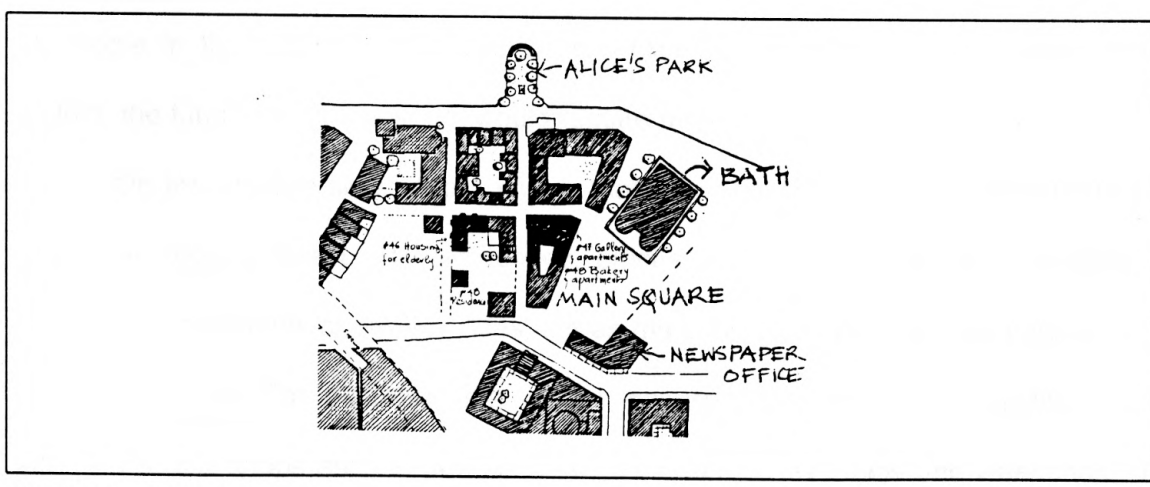


Fig. 8.1 The main square

In the Reading project, map 1 and map 3 indicate two clearly identifiable primary uses: housing and offices. These two primary uses are supported by a good variety of secondary uses like shops, pubs, sports hall, theater and studio, and so forth. Overall, the various land uses are categorized as follows: primary uses--housing 14%, offices 35%; secondary uses--parking 30%, community functions 6%, and shops and restaurants 14%. Offices account for the highest land use in the project. Further, housing and offices--the two primary uses--combined together account for 49% of the total land uses.

The figures above indicate that the Reading project too has two primary uses--housing and office--to generate diversity within the site. But as discussed in the San Francisco project, it is important to consider if the presence of these primary uses is sufficient to ensure the presence of the maximum number of people at different times on the streets. To begin with, from map 1, the uses on the main street on the site--Bridge Street--can be examined. Bridge Street is a predominantly office-use street with a little sprinkling of houses and shops. Though this street would be busy on weekdays and afternoons, there do not seem to be enough houses and shops to ensure large number of people in the evenings and weekends. Thus, in order to become a more lively district, the functions on this street would require more shops and residences.

On the positive side, Map 1 shows that Courage Street with offices and shops, and New Fobney Street with residences, offices and a sports hall are examples of streets with a rich mix of primary uses, act as magnets to draw people and support the secondary uses. For example, the offices ensure the presence of people in the afternoons, the shops and residences draw people in the evenings and weekends. All the various functions together ensure the presence of large number of people at

different times of the day all through the week. Several other streets that are similarly designed and are thus successful in achieving a rich mix of uses are Holy Brook Street and Oracle Street. The Malt House Square and the Triangle, the major public areas of the Reading project, are also well designed to succeed as dynamic areas with good primary anchors and secondary uses (map 2 & 3).

On the other hand, the edges of the site present a cause for concern. This is because the blocks along the edges of the site do not effectively link to the surroundings. Instead, most of these blocks turn inward to the site with only parking as the main function along the edge. Therefore, particularly in the eastern part of the site, there is no activity to draw people. Moreover, as map 1 indicates, the pedestrian access was deliberately closed to protect the privacy of the 'almshouse'--a historically important existing building on the site. Further, along the southwestern edge beyond River Kennet, there are no streets to link the site to the surroundings. However, as map 1 clearly shows, there is much more effective street linkage to the northern and eastern edges of the site, and these links draw people from the surrounding areas into the shops, retail outlets and parking areas located here. In summation, major parts of the Reading site, barring the edges, have a good mix of uses with potential to grow into lively urban districts.

From the above discussion, it is evident that both the San Francisco and Reading projects incorporate mixed uses in a manner prescribed by Jacobs. An interesting observation is that both projects chose remarkably similar components for diversity--housing, offices, shops and retail outlets, community functions, parking and so forth--though the components varied in their proportions. Comparatively, the San Francisco project is more differentiated in its mix than Reading. For example, almost

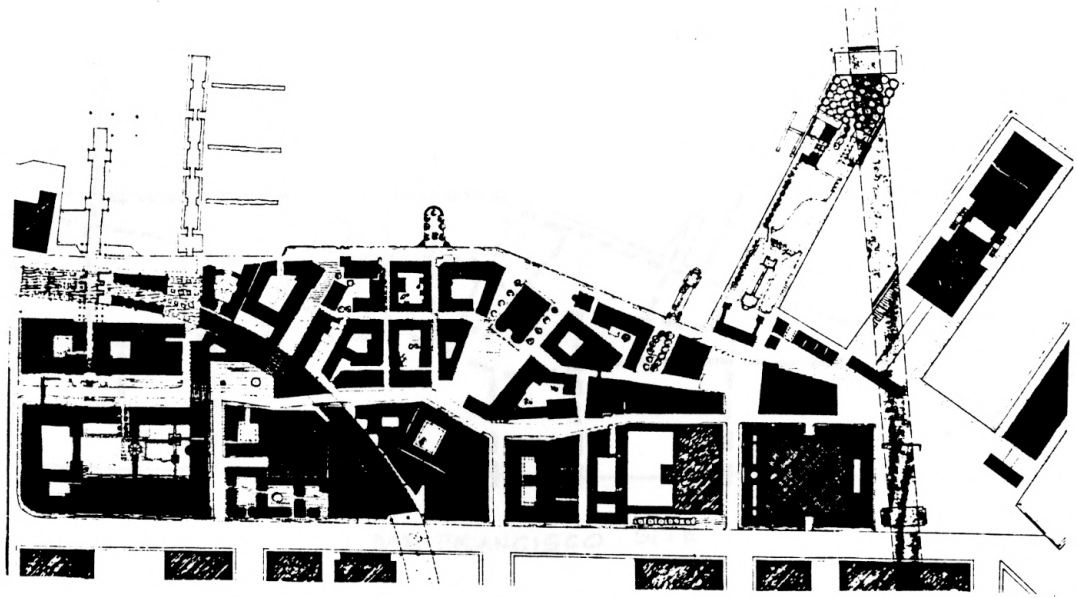
every block in the San Francisco project incorporates three or four uses. While the Reading project has three mixed-use blocks, most other blocks have only one function--housing, offices and so forth. However, the important point is that both projects achieve a good mix of primary and secondary functions overall.

SMALL BLOCKS

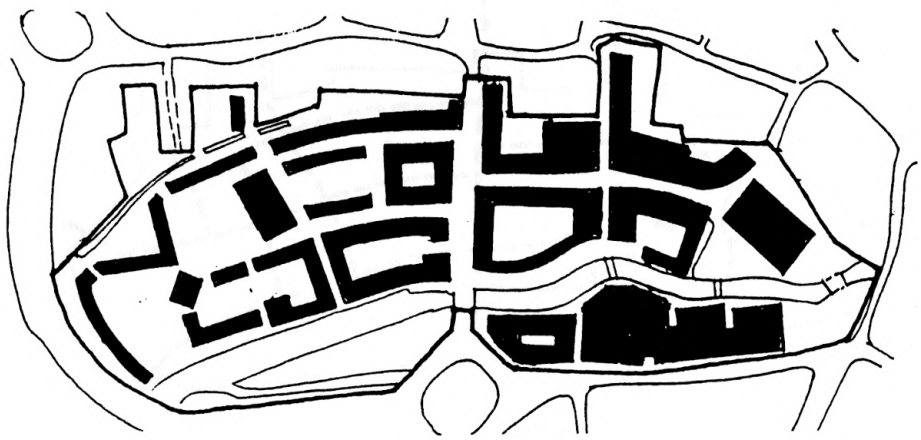
In order to study the street/block system in the two projects, two maps each were drawn for the San Francisco and the Reading projects. Map 4 highlights block patterns of the two sites, and map 5 highlights the street networks. These two maps furnish the basis for the following discussion of small blocks for the two projects.

In the San Francisco project's final layout, there were ninety projects. As map 4 indicates, though the NT design process does not seek to specifically create blocks, three or four buildings were grouped together and, thus, developed into small blocks. Most blocks on the site are small and average 150 ft. to 200 ft. in length, compared to the surrounding city blocks which are around 500 ft. in length. Because of this, what would have been a single block in the city's traditional plan is now divided into at least two or three blocks. However, there are two long blocks encompassing the hotel, garden and parking block to the right of the gateway. These long blocks are around 400 ft in length.

Map 5 shows the street pattern created by the small blocks of the San Francisco project. Comparatively, there are more streets in the new layout than in the earlier street plan of the site. These streets are narrow and more pedestrian than vehicular and link the site very well to its surroundings as can be seen in map 5. For example, compared to the earlier street plan, where only three streets opened into Spear Street that runs along the northeastern edge of the site, five streets open into Spear in the final design.

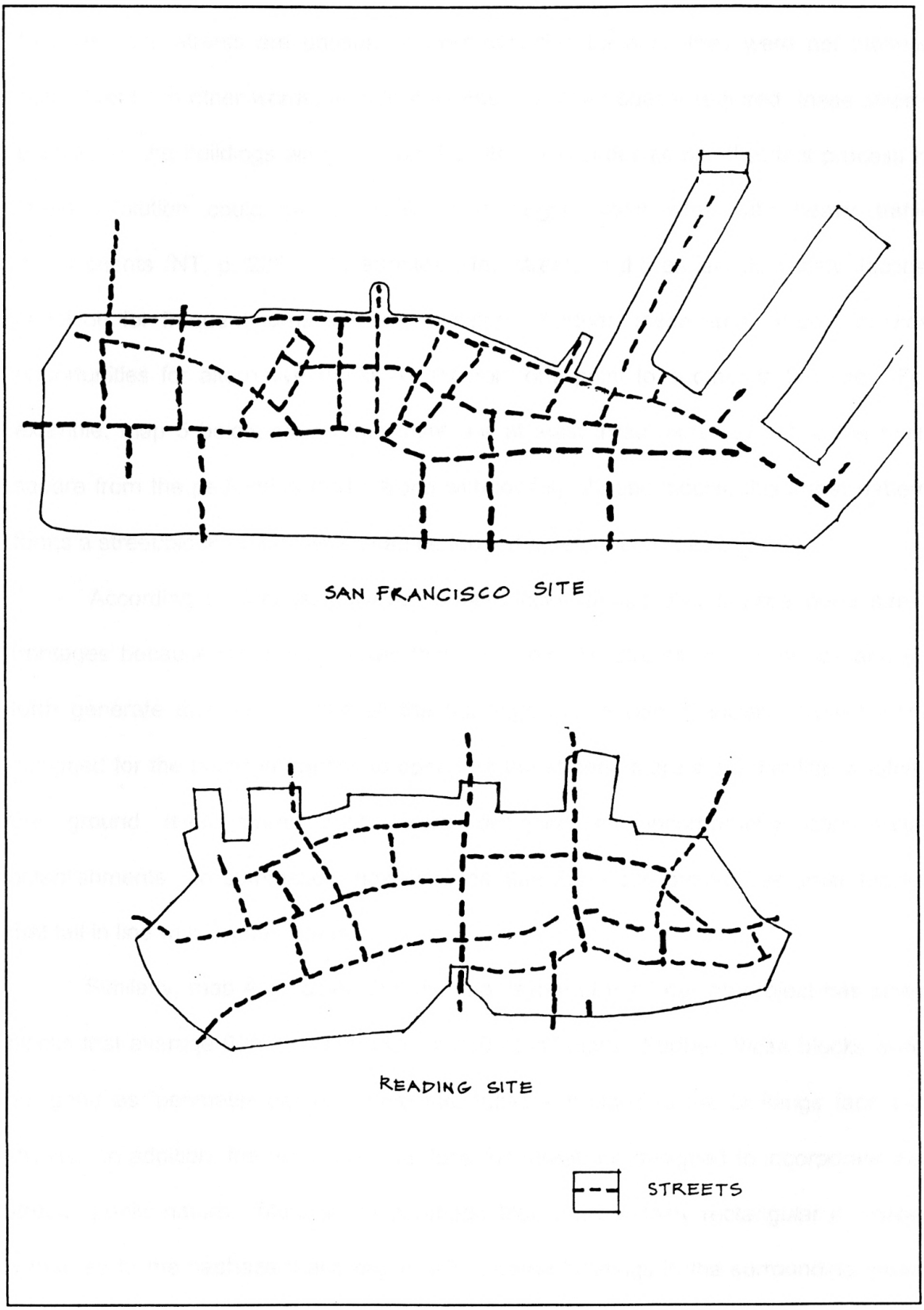


SAN FRANCISCO SITE



READING SITE

Map 4 Pattern of blocks



Map 5 Street networks

However, the streets are unusual in their evolution because they were not planned beforehand. In other words, as rule # 4--Positive urban space--required, these streets evolved as the buildings were built on the site. Alexander admits that this process of street evolution could cause problems in larger urban sites with heavy traffic requirements (NT, p. 238). Nevertheless, the streets in the project do satisfy Jacobs' condition for frequent turns and intersections. Further, these small streets provide opportunities for alternative routes to get from one point to another in the site. For example, map 5 below shows that there are at least three routes to get to the main square from the pedestrian mall. Along with loosely shaped blocks, this street pattern forms a street/block system which can be termed a deformed organic grid.

According to Jacobs, however, small blocks should also provide good street frontages because small enterprises that open into the streets, corner shops and so forth generate diversity. While all the buildings in the San Francisco project were designed for the public entrances to open into the streets, there is no mention whether the ground level street fronts were designed for incorporating commercial establishments. In summation, however, the San Francisco project has small blocks that fall in line with Jacobs' ideas.

Similarly, map 4 indicates that the final layout of the Reading project has small blocks that average 90m to 100m (300 to 330 ft) in length. Further, these blocks were designed as 'perimeter blocks' where the public entrances to the buildings face the streets. In addition, the elevations that face the street are designed to incorporate the streets' public nature. Most of the perimeter blocks are loosely rectangular in shape compared to the haphazard and organically ordered buildings in the surrounding areas of the site.

As can be seen in map 4, the Reading blocks naturally give rise to a street system that is more efficient compared to the surrounding areas. This is because the streets provide a very good choice of alternative routes for users traveling within the site. For example, fig. 8.2 below shows that most points in the site can be reached by at least two alternative routes. Further, map 5 indicates that the streets also link the site to its surroundings on its northwestern and northeastern edges. However, on the southeastern edge beyond River Kennet and the southwestern edge, there are virtually no streets opening into the major inner distribution road. This somewhat dilutes the permeability of the internal streets and areas along these portions of the site. Overall, the Reading project's small blocks create a system of streets with many intersections and nodes, which all together form a relaxed orthogonal grid.

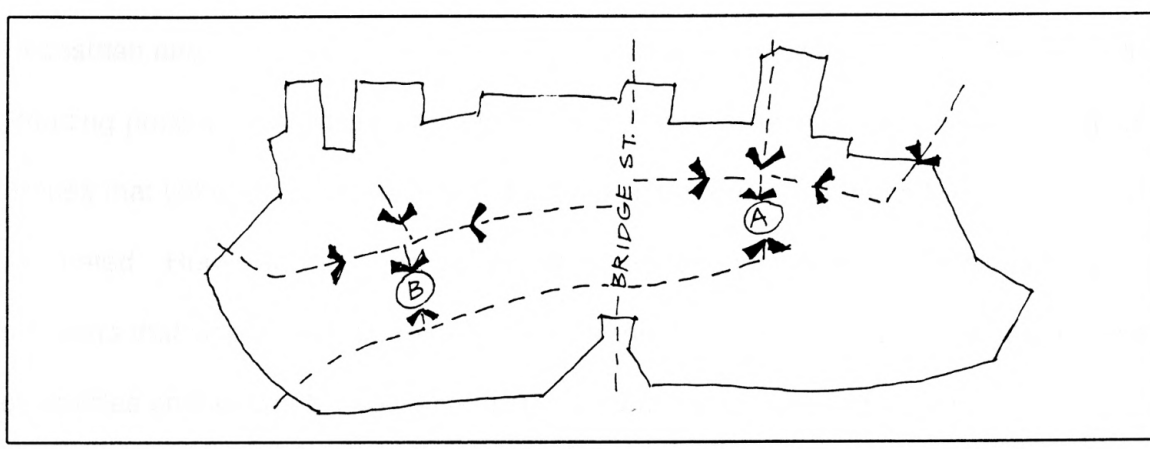


Fig. 8.2 Alternative routes for various points on the site

As discussed in the San Francisco project, small blocks should also contribute to street frontage. The various blocks in the Reading project, as already mentioned, were designed as perimeter blocks which naturally lend themselves to good street-building linkages. The groundfloor-level fronts are especially designed to incorporate shops, restaurants and retail outlets along with the public entrances to residences, offices and

so forth. Thus, in summation, the small blocks of the Reading project incorporate all the qualities prescribed by Jacobs.

From the discussions above, it is evident that both the projects have small blocks that average around the same length of 300 ft, in between Jacobs' measure of at least 200-400 ft blocks. It is interesting that, with a totally different set of rules, and different methods of implementation, the final designs show a remarkable similarity with respect to small blocks in terms of average length. While the San Francisco site does have most of its buildings' public entrances opening into the street, the blocks, however, may not be as efficient as the perimeter blocks of the Reading project, which provide good street frontages, at least at the ground level, so that there will be generated a healthy amount of secondary uses. Again, the streets of the San Francisco project are mostly pedestrian and do not integrate vehicular use whereas most streets, barring a few in the Reading project, are designed for both vehicular and pedestrian use. While Alexander argues that vehicles and pedestrians don't mix, RE argues that these two should not be separated. However, this is an issue that has its opponents and proponents. Jacobs suggests that where conflicts exist between traffic flow and other city uses, the number of vehicles on the streets should be restricted. But the argument goes on.

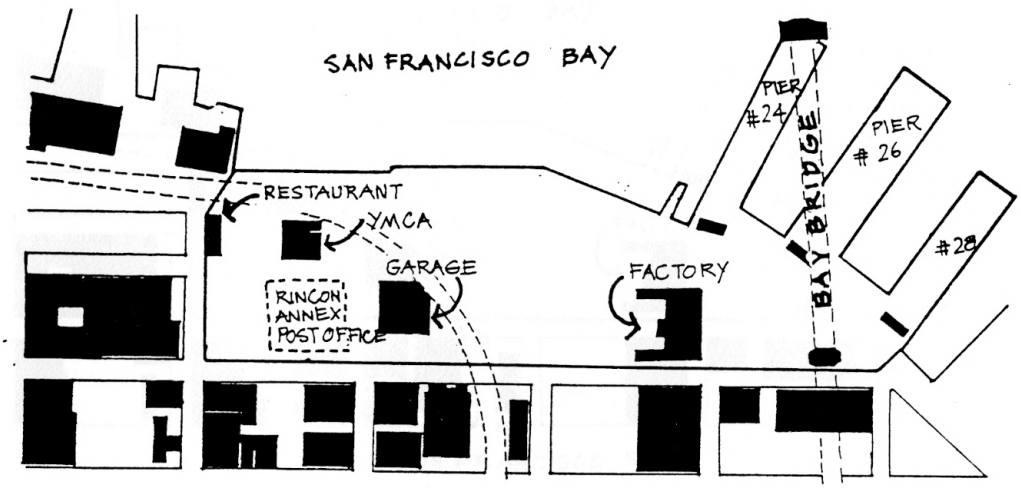
Finally, while Jacobs advocates small blocks, Peponis (1989) cautions that small block designs can be associated with under-used public spaces when not integrated into their larger context. Both the San Francisco and Reading projects have taken care of this point very well in their design. The public spaces of both the San Francisco and the Reading projects, as discussed earlier, are well connected to primary use areas incorporating various points of interest. Overall, both projects have a nice amount of small blocks that fall well in line with Jacobs condition.

AGED BUILDINGS

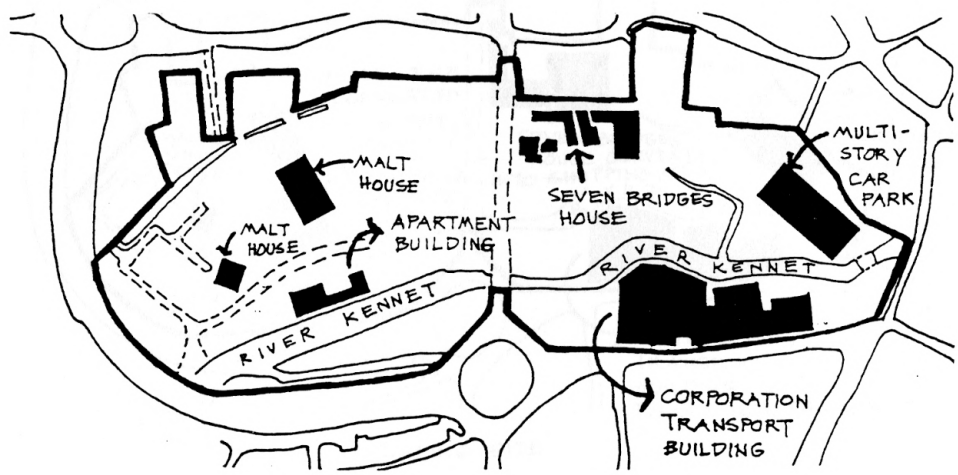
In order to study the buildings for their age and condition in the two sites, two maps were drawn. Map 6 shows the existing buildings at the beginning of the two projects in the San Francisco and the Reading layouts. Map 7 shows existing buildings that were renovated or redesigned in the final designs. These two maps provide the material for discussion in this section.

There were several existing buildings on the San Francisco site at the beginning of the project. Map 6 shows various existing buildings like the YMCA, the Hills Brothers coffee factory, a cafe at the entrance to the site, and a few old buildings to the center of the site. Some buildings like the YMCA and the Hills Brothers Coffee Factory were neither redesigned for a different use nor were they demolished in the design but were simply left intact. Unfortunately, Alexander does not explain whether these blocks became important elements in the master design. Map 7 shows that other buildings like the cafe at the entrance to the site still retains its function as a coffee shop. Map 7 also indicates that another building close to the smaller square was redesigned into an apartment building.

However, given the ninety projects that were designed for the site and the seven buildings that already existed on the site, the final design does not even have 1% of old buildings incorporated into its design scheme. But this does not mean that the San Francisco project does not reflect Jacobs' ideas on this issue. In fact the economics of old and small buildings is discussed at length in Alexander's Oregon Experiment (1979), though in this work, he tackled this issue from a different angle which is discussed next.

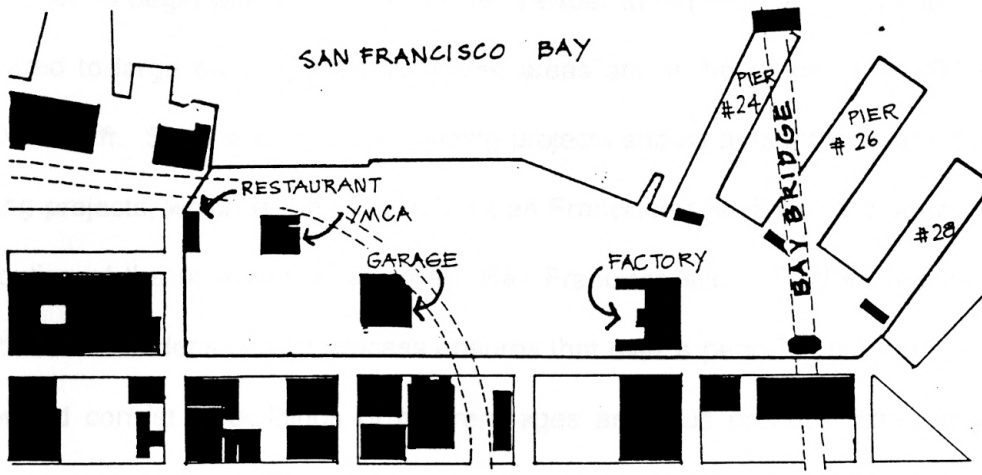


SAN FRANCISCO SITE



READING SITE

Map 6 Existing buildings at the beginning of the projects



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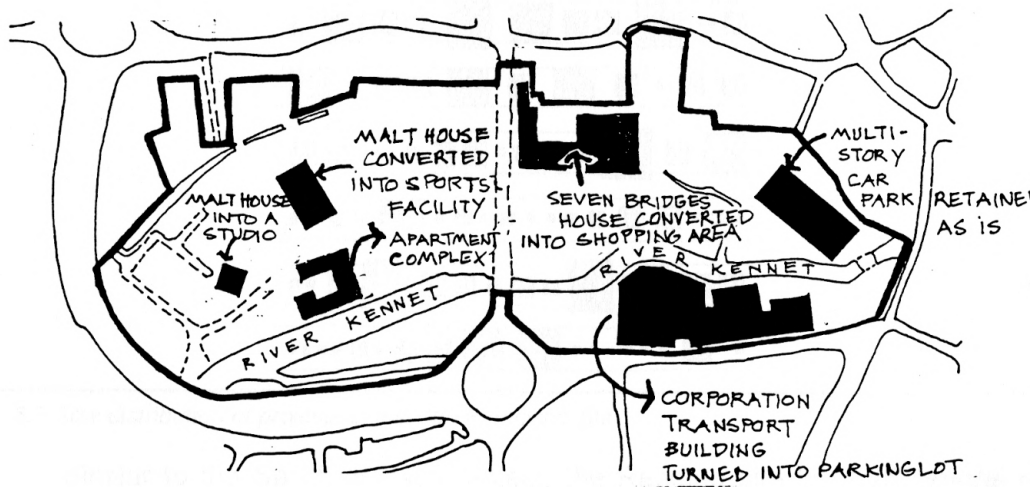


READING SITE

Map 7 Redesigned/ Renovated buildings

While Jacobs proposed that there should be a good number of aged buildings in order to withstand the high rents caused by new construction, Alexander proposed that there should be more small building projects--around 1000 sqft in area--which need small funds to begin with and which will be cheaper to maintain and repair as they age, compared to large building projects whose areas are in the range of 10,000 sq. ft to 100,000 sq. ft. Small and medium building projects should amount to nearly 50% of all building projects, which is the case in the San Francisco site (figure 8.3 shows the size distribution of the ninety projects on the San Francisco site). Further, the piecemeal-growth of Alexander's design process ensures that over a period of time, a given urban site would consist of buildings of different ages and thus produce different yields, a concept which is very similar to Jacobs' ideas. For example, the first projects--the gateway, hotel and so forth--are nearly five years older than the last few projects like the electronic factory, health clinic and so forth.

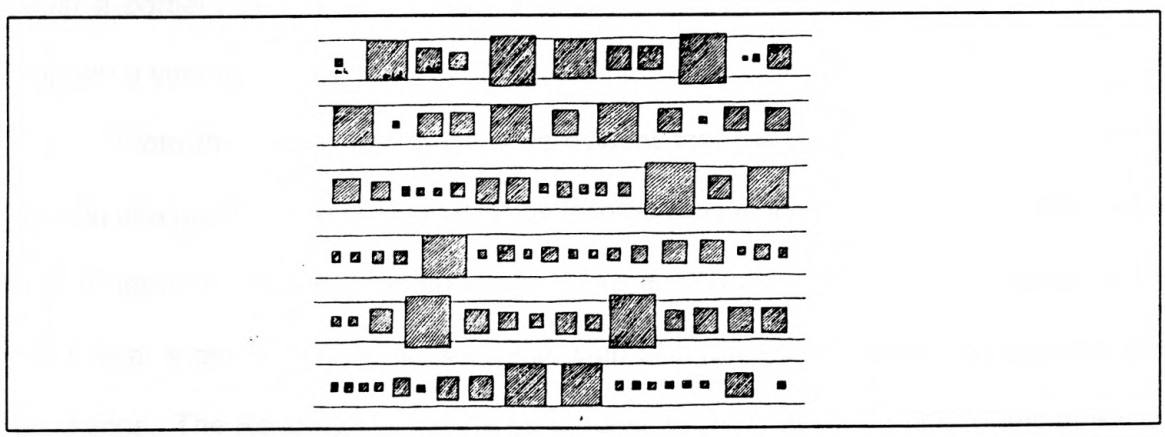


Fig. 8.3 Size distribution of projects in the San Francisco site

Similar to the San Francisco project, the Reading site too had several existing buildings at the beginning of the design process. Map 7 shows the existing buildings: the Malt House, the Seven Bridges House, the Transportation Depot building, the multi-story car park and several houses along the Kennet River. Map 8 shows that almost all these buildings were incorporated into the design: the Malt House was converted into a

Sports Facility and another of its buildings renovated into a theater and a studio. Similarly, the Seven Bridges House was redesigned to become an office building, while the Transportation Depot building was converted into a multi-story car park and the other car park was retained as is. The houses along the river were converted into apartment blocks. Thus, the Reading project has several older buildings included into the design.

The underlying idea in the Reading project for incorporating existing buildings in the site comes from Jacobs herself who argues that "large swatches of construction built at one time are inherently insufficient for sheltering wide ranges of cultural, population, and business diversity" (Jacobs,1960, p. 238). This idea issues a warning, particularly in the case of the Reading project, where most construction takes place in one single swoop. Thus, the several old buildings incorporated in the design bring in at least a partial mix of building ages and conditions, generating a variety of rents that support a variety of uses.

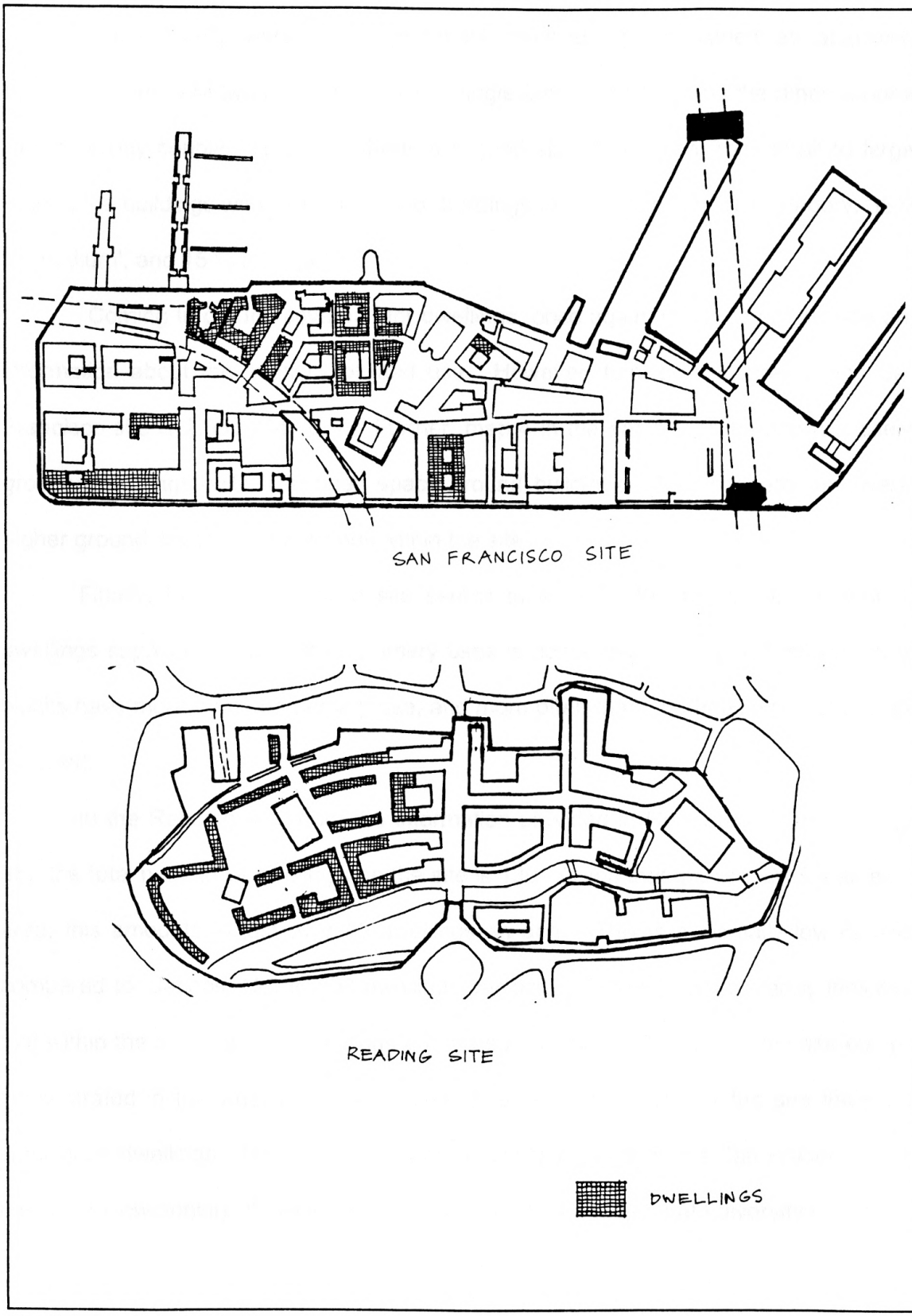
From the above discussion, it is evident that the San Francisco project, while lacking in a good number of old buildings incorporated in the design, nevertheless works well in terms of Jacobs' third condition. This is because the piecemeal growth lends itself, over a period of time, to the generation of buildings of different ages, sizes and conditions. The Reading site, on the other hand, incorporates a number of old buildings that have been converted to new uses. Both projects, in the final analysis, have a good measure of buildings that vary in age and condition. Thus, they are relatively successful, though probably the building ranges are not as fully varied as Jacobs herself would wish.

CONCENTRATION

In order to study the two sites for concentration, map 8 was drawn to show the dwellings in the two layouts. While the map does not indicate the number of dwellings or the built-up area of dwellings in the two sites, it clearly shows the distribution of dwellings within the two sites, information which is helpful in understanding the concentration of dwellings when supported by additional numerical materials.

NT provides very little information about the number of dwellings in the San Francisco project. Map 8 further indicates a thin spread of dwellings throughout the site. While there are about 25 apartments and residential buildings in the final layout, the total number of dwellings in these apartments cannot be determined from the information provided in NT. However, what is known is that housing accounts for 26% of the total built-up area which is 2,660,284 sq. ft. Thus, the built-up area for housing amounts to 687,130 sq. ft. Given that the San Francisco site has an area of 30 acres, the built-up dwelling area amounts to 22,904 sq. ft per acre. Even assuming a lower average dwelling area of 800 sq. ft, the ratio of number of dwellings per acre works out to approximately thirty to thirty-five dwellings. Compared to Jacobs' suggested 125 to 200 dwellings per acre, this is a very low number. Thus, in terms of Jacobs, the San Francisco site does not have enough dwellings to provide the number of people sufficient to generate and sustain diversity.

Apart from the number of dwellings itself, Jacobs emphasizes varieties in dwellings (single family houses, houses with flats, tenements, all kinds of apartment houses and so forth) and high ground coverage (in other words, intensive land use) and, finally, dwellings supplemented by other primary uses. In the San Francisco site, there



Map 8 Concentration of dwellings

is not much variety within dwellings; most dwellings are designed as apartment buildings. There are two residences, one a single-family structure and the other, a home for an elderly couple. However, there is a good size distribution from small to large, among the buildings with at least 50 % of buildings falling into the 'small' category, 35 % in 'medium', and 15 % in 'large'.

Coming to ground coverage for dwellings, once again, NT does not provide any information about the intensity of land use. However, total built-up area in the San Francisco site is 2,660,284 sq. ft. Further, map 4 in the earlier section shows closely-grouped buildings, with little open space around buildings. This suggests an overall higher ground coverage of buildings within the site.

Finally, the San Francisco site seems to work as far as Jacobs' criterion of dwellings supplemented by other primary uses is concerned. As fig. 8.4 shows, most blocks have more than one primary use, and more often than not, housing functions are included.

In the Reading site, from the information provided in RE's design sheet 2.4 (p. 38), the total number of dwellings on the site is 130. Given that the site is 13.8 acres in area, this amounts to just over 10 dwellings an acre. This is a dismally low number compared to Jacobs' 125 to 200 dwellings per acre. Further, map 8 clearly indicates that within the site itself, the dwellings are not spread evenly throughout the site but are concentrated in the western portion. Therefore, in certain parts of the site there are virtually no dwellings. Therefore, the Reading site too, similar to the San Francisco site, has a very low density of dwellings that cannot work well to generate diversity in a city.

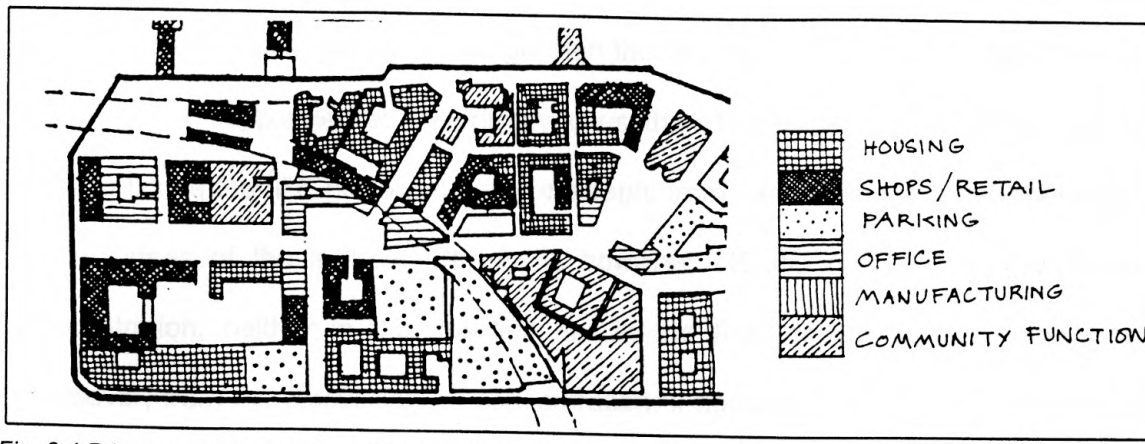


Fig. 8.4 Primary uses in the blocks of the San Francisco site

As far as variety within the dwellings is concerned, almost all the housing provided is apartments. There is no single-family housing or any other kind of housing. And it cannot be determined if there is variation in the sizes of these apartment blocks as is the case in the San Francisco site, because RE does not provide any information. Similarly, there is no information about the ground coverage or intensity of land use. However, similar to the San Francisco site, the built-up area of the Reading site is 1,306,800 sq ft. Map 7 shows more open spaces around buildings than in the San Francisco site. Altogether this suggests a relatively lower ground coverage and lower intensity of land use.

As mentioned above, the final criterion of Jacobs' is dwellings supplemented by other primary uses. While within the site, overall, there is a good mix of primary uses, as map 8 shows, most housing is concentrated in the western portion of the site. There are three blocks in the site that have a mix of uses. The rest all have only one function like housing, offices, shops and so forth. Thus, primary uses do not supplement each other evenly throughout the site.

From the above discussions, it is evident that both sites have very low dwelling densities and little variation in the type of dwellings. However, the San Francisco site

has seemingly higher ground coverage than the Reading site. Also, the San Francisco site is better supplemented by primary uses than the Reading site. One important observation is that RE borrowed many concepts from Jacobs and adapted these to the design ideas of the authors. Strangely, however, RE did not take up the issue of concentration, neither in the qualities nor in the final design of the Reading site. Moreover, from the discussion on concentration, it appears that the San Francisco site better falls in line with Jacobs' ideas more than the Reading site does. Overall, however, both San Francisco and Reading projects do not well satisfy Jacobs' fourth condition for lively cities.

In summation, the Jacobs' four conditions for lively cities provide a analytical platform for discussing whether or not NT and RE achieved their goals of wholeness and responsiveness. From the discussion, it is evident that there were both successes and weaknesses in the design processes of the San Francisco and Reading sites. The relative successes and weaknesses will be discussed in the final chapter which follows.

Chapter 9

CONCLUSIONS

As chapters 5-8 have demonstrated, the four sources of the tetrad for urban-design activity--*ground*, *instrument*, *direction*, and *goal*--provide a common platform for the comparative study of NT and RE and a way to juxtapose the similarities and contrasts of the two approaches. The discussion in chapter 6--***instrument***--centered around the issue of how the rules of NT and the qualities of RE contributed to the design process. The comparative study highlighted certain similarities and differences between NT and RE pertaining to the design process. Chapter 7--***direction***--centered around the issue of the practical methods of implementation of the resulting designs and demonstrated fundamental differences in the methods of implementation of the two approaches.

The final source of the tetrad--***goal***--discussed in chapter 8, was an evaluation of the end designs of the two sites of San Francisco and Reading, based on Jane Jacobs' (1961) four criteria for successful cities--primary mixed uses, small blocks, aged buildings and concentration. This chapter brought to light the many similarities in the final designs of the San Francisco and Reading sites with respect to the four criteria, despite the fact that there were many differences with respect to design and implementation.

In the end, the discussions in chapters 5-8 demonstrate that the final designs of the San Francisco and Reading sites are the result of different design and implementation processes. It appears, then, that successful design, at least ideally, involves the processes of design and implementation combining to achieve practically, the original goals in terms of which the approach was framed. Extending this notion, a

successful urban-design approach is strongly developed in two dimensions: (1) the theory contributing to the design process, (2) a practically feasible method of implementation. In light of these two aspects, therefore, this chapter examines the relative strengths and weaknesses of NT's and RE's processes of design and implementation as revealed in the final designs of the San Francisco and the Reading sites. The chapter examines the following issues:

(1) the contribution of the rules and qualities to the design process;

(2) the methods of implementation;

For each of these two issues, the discussion begins with NT and then discusses RE.

THE CONTRIBUTION OF RULES AND QUALITIES TO THE DESIGN PROCESS

NT developed seven rules to create wholeness in urban environments. As chapter 6--instrument--demonstrates, these seven rules contribute to various aspects of urban design, beginning with the layout of the site, the continuing process of design on the site, the public spaces and their relationship to the surrounding buildings, the street patterns and parking, the geometrical nature of wholeness, and the style of architecture of the individual buildings. The rules, therefore, cover a comprehensive range of variables in the urban design process.

One of the strong points of NT's design process is the emphasis on piecemeal growth, an idea which is radically different from most prevailing planning concepts. The piecemeal-growth process seeks to integrate various stages within the broad field of urban design into one single process. Thus, every act of building should have wholeness as the single aim. Further, as Alexander argues, there is also the need for such integration within the field of building construction because, otherwise, different designers and projects act with differing aims and the result is often chaos. Through

designers and projects act with differing aims and the result is often chaos. Through piecemeal growth, as demonstrated in the San Francisco project, Alexander shows how various processes can be integrated to create whole environments.

Another strong feature of NT is the evolution of public spaces. In NT's approach, every building shapes the space around it, a pattern which over time is said to result in the coming together of unified urban spaces. The resulting buildings and urban spaces form a continuous urban fabric of relaxed and loose shapes. This reflects the powerful vision of Alexander which envisages an urban geometry in which there is no leftover space that is awkward or difficult to develop. Rule 7--Formation of centers--further provides a strong geometrical framework for designing such urban spaces.

However, as the San Francisco site shows, NT's concept of street design leaves much to be desired. The idea of streets developing as the buildings come up on the site cannot contribute to a good street network. Though the San Francisco design shows a decent network of streets, it must be remembered that in this site of thirty acres, most of these streets are for the pedestrians and not for vehicles. In a larger urban context, this concept is impractical as far as vehicular transportation is concerned. Alexander himself admits that this is one of the most questionable rules in the theory. However, for piecemeal growth to develop, one of the preconditions is that there be no masterplan, a fact which in turn, precludes predetermined street networks. Consequently, the street system that NT requires presents an inherent dilemma within the theory and, therefore, needs significant revisions while still maintaining an underlying wholeness.

Another weakness of the theory pertains to the arrangement of functional uses. While the theory supports a strong mix of uses, it does not provide a clear method for coming up with a mix of uses. All it says is that there should be an ideal distribution

index which encourages projects that fall within the range of this index. This ideal mix of uses is supposed to depend on the individual needs of every community--an idea that is good because the theory would be adaptable to the differing needs of different communities. But the question is how each community decides what is the ideal mix of uses for them? NT does not provide a satisfactory answer.

A final point of weakness in NT is the style of architecture. The step-by-step rules 5 and 6--"Lay out of Large Buildings" and "Construction"--appear to be too prescriptive. Further, the resulting buildings appear to be a poor post-modern-style architecture. Obviously, all buildings cannot follow the same building prescription either in terms of layout design or structural style. NT does not discuss these issues in the two rules mentioned above.

On the other hand, the strength of RE's design process lies in its concept of responsiveness, which seeks to provide a multiplicity of choices for the end-users of an urban environment through the seven qualities of responsiveness. These seven qualities cover a comprehensive range of variables in the urban-design process. One of the highlights of RE's contribution to the design process is the perimeter-block concept. Perimeter-block development contributes to the liveliness of the city because all the public entrances to the buildings open into the public streets of the city, thus avoiding any dead facades facing the street. This concept efficiently translates Jacobs' (1961) emphasis on a higher number of street frontages.

Another important feature of RE is the discussion on the variety of use. RE provides a clear method of how to create functional variety that is self-sustaining economically. RE also suggests allocation of uses based on detailed analyses of viability and profit. The authors of RE urge designers to ask the question, "What uses

can be found for this piece of land?" But the authors also clarify that profit should not be the only motive. The underlying idea is that viable and profitable spaces can sustain the quality of variety over a long period of time and thus draw people to the area creating a rich mix of people.

Finally, the street system is one of the strongest concepts of RE's design process. The street design is based on the concept of permeability which as has been discussed several times, is the number of alternative routes to get from one point to another point in the city. Together with the perimeter block, the street system forms an efficient street/block pattern of a responsive urban fabric.

There are, however, certain weaknesses in the RE's design process. RE's style of architecture, from the results of the end designs on the Reading site, is a kind of post-modern architecture that does not really stand out as unique. Further, from the evaluation of the final designs of the Reading site, it is clear that RE did not take the concentration of people per acre as an important criterion that contributes to the design process. Finally, as the authors themselves admit, the qualities of *richness* and *personalization* still need further development.

METHODS OF IMPLEMENTATION

NT's method of implementation is an intuitive, interactive process. It is intuitive because there is no pre-determined course of growth--only a general consensus on its direction. It is interactive because it requires communication among the various groups involved in the building activity. Anybody interested can participate by learning the rules for creating wholeness. While, at the theoretical level, the approach is democratic and community-oriented, NT's method of implementation, which emphasizes the ideal of wholeness in an urban environment over profit, is difficult to achieve in practice.

However, small successes with similar concepts put forward by Alexander (albeit outside North America), show that NT's concepts can be actualized in settings where community participation programs show a good response.

However, a major area of weakness in the NT's method of implementation is that Alexander only broadly outlines the process and, therefore, has not provided sufficient depth in working out details--for example, a clear constitution of the committee that would guide the design process is not worked out. Therefore, in any setting, the NT's method of implementation, though well conceived, is impractical and difficult to practice. Though the San Francisco site demonstrates that the design process can be implemented, in the final analysis, it was only a simulation carried out by faculty and graduate students who could readily communicate and agree upon decisions--a situation not so easily duplicated in the real world.

On the other hand, RE's method of implementation is a rigorously methodical process that can be easily implemented, since it conforms to conventional planning models. Unlike NT, RE does not seek to change the existing methods of implementation or social systems. As long as the designer can convince the developers and planning authorities on the profitability and viability of his schemes while he still retains the design's responsiveness, his designs can be actualized. Its easy implementation can be seen as one of the approach's greatest strengths.

However, one potential pitfall in this approach arises when the designers focus too much on pleasing the developers instead of concentrating on the needs of the end-user. As indicated in the New Fobney Street development, the designers compromised the robustness of the housing designs because the developer argued that there would not be enough profit in a more robust scheme. This, therefore, seems to be an inherent

weakness of the implementation process of RE, which ideally emphasizes that it is important to convince the developer of the soundness of responsive design schemes. Also, for all the importance that RE attaches to the end-user and his needs, it does not include the end-user either in the design process or in implementation.

From the above discussion, it is evident that both NT's and RE's approaches to urban design have strengths and weaknesses in regard to both design and implementation. One strength that both approaches share is they comprehensively address different aspects of urban design, despite the fact that some of these aspects are not fully developed. This thesis identified the strengths and weaknesses of the two approaches. In order to strengthen these approaches to make them better tools for urban design, the problem areas need further development. Future research can be directed in this direction--for example, the formulation of a better street system in NT's approach without compromising wholeness.

Indeed, comprehensive approaches to urban design that seek practical usefulness, like NT and RE, need to be constantly reviewed, evaluated and refined. A process of research, feedback, and practical application of these approaches would greatly contribute to the development of stronger tools for practicing urban design. This is important because advances in urban design would make our cities much better places to live, which in the final analysis is what urban design is all about.

REFERENCES

Alexander, C. (1975). *Oregon Experiment.* New York: Oxford University Press.

Alexander, C. (1979). *Timeless Way of Building.* New York: Oxford University Press.

Alexander, C. (1993). *A Foreshadowing of 21st Century Art: The Color and Geometry of Very Early Turkish Carpets.* New York: Oxford University Press.

Alexander, C., Anninou, A., King, I., Neis, H. (1987). *A New Theory of Urban Design.* New York: Oxford University Press.

Alexander, C., Davis, H., Martinez, J., and Corner, D. (1985). *The Production of Houses.* New York: Oxford University Press.

Alexander, C., Ishikawa, S., Silverstein, M. (1977). *Pattern Language.* New York: Oxford University Press.

Broadbent, G. (1990). *Emerging Concepts in Urban Space Design.* New York: Van Nostrand Reinhold.

Bacon, E., N. (1974). *Design of Cities.* New York: Viking Press.

Barnett, J. (1974). *Urban Design as Public Policy.* New York: Mc-Graw Hill.

Bennett, G., J. (1993). In David Seamon (Ed.), *Elementary Systematics: A Tool for understanding wholes.* Santa Fe, New Mexico: Bennett Books.

Bentley, I., Murrain, P., Alcock, A., McGlynn, S., & Smith, G. (1985). *Responsive Enviroments: A Manual for Designers.* London: The Architectural Press.

Dorritt, F. & Bosselmann, P. (1984, Summer). Mexicali Revisited: Seven Years Later. *Places, 1.* pp. 76-90.

Grabow, S. (1983). *Christopher Alexander: The Search for a New Paradigm in Architecture.* Boston: Oriel Press.

Jacobs, J. (1961). *The Death and Life of Great American Cities.* New York: Vintage Books.

Le Corbusier. (1929). *The City of Tomorrow.* (Etchells, F. Trans.). London: John Rodker. (Original work published 1924).

Le Corbusier. (1967). *The Radiant City.* (Trans.). London: Faber. (Original work published 1935).

Maki, F. (1983, March). Modernism at the Crossroads. *Japan Architect, 58.* pp. 18-22.

Peponis. (1989). Space, Culture, and Urban Design in Late Modernism and After. *Ekistics, 56*, pp. 93-108.

Rowe, C. (1978). *Collage City*. Cambridge, Massachussetts: MIT Press

Seamon, D. (1988). Christopher Alexander's New Book, A New Theory of Urban Design, Interpreted from the Vantage point of Systematics. *Unis, 2*. pp. 19-38.

Seamon, D. (1991, Spring). Responsive Environments: Designing for a sense of Place. *Environmental and Architectural Phenomenology Newsletter, 2*, pp. 11-13.

Seamon, D. (1995, Winter). Special section on Pattern Language: Book Review. *Environmental and Architectural Phenomenology Newsletter, 6*, pp. 5-10.

.Vitruvius. (1914). *Vitruvius: The Ten Books of Architecture*. (Morgan, W.H. Trans.). Cambridge, Massachussetts: Harvard University Press. (Original work published n.d.).

Woodbridge, S. (1995, November). When good urban plans go awry. *Progressive Architecture, 76*, pp. 60-67.

Whyte, W. (1980). *The Social Life of Small Urban Spaces*. Washington, D. C.: The Conservation Foundation.

Ziesel, J. (1981). *Inquiry by design: Tools for environment-behavior research*. Monterey, California: Brooks/Cole Publishing.