Fumihiko Maki

INVESTIGATIONS IN COLLECTIVE FORM

A Special Publication Number 2

THE SCHOOL OF ARCHITECTURE

Washington University : St. Louis : June 1964

ABOUT FUMIHIKO MAKI

Professor Maki was a member of the faculty of the School of Architecture at Washington University from 1956 to 1963. During this time, much of the research contained in this book was initiated.

Graduated from Tokyo University in 1952 with a Bachelor in Architecture and Engineering degree, Mr. Maki then received a Masters in Architecture from Cranbrook in 1953 and a Masters in Architecture from Harvard in 1954. In 1958 he was the recipient of a $10,000 International Graham Foundation Fellowship. He is the designer of Steinberg Hall at Washington University and auditoriums at Nagoya University and Chiba University in Japan. He is also one of the founders of the "Metabolism" group in Japan, as well as having done work with the well known architectural group, "Team 10."

At present Mr. Maki is Associate Professor of Architecture at the Harvard Graduate School of Design and is continuing his investigations into collective form. This book represents a "progress report" for architects and planners who have interest in its important conceptual content.

INTRODUCTION

In the spring of 1960, Masato Ohtaka and I published an article called "Group-Form" in the first issue of "Metabolism." Since then, the idea has further been developed and become presently "Collective Form." The study on "Linkage" followed in collaboration with Jerry Goldberg.

Methodological investigation on collective forms has seldom been done until very recently. What is needed is not just observation and critical comment, but utilization of the observation to develop strategic tools in making our physical environment.

Together with illustrative works, these papers are intended to discuss why, what, and how we should design. These are open-ended discussions, to be polemical rather than definitive. They represent, however, only the beginning of vast inquiry on the collective form.

Jerry Goldberg, the co-author of "Linkage in Collective Form", has always been the most valuable collaborator and has contributed much in substantiating many ideas.

Much of the writing was done while I was with the School of Architecture, Washington University, which offered me a challenging architectural climate. I am particularly grateful to Dean Joseph R. Passonneau and Prof. Roger Montgomery who have always been sources of encouragement to produce this work.

I also wish to thank Prof. Robert L. Vickery for the effort he made in editing this publication.

Fumihiko Maki
April, 1964

TABLE OF CONTENTS

COLLECTIVE FORM -- Three Paradigm

Fumihiko Maki Masato Ohtaka

BEGINNING

There is no more concerned observer of our changing society than the urban designer. Charged with giving form—with perceiving and contributing order — to agglomerates of building, highways and green spaces in which men have increasingly come to work and live, they stand between technology and human need and seek to make the first a servant, for the second must be paramount in a civilized world.

For the moment, we are designers only, interested in technology and order, insofar as these may be divorced from the political, the economic.

Of course, the progenitors of any formal idea include politics and economics. The reason, in fact, for searching for new formal concepts in contemporary cities lies in the magnitude of relatively recent change in those very problems. Our urban society is characterized by: (1) coexistence and conflict of amazingly heterogeneous institutions and individuals; (2) unprecedented rapid and extensive transformations in the physical structure of the society; (3) rapid communications methods, and (4) technological progress and its impact upon regional cultures.

The force of these contemporary urban characteristics makes it impossible to visualize urban form as did Roman military chiefs, or Renaissance architects Sangallo and Michaelangelo; nor can we easily perceive a hierarchical order as did the original C.I.A.M. theorists in the quite recent past. We must now see our urban society as a dynamic field of interrelated forces It is a set of mutually independent variables in a rapidly expanding infinite series. Any order introduced within the pattern of forces contributes to a state of dynamic equilibrium — an equilibrium which will change in character as time passes.

Our concern here is not, then, a "master plan," but a "master program," since the latter term includes a time dimension. Given a set of goals, the "master program" suggests several alternatives for achieving them, the use of one or another of which is decided by the passage of time and its effect on the ordering concept.

As a physical correlate of the master program, there are "master forms" which differ from buildings in that they, too, respond to the dictates of time.

Our problem is this: Do we have in urban design an adequate spatial language (an appropriate master form) with which we can create and organize space within the master program? Cities today tend to be visually and physically confused. They are monotonous patterns of static elements. They lack visual and physical character consonant with the functions and technology which compose them. They also lack elasticity and flexibility. Our cities must change as social and economic use dictate, and yet they must not be "temporary" in the worst visual sense.

We lack an adequate visual language to cope with the superhuman scale of modern highway systems and with views from airplanes. The visual and physical concepts at our disposal have to do with single buildings, and with closed compositional means for organizing them.

The wealth of our architectural heritage is immense. One cursory look on architectural history is sufficient to find that the whole development is characterized by man's immense desire to make buildings grand and perfect. True, they have often mirrored the very strength of each civilization. They have produced the Pyramids, the Parthenon, the Gothic Cathedrals, and Seagram House. Today this is still a prevailing attitude among many architects — the creation of something new and splendid in order to outdo others..

Naturally, the theory of architecture has evolved through one issue as to how one can create perfect single buildings whatever they are.

A striking fact against this phenomenon is that there is almost a complete absence of any coherent theory beyond the one of single buildings. We have so long accustomed ourselves to conceiving of buildings as separate entities that, today we suffer from an inadequacy of spatial languages to make meaningful environment.

This situation has prompted us to investigate the nature of "Collective Form." Collective form represents groups of buildings and quasi-buildings — the segment of our cities. Collective form is, however, not a collection of unrelated, separate buildings, but of buildings that have reasons to be together.

Cities, towns, and villages throughout the world do not lack in rich collections of collective form. Most of them have, however, simply evolved: they have not been designed. This gives some reason why today so many professionals, both architects and planners, often fail to make meaningful collective forms — meaningful to give the forms forceful raison-d'etre in our society.

The following analysis evolves through two questions: first, how collective form has been developed in history; and second, what are its possible implications for our current thinking in architecture and urban design.

The investigation of collective form is extensive, but promising. The first step is to analyze structural principles involved in making collective form. We have established three major approaches.

Compositional Form	Compositional Approach
Mega-Structure (Form)	Structural Approach
Group-Form	Sequential Approach

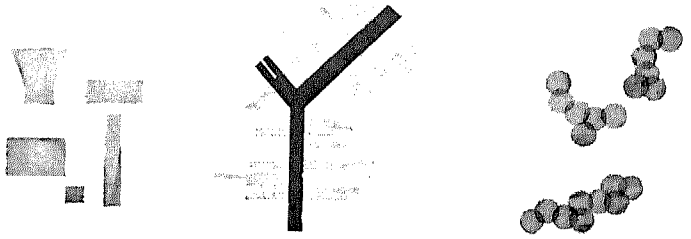


Fig. 1, Approaches to collective form. From left to right, compositional form, megaform, group form.

The first of these, the compositional approach is a historical one. The second two are new, and are efforts toward finding master forms which satisfy the demands of contemporary urban growth and change.

COMPOSITIONAL FORM

The compositional approach is a commonly accepted and practiced concept in the past and at present. The elements which comprise a collective form are preconceived and predetermined separately. In other words, they are often individually tailored buildings. Then, proper functional, visual, and spatial (sometimes symbolic) relationship would be established on a two-dimension plane.

It is no surprise that this is the most understandable and used technique for architects in making collective form, because the process resembles the one of making a building out of given components. It is a natural extension of the architectural approach. It is a static approach, because the act of making a composition itself has a tendency to complete a formal statement.

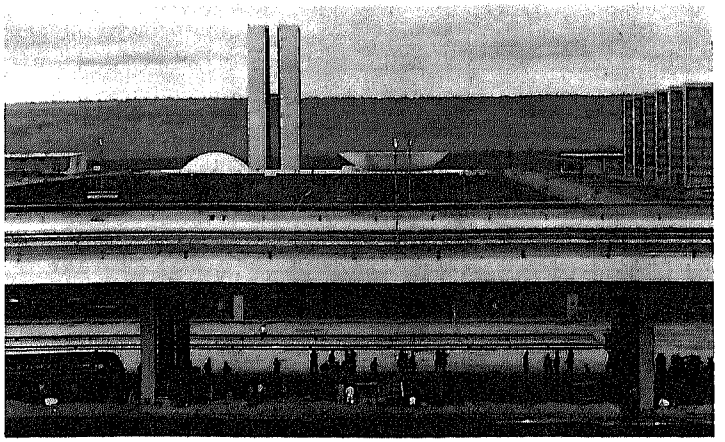


Fig. 2 (above) Brasilia (Oscar Niemeyer) and Fig. 3 (below), Horyuji, Japan. Two examples of compositional approach to architecture.

Most contemporary large scale urban designs fall into this category. Rockefeller Center, Chandigarh Government Center, and Brazilia are good examples of compositional urban design.

In any case, the compositional approach is a familiar one, and it has received some treatment in works on architecture and planning. We will, therefore, let it stand on its merit, and introduce two less well-known approaches.

THE MEGASTRUCTURE

The megastructure is a large frame in which all the functions of a city or part of a city are housed. It has been made possible by present day technology. In a sense, it is a man-made feature of the landscape. It is like the great hill on which Italian towns were built.

Inherent in the megastructure concept, along with a certain static nature, is the suggestion that many and diverse functions may beneficially be concentrated in one place. A large frame implies some utility in combination and concentration of function.

Urban designers are attracted to the megastructure concept because it offers a legitimate way to order massive grouped functions. One need only look at work in the recent Museum of Modern Art show of "Visionary Architecture," to sense the excitement generated among designers by megaform. While some of the ideas displayed in the show demonstrate structural virtuosity at the expense of human scale and human functional needs, others have a quality which suggests no divergence between compacted, economic function and human use.

That utility is sometimes only apparent. We frequently confuse the potential that technology offers with a kind of compulsion to "use it fully." Technological possibility can be sanguinely useful only when it is a tool of civilized persons. Inhuman use of technological advance is all too frequently our curse. Optimum productivity does not even depend on mere concentration of activities and workers.

Paul Goodman says in **Communitas** (P.13):

> "We could centralize or decentralize, concentrate population or scatter it . . . If we want to continue the trend away from the country, we can do it; but if we want to combine town and country values in an agri-industrial way of life, we can do that . . . It is just this relaxing of necessity, this extraordinary flexibility and freedom of choice of our techniques, that is baffling and frightening to people . . . Technology is a sacred cow left strictly to (unknown) experts, as if the form of the industrial machine did not profoundly affect every person . . . They think that it is more efficient to centralize, whereas it is usually more inefficient."

Technology must not dictate choices to us in our cities. We must learn to select modes of action from among the possibilities technology presents in physical planning.

One of the most interesting developments of the megaform has been done by Professor Kenzo Tange with M.I.T. graduate students when he was a visiting professor there. In a series of three articles in the October issue of Japan Architect, Professor Tange presents a proposal for a mass-human scale form which includes a megaform and discrete, rapidly changeable functional units which fit within the larger framework.

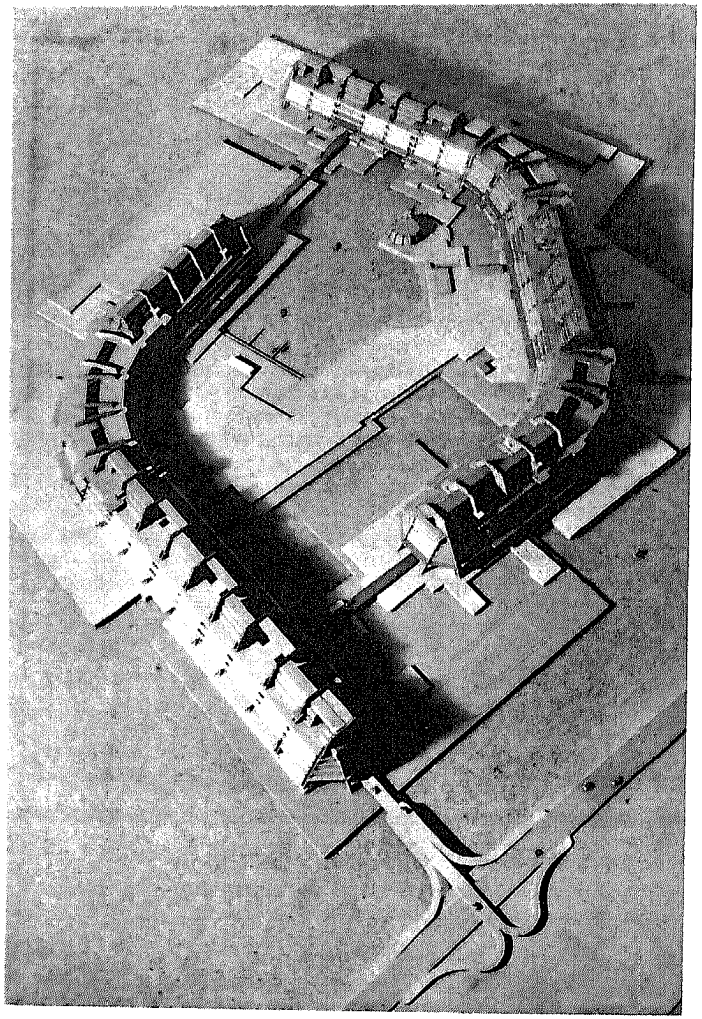


Fig. 4, a community for 25,000. Kenzo Tange at M.I.T. (with Pillorge, Halady, Niederman, Solomons).

Professor Tange says:

> "Short-lived items are becoming more and more short-lived, and the cycle of change is shrinking at a corresponding rate. On the other hand, the accumulation of capital has made it possible to build in large-scale operations. Reformations of natural topography, dams, harbors, and highways are of a size and scope that involve long cycles of time, and these are the man-made works that tend to divide the overall system of the age. The two tendencies—toward shorter cycles and toward longer cycles—are both necessary to modern life and to humanity itself." *(Japan Architect)*

Tange's megaform concept depends largely on the idea that change will occur less rapidly in some realms than it will in others, and that the designer will be able to ascertain which of the functions he is dealing with fall in the long cycle of change, and which in the shorter. The question is, can the designer successfully base his concept on the idea that, to give an example, transportation methods will change less rapidly than the idea of a desirable residence or retail outlet? Sometimes, the impact and momentum of technology become so great that a change occurs in the basic skeleton of social and physical structure. It is difficult to predict to which part of a pond a stone will be thrown and which way the ripples will spread. If the megaform becomes rapidly obsolete, as well it might, especially in those schemes which do not allow for two kinds of change cycle, it will be a great weight about the neck of urban society.

The ideal is not a system, on the other hand, in which the physical structure of the city is at the mercy of unpredictable change. The ideal is a kind of master form which can move into ever new states of equilibrium and yet maintain visual consistency and a sense of continuing order in the long run.

This suggests that the megastructure which is composed of several independent systems that can expand or contract with the least disturbance to others would be more preferable to the one of a rigid hierarchical system.

In other words, each system which makes the whole, maintains its identity and longevity without being affected by others while at the same time engaged in dynamic contact with others. When optimum relationship has been formed, an environmental control system can be made. The system that permits the greatest efficiency and flexibility with the smallest organizational structure is ideal.

Two basic operations are necessary to establish this optimum control mechanism. One is to select proper independent functional systems and to give them optimum interdependency through the provision of physical joints at critical points. (This will be elaborated further in one of the following articles.)

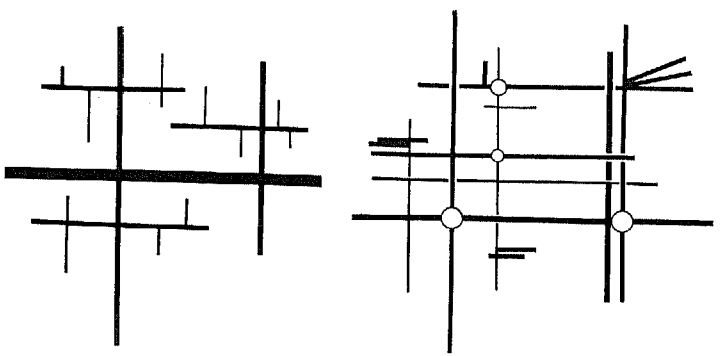


Fig. 5, Two types of megaform. At left, hierarchical structure. At right, open-ended structure.

Although the megastructure concept presents the problems outlined above, it also has great promise for:

1) Environmental Engineering: Megastructure development necessitates collaboration between the structural and civil engineer. Possibilities in large spans, space-frames, light skin structures, prestressed concrete, highway aesthetics, and earth forming will be developed far beyond their present level. Large scale climatic control will be studied further. A new type of physical structure, environmental building, will emerge.

2) Multi-functional structures: We have, thus far, taken it for granted that buildings should be designed to fulfill one specific purpose. In spite of the fact that the concept of multi-functionalism must be approached with caution, it offers useful possibilities. We can within the megaform structure, realize combinations such as those in Kurokawa's "Agricultural City."

3) Infra-structure as public investment: substantial public investment can be made in infra-structures (the skeleton of megastructures) in order to guide and stimulate public structures around them. This strategy can be further extended to a new three-dimensional concept of land use where public offices will maintain the ownership and upkeep for both horizontal and vertical circulation systems.

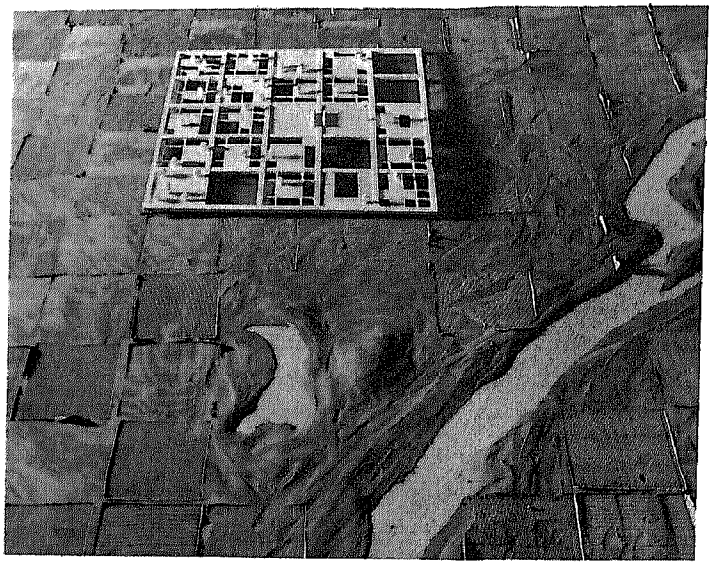


Fig. 6, An example of Megastructure. An agricultural city designed by Noriaki Kurokawa.

GROUP FORM

Group-Form is the last of the three approaches in the collective form. It is form which evolves from a system of generative elements in space. Some of the basic ideas of the group-form can be recognized in historical examples of town buildings. Urban designers and architects have recently become interested in them because they appear to be useful and suggestive examples in making large scale form. For instance, medieval cities in Europe, towns in Greek Islands, villages in Northern Africa are a few examples. The spatial and massing quality of these towns is worth consideration.

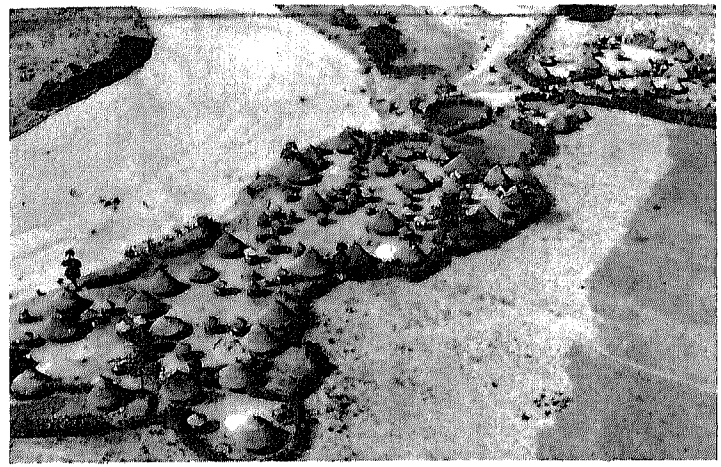
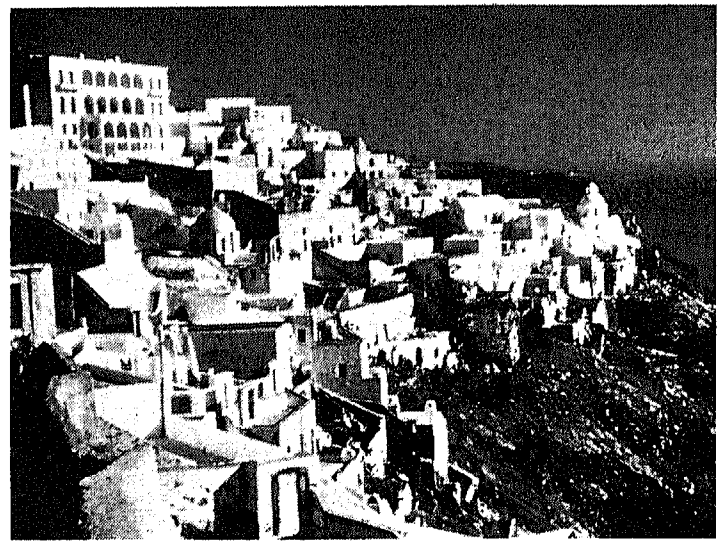


Fig. 7, (above) a Sudanese village. Fig. 8, (below), a Greek village. Two examples of Group Form architecture.



Factors which determine the spatial organization of these towns are:

(1) Consistent use of basic materials and construction methods as well as spontaneous, but minor, variations in physical expression.

(2) Wise, and often dramatic use of geography and topography.

(3) Human scale preserved throughout the town. (This is frequently in contrast to superhuman land forms.)

(4) Finally, sequential development of basic elements which predominantly, are dwelling houses, open spaces between the houses, and the repetitive use of certain visual elements such as walls, gates, towers, waters, etc. The idea of sequential development has been recently explicated by Professor Roger Montgomery of Washington University, who sees the series of buildings or elements without apparent beginning or end as a contemporary compositional "theme" distinct from the closed composition of forms which characterizes classic or axial "themes."

The sequential form in historical examples developed over a period of time much longer than that in which contemporary cities are being built and rebuilt. In this sense, then, the efforts of contemporary urban designers are quite different from their historical counterparts, and the forms which they consciously evolve in a short time span must accordingly differ.

The lesson is, however, a useful one. A further inquiry of the basic elements and particularly of the relationship between the elements and groups reveals interesting principles involved in making collective form.

Fig. 9, A Japanese lineal village.

Many Japanese villages in the past developed along major country roads. This one shown in figure No. 9 is one of them. Houses are generally U-shaped, and juxtaposed one against another perpendicular to the road. (They are basically court-type rowhouses.) The front part of the house is two stories high, and forms a tight continuous village facade together with other units. Behind it is an enclosed yard, which is used for domestic work, drying crops, making straw, etc. A barn is located at the other end of the house, and faces an open country field.

There exists unquestionably a clear structural relationship between the village and the houses, between village activities and individual family life, or between the movement of villagers and cows.

Here the house unit is a generator of the village form, and vice versa. A unit can be added without changing the basic structure of the village. The depth and frontage of the unit, or the size of the court or barn may differ from unit to unit. But there prevails an understanding of basic structural principles in making the village.

Another example is Dutch housing of the 16th century. The Dutch have a reputation for living in communal units. Volunteer cooperation has long existed by limiting their personal liberty through common obedience to self-made laws. Their houses reflect this spirit.

Steen Eiler Rasmussen in his "Town and Buildings" tells us:

> A stone walled canal with building blocks above it on each side, covered with houses built closely together and separated from the canal by cobbled roadways. The narrow, gabled ends of the houses face the canal and behind the deep houses are gardens. . . . Outside the houses is a special area called, in Amsterdam, the 'stoep', which is partly a pavement and partly a sort of threshold of the house. . . .

The stoep is actually a part of the house, and the owner takes immense pride in maintaining it. It is also a social place, where neighbors exchange gossip and children play. By raising the ground floor of houses, it gives privacy to the resident even with large glass panes in front, which reduce the load on pilings under the house.

There is again a unity between the existences of canals and of trees, of paved roadways and of stoep and of large glass windows and rear gardens. This set of situations has emerged through long experience and the wisdom of the people.

Forms in group-form have their own built-in link, whether expressed or latent, so that they may grow in a system. They define basic environmental space which also partakes of the quality of systematic linkage. Group-form and its space are indeed proto-type elements, and they are prototypes because of implied system and linkage.

The element and the growth pattern are reciprocal — both in design and in operation. The element suggests a manner of growth, and that, in turn, demands further development of the elements, in a kind of feedback process.

On the other hand, the element in mega-form does not exist without a skeleton. The skeleton guides growth and the element depends on it. The element of group-form is often the essence of collectivity, a unifying force, functionally, socially, and spatially. It is worth noting that generally group-form evolves from the people of a society, rather than from their powerful leadership. It is the village, the dwelling group, and the bazaar which are group-forms in the sense we are using this term, and not the palace complex, which is compositional in character.

Can we, then, create meaningful group-forms in our society? The answer is not a simple one. It requires a new concept and attitude of design. It also requires the participation of cities, and their social institutions.

Two recent remarks by architects cast light on this definition of group-form.

The distinction between form and design was given in a speech at the World Design Conference (Tokyo, May 1960) by Louis Kahn. Kahn said on that occasion: "There is a need to distinguish 'form' from 'design.' Form implies what a building, whether it be a church, school, or house, would like to be, whereas the design is the circumstantial act evolving from this basic form, depending on site condition, budget limitation or client's idea, etc." As soon as a form is invented, then it becomes the property of society. One might almost say that it was the property of society before its discovery. A design, on the other hand, belongs to its designer.

John Voelker, in his CIAM Team X report, comments on a similar subject. Referring to Hansen and Soltan's work from Poland, he says: "In an open aesthetics, form is a master key not of any aesthetic significance in itself, though capable of reciprocating the constant change of life . . . Open aesthetic is the living extension of functionalism."

Both Kahn's definition on 'Form' and Voelker's on 'An open form' express their desire to produce a form that would be a catalytic agent which may become many forms rather than just a form for its own sake. While they are speaking on it still within architectural idiom, we are interested in examining the form in much larger context — collectivity in our physical environment. Nonetheless, both statements are significant in assuming that such a form can be created by architects today.

It may be easy for someone to invent a geometric form and call it group-form because such forms have characteristics of being multiplied in a sequential manner. This is, however, meaningless, unless the form derives from environmental needs. Geometry is only a tool of search for group-form. One can not seek group-form in hexagons or circles. James Stirling, in his article "Regionalism and Modern Architecture" in Architects Year-book 8, says:

> "The application of orthogonal proportion and the obvious use of basic geometrical elements appears to be diminishing, and instead something of the variability found in nature is attempted. 'Dynamic cellularism' is an architecture comprising several elements, repetitive or varied. The assemblage of units is more in terms of growth and change than of mere addition, more akin to patterns of crystal formations or biological divisions than to the static rigidity of a structural grid. The form of assemblage is in contrast to the definitive architecture and the containing periphery of for example, a building such as Unite."

One finds the source of generative element in dynamic human terms, such as "gathering," or "dispersal," or "stop." The human quality which determines form has to do with the way of life, movement, and relation of persons in society. If the function of urban design is the pattern of human activities as they express being alive in cities, then the functional patterns are crystallized activity patterns. Le Corbusier limits generative human qualities in urban architecture to 'air,' 'green' and 'sun' while exponents of group form find a myriad of suggestive activities to add to that list.

The visual implications of such crystallized patterns of human activity become apparent. The way in which one activity changes to another as people move from work, to shopping, to dining, suggests the physical qualities which are used to express transformation in design rhythm, change, and contrast.

Characteristic spaces may be named in accord with the way in which human groups use them, i.e., transitional space, inward space, outward space, etc . . .

Addition of activities to physical qualities in a search for form determinants in the city suggest a new union between physical design and planning. The investigation on group-form inevitably leads us to give our attention to regionalism in collective scale.

Until recently our understanding of regional expressions had very much been confined to that of single buildings. In the age of mass communication and technological facility, regional differences throughout the world are becoming less well-defined. It is apparent that it is becoming less easy to find distinctive expressions in building techniques and resulting forms.

If materials and methods of construction or modes of transportation system are becoming ubiquitous in this world, perhaps their combination, especially in large urban complex can reflect distinguishing characteristics of the people and the place in which they are structured and used according to their value hierarchy. Thus it may be possible to find regionalism more in collective scale, but less in single buildings.

The primary regional character in urban landscape will probably be in the grain of the city. Both group-form and mega-form affect the urban melieu at precisely that level.

Homogenization of environment is not, as many people feel, the inevitable result of mass technology and communication. These same forces can produce entirely new products. With modern communication systems one element (cultural product) will soon be transmitted to other regions, and vice versa.

While each region a set of similar elements, it can express its own characteristic from of the elements. Here regionalism arises not only from just indigenous elements or products, but rather from the manner such elements are evaluated, and expressed. This suggests a concept of open regionalism, which is itself a dynamic process of selecting and integrating vital forces however these forces may conflict with inherent cultural values. Thus the genuine strength of different cultures can be tested and measured in this light. (The thesis was initially developed, with Professor Montgomery).

In group-form, the possibility for creating grain elements, hence regional qualities, exists. The reciprocal relation between the generative elements and the system can produce strongly regional effects. In megaform, it is a large form that represents all the power of technique, and that may represent the best aspects of regional selectivity.

In any event we predict that in a coming decade the investigation of regional expression in collective scale will become one of the most important and fascinating issues of architecture and planning.

Finally, these three approaches are models of thinking about possible ways to conceive large complex forms. It is likely that in any final form of design, these three concepts will appear either combined or mixed.

LINKAGE IN COLLECTIVE FORM

Fumihiko Maki Jerry Goldberg

INTRODUCTION

Investigation of the collective form is important because it forces us to reexamine the entire theory and vocabulary of architecture, the one of single buildings.

For instance, the components of the collective form, as conceived here, differ from the traditional elements as single structures:

1. Wall: Any element which separates and modulates space horizontally. Walls are places where forces outward and inward inter-act, and the manner of the inter-actions define the form and functions of the wall.

2. Floor or Roof: Any element which separates and modulates space vertically. In a broad sense, "floor" includes underground, ground and water surfaces, and even floating elements in the air.

3. Column: Architecturally it is a supporter of gravitational loads; but environmentally it is an element which transfers certain functions,—man, goods, and other things.

4. Unit: A primary space which performs and contains some of the basic functions of human existence and of society.

5. Link: Linking, or disclosing linkage, are invariant activities in making collective form out of either discrete or associate elements. In operational terms there are a number of linkages,—physically connected link, implying link, built-in link, etc.

INTRODUCTION

Investigation of the collective form is important because it forces us to reexamine the entire theory and vocabulary of architecture, the one of single buildings.

For instance, the components of the collective form, as conceived here, differ from the traditional elements as single structures:

1. Wall: Any element which separates and modulates space horizontally. Walls are places where forces outward and inward inter-act, and the manner of the inter-actions define the form and functions of the wall.

2. Floor or Roof: Any element which separates and modulates space vertically. In a broad sense, "floor" includes underground, ground and water surfaces, and even floating elements in the air.

3. Column: Architecturally it is a supporter of gravitational loads; but environmentally it is an element which transfers certain functions,—man, goods, and other things.

4. Unit: A primary space which performs and contains some of the basic functions of human existence and of society.

5. Link: Linking, or disclosing linkage, are invariant activities in making collective form out of either discrete or associate elements. In operational terms there are a number of linkages,—physically connected link, implying link, built-in link, etc.

Collective form also requires a new dimension in conceiving construction methods and structural and mechanical systems. The aesthetics of the collective form necessitate new definitions of scale and proportion of buildings.

Above all, this entire essay questions the meaning of the very act of "design" in our society.

The article contains no answers, but seeks to ask the right questions, and to draw out further discussions.

THE UNITY OF EXPERIENCE

Observation is the prime tool of the urban designer. What he can see in the city, he can refer to his own experience. Fact and observer are combined to comprehend new problems, and new three-dimensional solutions.

The whole sequence of articles on collective form is a means of ordering observation. What the categories of analysis are, is not of expreme importance. They provide a framework within which we can present extremely important observable phenomena in cities. Only through seeing accurately can we locate the specific formal result of forces in the city—forces that sociologists, economists and men who write "fiction" have described in other terms.

We are fond of observing that our urban world is a complex one, that it changes with a rapidity beyond real comprehension, and finally, that it is a disjointed world.

At certain moments in our urbane lives we relish all the diversity and disjointedness of cities, and bask in the variety of them. Certainly cities have been the locus of man's most creative moments in history, because of the varied experience they afford us.

But when a plethora of stimuli begins to divert us from receptive consciousness, the city renders us insensible. Then, in our inability to order experience, we suffer the city, and long for some adequate means to comprehend it as a product of men like ourselves—as the product of an intelligent, ordering force. If the scientist is frustrated when the order or pattern of phenomena is too fleeting for him to observe, or too complex to recognize with extant tools, so is the city dweller frustrated when he cannot find human order in his environment. At those moments when he sees only the results of mechanical and economic processes controlling the form and feel of his place, he must feel estranged, and outside.

If urban design is to fulfill its role, to make a contribution to the form of the city, it must do more than simply organize mechanical forces, and make physical unity from diversity. It must recognize the meaning of the order it seeks to manufacture, a humanly significant, spatial order.

INTRODUCTION TO LINKAGE

Urban design is ever concerned with the question of making comprehensible links between discrete things. As a corollary, it is concerned with making an extremely large entity comprehensible by articulating its parts.

The city is combinations of discrete forms and articulated large forms. It is collective form—the agglomerate of decisions (and abnegations from decision) in the past concerning the way in which things fit together, or are linked. Linking, or disclosing linkage (articulating the large entity), are invariant activities in making collective form.

In regard to historical examples of collective form, we refer to the recent thinking of Aldo van Eyck.

He finds in vernacular building a substantial clue to the natural process of human association in urban situations. Vernacular unit and link are evolved together and appear at the end as a perfectly coordinated physical entity — village or town.

One need not go to completely vernacular situations to discover examples of similar character. Builders of the cities we admire — that we sense are good environment — have generally been generations of men working over decades and centuries of time. We must perceive what they have done in our limited study-span. More important, we must build, in our own environment, in an abbreviated time.

One thing is certain. We have spent too little time observing the successes of our predecessors with an acute eye. Further, we probably do not approach particular parts of our cities with sufficient understanding to extrapolate what is useful, in human terms, from them. It is one thing to grunt ecstatically in the presence of a significant work of man. It is another to learn from it what it can offer for the future.

The specific subject of scrutiny here is Linkage, in particular, the act of making linkage.

In what follows, the business of putting things together is studied in detailed fashion. First, historical examples provide examples of linkage. Each place, and each moment, had its own characteristic form of making coherent physical form. We are interested in how, and why, particular links were used.

In the end, we are concerned, as designers, with making collective form. The examples that follow have been discovered in a framework of operational definitions. Looking at examples, we ask ourselves what the act of making a particular juncture among elements was, and how, theoretically, that act could be reproduced. This loosely operational framework was useful for purposes of analysis, but does not carry through the entire survey of material.

It is perhaps a mistake to insulate types of links one form another by categorizing them. The activity we are discussing, is, after all, a singular one — that of making a comprehensible and humanly evocative urban environment.

It is one of the primary theses of this study that once a link is established for any reason, it takes on a complicated secondary system of meanings and uses. See the discussion of the stoep in Amsterdam, for example, or of Bologna's arcades.

One can see the Medieval street bridges over the Via Ritorta, in Perugia, an example of a link that began as a simple means for joining two buildings at their second story or, perhaps reinforcing structurally weak walls. The bridges, which mediated between two buildings at the second level, also serve to define the overhead in the street, and to reinforce it spatially as a pathway.

The bridges serve all these functions because they are repetative along the street. It is no longer important which is the primary kind of linkage, and which the secondary.

WHAT DOES THIS STUDY OF HISTORICAL LINKAGE SUGGEST FOR THE FUTURE?

Certainly this — whatever we use to determine the form of linkage in urban design must come from a body of largely untapped information about cities as we know them. We are involved in an investigation of the morphological resultants of forces present in cities.

And this is certain. The primary motive is to make unity from diversity. We suggest, as the other side of that issue, that there is diversity in every unit situation of sufficient scale to admit more than one function, or one angle of vision.

That we have not previously adequately identified form-giving forces is perhaps due to the fact that they seem to defy formulation. At a particular scale of urban activity, they have more to do with movement through space, than with a standard vision of the shape of a place. Thus we have been notably remiss in our ability to conceive of shapes for our paths of high-speed movement, or our commercial clusters, or power lines.

Each of these things seems to defy relation to a human collective scale — their functional and social aspects seem diametrically opposed; yet the Romans succeeded in making powerful symbols of their water-carriers, and in this country we have succeeded in building TVA dams that integrate functional and symbolic characteristics.

If a garage can serve as an architectural stop between the moving world of the highway and the static world of a town center, or shopping precinct, it can, if handled as Louis Kahn suggests, become a symbol of the collective and human aspect of what occurs in town or shop. Garage or station of rapid transit system as stop, is a link between the highway (or train) and pedestrian movement. If designed with sufficient understanding, it can serve as a defining wall, or perhaps a built mountain, for the activity it links with the world of the highway.

Another thing that seems indicated for the future is the realization of a wholly new concept of three dimensional linkage. If we are successful at making unified and meaningful complexes of form and activity near the ground, we are notably unsuccessful at going into the air with linked functions.

A high-rise tower (either for dwellings or offices) provides us with little integrated experience of its form, or of the excitement of rising through its many layers. Somehow, each deck of a tower or slab must be transparent to us, and each level of activity must be unique. Then, and only then, will we sense three-dimensional linkage.

This type of linkage is necessary because we will be building more high buildings as land in our cities becomes scarcer. It is possible because our building techniques and our love of communication makes it so.

Sant 'Elia gave some indication of what the visual residue of such an idea of three-dimensional linkage might be as early as 1913.

If we must learn to integrate our knowledge of short-range movement, movement through cities from point to point, so must we attach a more subtle time concept, one which deals with the constant cycle of decay in cities. An urban dwelling may last for eighty-four years, on the average. If we allow all the old dwellings in a given area to become unsuitable for use at the same time, we are forced to declare extensive blight, clear hundreds of acres, and build new housing. There is no link between such a cleared and renewed area and the city around it. Persons who, by choice, or force of economic circumstance move into such developments feel isolation keenly enough that they cannot regard themselves as anything but "project" people. There is nothing less urbane, nothing less productive of cosmopolitan mixture, than raw renewal, which displaces, destroys, and replaces, in that mechanistic order.

The cycle of decay can become a linking force in our cities. If recognized, it provides an opportunity to replace old structures in an old environment with new structures, still in an old environment. Such diversity in age is itself a kind of linkage. It gives morphological demonstration of the ever-changing and diverse character of city life. It offers a new kind of choice to people in cities — the possibility that one can live in a historically blessed place in a new house.

Our cities are fluid and mobile. It is difficult to conceive of some of them as places, in the real sense of that word. How can an entity with no discernible beginning or end be a place? It is certainly more apt to think of a particular part of a city as a place. If it were possible to articulate each of the parts of the city more adequately, to give qualities of edge and node to now formless agglomerates, we would have begun to make our large urban complexes at least understandable, if not "imageable."

By the same argument, the rapidity with which the urban system expands suggests that there must be some means for linking newly established parts with parts not yet conceived. In short, there is need for something that may be termed "open linkage." That idea is inherent in the linkage of group-form. Links become integral parts of system and unit and suggest that system can be expanded indefinitely, and with variation.

THE CITY AS A PATTERN OF EVENTS

Linkage is simply the glue of the city. It is the act by which we unite all the layers of activity and resulting physical form in the city.

Insofar as linkage is successful, the city is a recognizable and humanly understandable entity. We are at home with it. We depend on understanding how two events within a city are combined to make a living sequence, and we depend on understanding how men have lived in the city we inhabit, and we depend on understanding how we can get from place to place in the city. Each at its own level contributes to our ability to know and enjoy experience—social, temporal, and spatial linkage.

We describe all these kinds of linkage in physical terms in the analysis that follows. That is because we want to describe linkage in operational terms, to say what must be done to make a link.

But each operation will end by implying a multitude of non-spatial facts. Ultimately, linking is assembling patterns of experience in cities.

OPERATIONAL CATEGORIES

We find five basic linking acts, or operations: 1) To mediate; 2) to define; 3) to repeat; 4) to make functional path; and finally, 5) to select.

Obviously, all of these slogan-definitions need explanation. We choose to give definition in diagrams as well as text, and to present examples of each type of linkage in evidence that each exists, or could exist.

Keep in mind that each type of linking may be done in physical fact (as with a wall or bridge between two buildings,) or by implication (as in the carefully balanced composition of buildings and spaces on a site.)

Physical links may be introduced into form as external elements, and the designer thus produces an a-a-a-a or a-b-c-d pattern. On the other hand, they may appear as built in links. That may be of particular consequence in group-form. There, an integral link and unit are the basis of formal, functional and structural results. Repetition and combination occur in accord with the logic of the built-in link.

Implied links are those used to compose elements in the landscape. Using either quasi-mathematical standards, as in Renaissance Italian composition, or subjectively seeking combinations of void and solid that seem "right," designers produce (hopefully) compelling combinations. A paragon of such composition should appear to be inevitable to all observers. Space is an adhesive in compositional design.

(The question of inevitablity does not arise in most cases of contemporary group form. There, combinations of linkage and element can do no better than to express the process from which their growth in combination has come.)

All the ways of implying linkage—by composing, by injecting transitional elements, by surrounding disparate things, depend largely on some kind of homegeneity. If elements in large-scale design are of the same order of magnitude (by virtue of mass, color, surface quality) they become a "grain" or a texture.

Elements of vastly different size are linked by implication only with difficulty. Transitional bits, or unifying surroundings are frequently injected between them to make the implication strong.

I. TO MEDIATE: Connect with intermediate elements or imply connection by spaces that demonstrate the cohesion of masses around them.

An interesting thing about mediation is that once done, it is almost impossible for an observer to assign a single cause for it. Mediation accomplished by adequate physical means, connotes multitudes of other transitions. It suggests that a link, properly conceived, changes with changing primary needs. The arcades of Bologna, for example, provide shelter from sun and rain, and visual unity to the street.

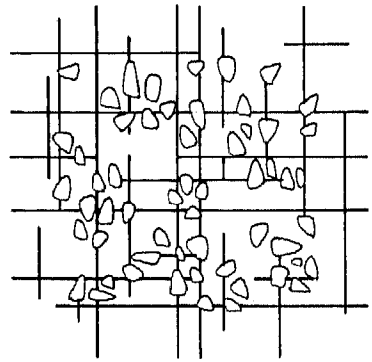


Fig. 10, Mediate: Connect with intermediate elements or imply medium (including composed open space).

Rasmussen, in his article "The Dutch Contribution," says that the stoep is a place that is half house property, half public way. "The house, itself, cannot be built out on it but it may be used for the basement entrance or for steps up to the high ground floor. These steps are often quite monumental, carried out in 'bleu belge' stone . . . When not used to accomodate stairs or other projections, the 'stoep' is raised a step above the road and covered with tiles or fine stonework."

The stoep is a functional transition between the public way and the private house. It is conceptually the meeting of the family and its urban world, and it is visually a means by which one sees the streetscape as an entity. From house to street, it is a link by mediation, and from house to house along the street it is a link by repetition.

II. TO DEFINE: To surround a site with a wall, or any physical barrier, and thus set it off from its environs.

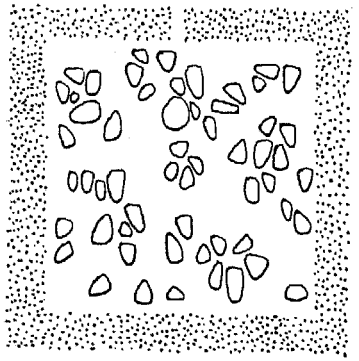


Fig. 11, Define: Enclose disparate structures with a sensible barrier. Produce unity within the barrier and separate from what is outside.

The wall around a medieval town says that all inside it belongs, and is different from the outside. Putting a wall around elements implies a visual connection between them, even though they have nothing in common.

A "wall" may be many things, such as a loop of rapid transit tracks in the heart of Chicago, or a ring of parking structures in Louis Kahn's proposal for Philadelphia.

Depending on its nature, and location, the wall may be either oppressive and confining or pleasantly protective. Walls in African villages of the plains must be a welcome relief from the agrophobic vista that otherwise occupied its inhabitant's gazes.

III. TO REPEAT: To link by introducing one common factor in each of the dispersed parts of a design, or of an existing situation. That common factor may be formal, or material, or even functional—historical.

Perhaps the most easily understood example of this kind of link lies in the Italian towns which are identified by the hundreds of private defensive towers which stand above their house-tops.

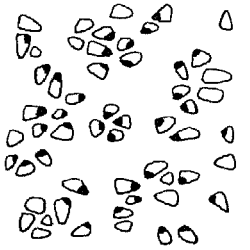


Fig. 12, Repeat: Give each element a feature common to all in the group so each is identified as part of the same order.

A more subtle example of repetition as a linking device is in what Kevin Lynch has called the "grain." If the plan of an urban place reveals clusters of buildings which have size and shape of space between them in common, we see that cluster as just that, a cluster of elements which relate to one another in a way different from the way other buildings in the vicinity do. They are an identifiable group, in plan, because they have a peculiar grain pattern.

On the ground, in three dimensions, one perceives the same unity because of the repetitive size of building and size of space between the masses of buildings. The only difference between this situation and the compositional means of linking by implication is that this repetition need not be a case of intent. Grain occurs in the historic build-up of an area because the use of buildings is similar, the style of building in a given time is similar, and the amount of space deemed adequate between them is similar.

IV. TO MAKE A SEQUENTIAL PATH: To arrange buildings, or parts of multi-use buildings in a sequence of useful activity. Further, to reinforce such a path by any means necessary to propel persons along a general, designated path. Finally, to design a path, or reinforce a path in the natural landscape which will catalyze and give direction to new development along its course.

Designers make sequences of functions on paper, and connect them with arrows, and establish the logic of the flow diagram. In some cases the three dimensional realization

of that diagram is a building in which each symbol has become a room, and the arrows simply doors. The case we are

The case we are interested in, however, is one in which each symbol is a place with the scale of a building. The arrows then become some three-dimensional path between buildings, or a progression through the mega-frame that contains quasi-buildings.

Perhaps this last is an apocryphal sequence of words. A large multi-functional structure may be described as a frame which contains many discrete quasi-buildings (or mono-functional structures) and which contains a transportation system for going from one function to another within the frame. Such a symbiotic entity is one example of a three-dimensional activity sequence.

The temporal sequence sometimes becomes long enough that it overrides visual aspects of an activity path. A two or three month temple pilgrimage on Shikoku Island must be seen as a kind of activity sequence. It is a linked experience. The after-image of some 88 temples and rituals is a demonstrable residue of the activity.

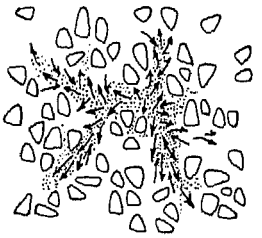


Fig. 13,
Make a Sequential Path:
Place activities that are done sequence in identifiable spatial relation to one another.

V. TO SELECT: To establish unity in advance of the design process by choice of site.

The designer may pre-select a link for a large scale project. He may, that is, choose a piece of land for a town (or an element in the town) which is prominent enough that it will both affect his design, and be a unifying visual force when the project is built.

Obvious examples of that situation exist in Greek peninsula towns, like Miletus and Priene. We frequently identify an area in a larger context by referring to some overriding topographical feature — Russian Hill in San Francisco, or Cool Valley. Unfortunately, designers infrequently utilize the formal potential of land in contemporary America.

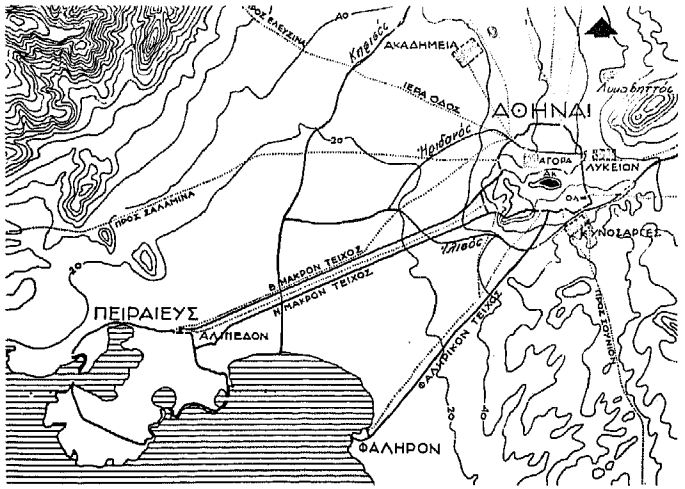


Fig. 14, The Long Wall: A great link between Athens and the port, Piraeus. Built to provide efficient and protected movement between the two cities. An example of Mediation.

Fig. 15, (above), Shopping District in Shinsaibashi, Osaka: *A roof unifier which is becoming more and more common in Japan. Each shop pays a portion of the cost of the structure. The roof simplifies and unifies streets which are otherwise chaotic. This elaborate example of mediation moves as the weather demands.*

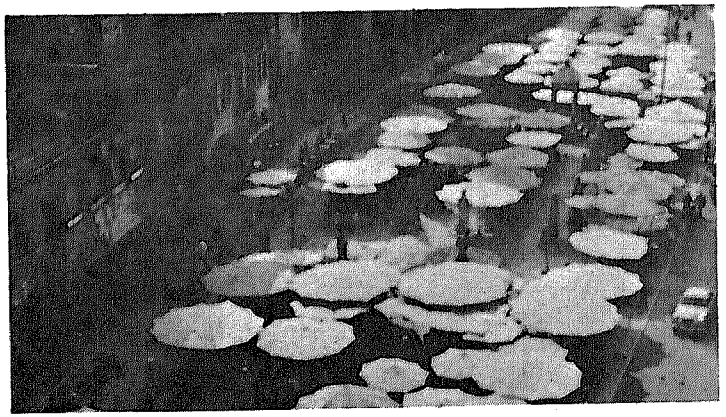


Fig. 16, Piazza in Verona: *A delightful pattern of umbrella roofs which cover a market. The place is already powerfully defined by surrounding building, and these roofs can be light and temporal. This is a subtle mediation.*

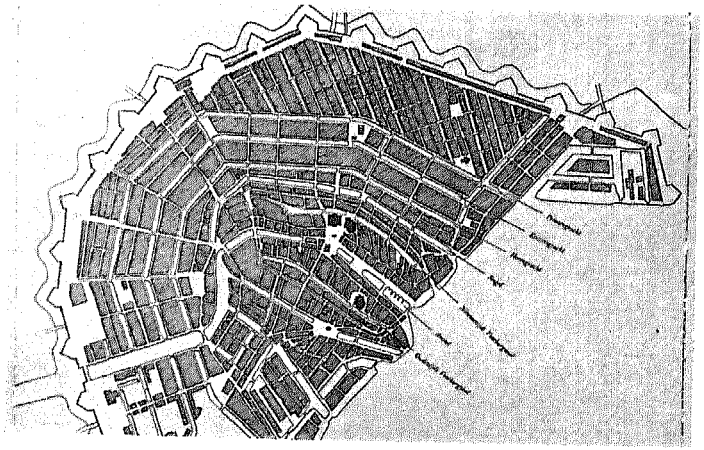
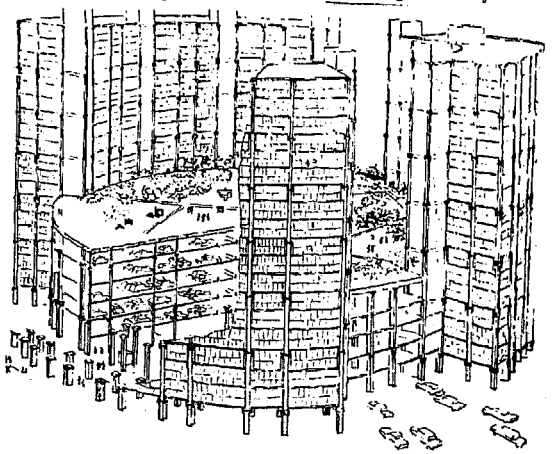


Fig. 17, (above) Nineteenth Century Amsterdam:
Canals flow between the buildings, establishing a pattern of movement, and an example of mediations by which the whole town is unified. Venice is another classic example of this mode of town building.

Fig. 18, (below) Gateway Interchanges:
(Louis I. Kahn). The garage is a mediator between automobile and pedestrian movement. It is a symbol of arrival.



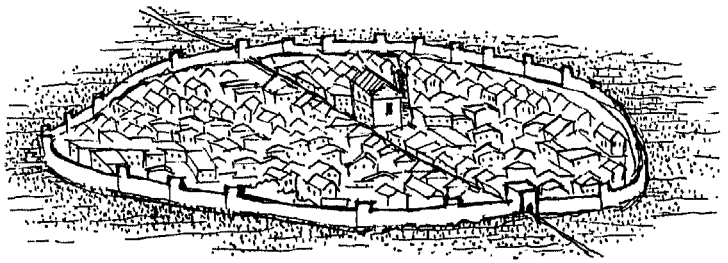


Fig. 19, Cittadella, Italy:
One of the great medieval walled towns . Defense was the primary motive for building this wall, but it defined visual enclosure and gave unity to the town as well.

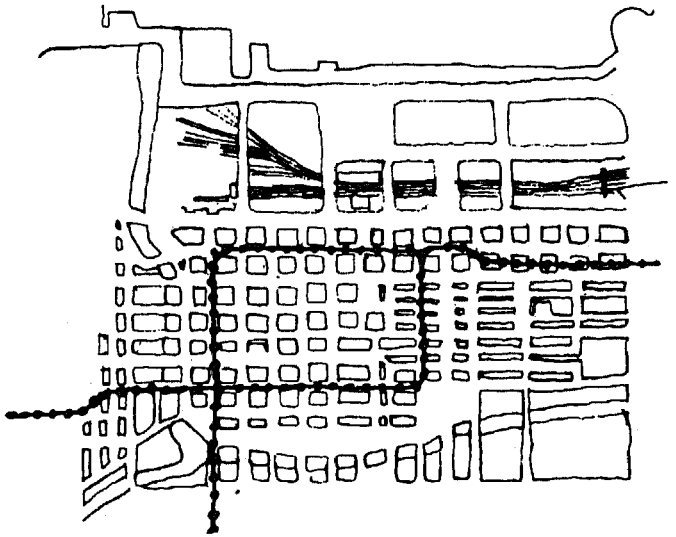


Fig. 20, The Chicago Loop:
Elevated tracks bring people into this commercial heart. They also enhance its concentrated nature by being a sharply defined edge.

Fig. 21, Japanese Agrarian Village:
A beautifully articulated spine of growth. Each of the units that is repeated along this street has the same elements: A large communal entry and place, house, court, and finally, fields. This kind of village is universal, and frequently seen in the Occident.

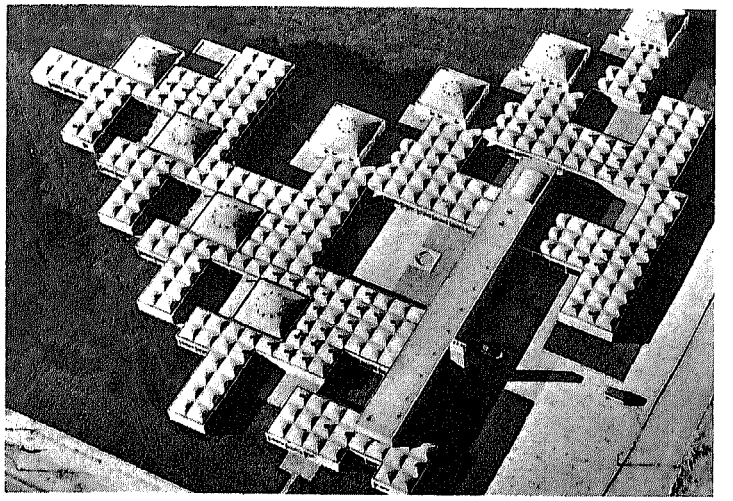


Fig. 22, (above), A Children's Home, Amsterdam:
(Aldo van Eyck) All concern is for providing a place for every kind of human activity, and allowing easy transition from one to another. An inside street has pools of gathering place along it, and opens on more and more private places until each child has his own sleeping area and a cabinet for clothes and toys.

Fig. 23, (below)
Manarola:
Very precise use of natural terrain and similar orientation along with the repetition of buildings that share scale and material, produces a unified townscape.

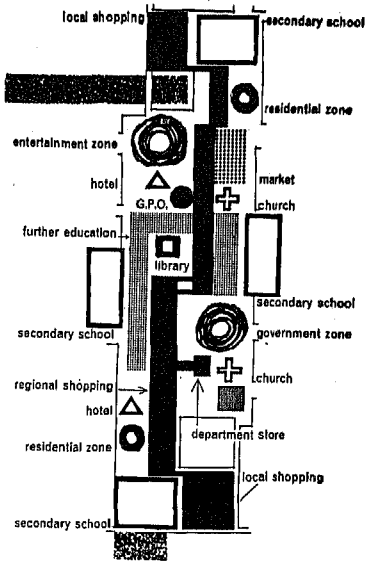


Fig. 24, (right), New Town Center, Hook:
(London County Council)
Retail shopping and civic/religious institutions are developed as mutally complementary sequence of activity. The town center is linked by the movement of people.

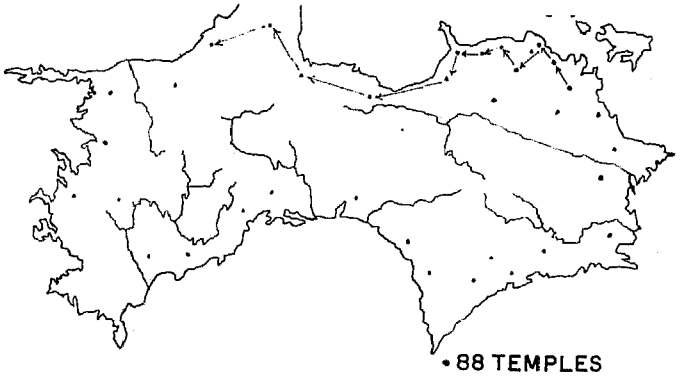


Fig. 25, (below), Shikoku Island, 88 Temples:
A pilgrimmage which takes two or three months. Retained images of recently viewed temples and anticipation of ones to come, make this a vivid visual sequential path.

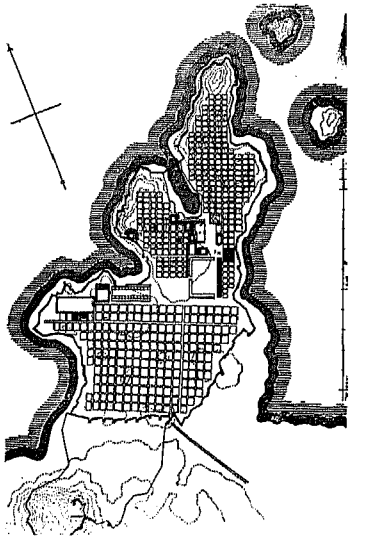


Fig. 26, (right), Miletus:
(Attributed to Hippodamus)
A town simply defined by the limits of the peninsula on which it is placed. This is a natural feature selected for reasons of defense.

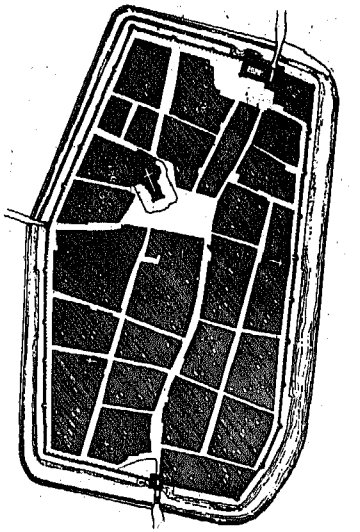


Fig. 27, (right),
Montagnana, Italy:
The result of selecting a hill upon which to build a town. Once again, the necessities of defense, and an economy of means that results from building on a hillside, are motives for selecting this natural feature of the landscape.

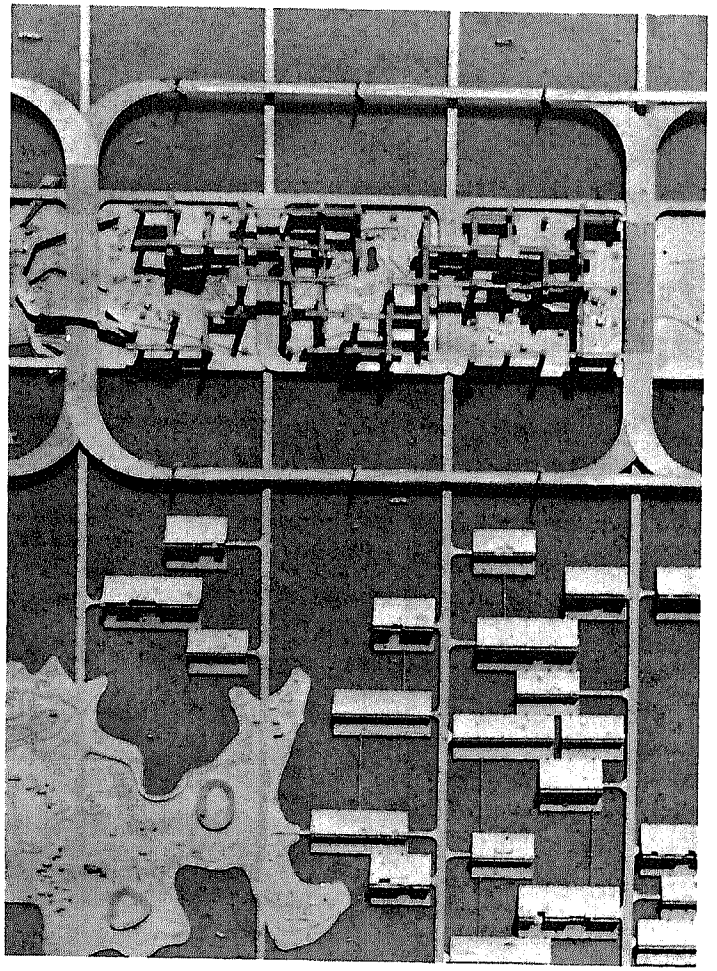


Fig. 28, Tokyo Bay Project: (Kenzo Tange). An example of creating a three-dimentional link. The circulation form extends into the bay (water) and is used as a strong constructed skeleton from which other elements may grow.

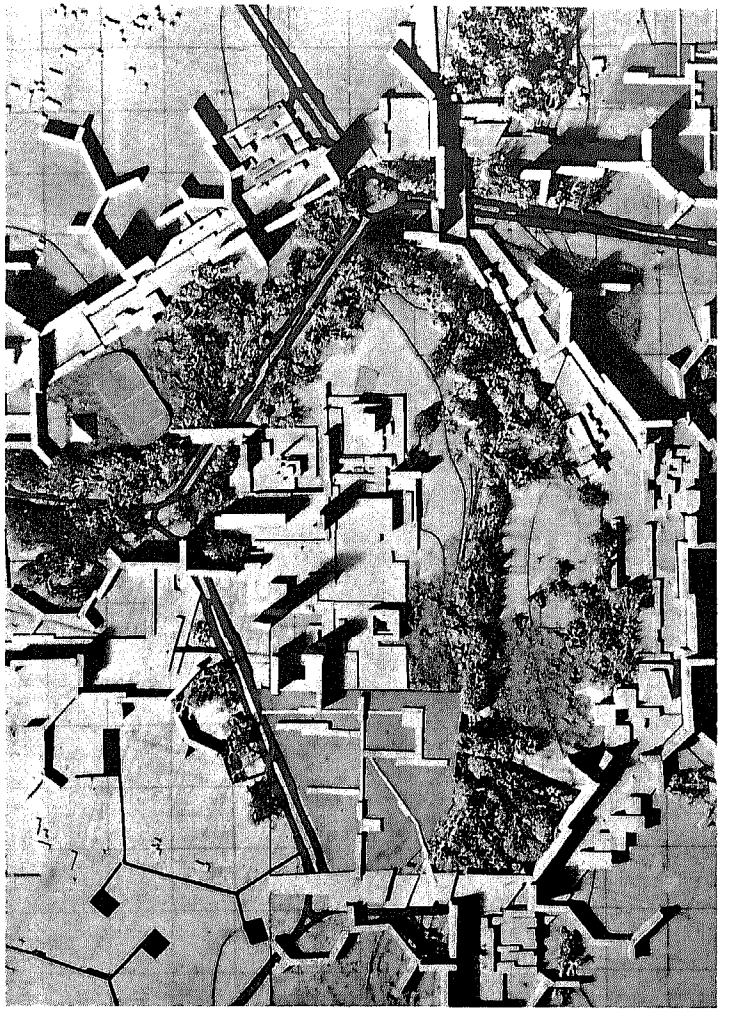


Fig. 29, Plan for new city at Toulouse, France: (Candellis and Woods). Again, the constructed form serves as a continual three-dimension link.

AN APPENDIX

Several projects are illustrated here with an intent to clarify some of the issues we have brought up in the foregoing analysis. The Shinjuku Redevelopment Project, and the Prototype Shopping and Housing Study are a series of proposals done jointly with Masato Ohtaka. They have been done with two purposes: first is the investigation of various collectives forms; second is the exploration of ideas which might be directly applicable for urban pilot projects in Tokyo and other major cities in Japan.

The third proposal—the Dojima Project, and the fourth, K Project are both in an exporatory stage with the possibility of their eventual realization in the near future. Again, a number of ideas derived from the concept of collective form are tested in these projects—an organization of flow and movement systems for people, goods, vehicles and utilities, and their urbanistic expressions are main concerns. Contributors in the projects are Yasuyoshi Hayashi and Toshio Koyama and the Design Department of Takenaka Co. of Japan.

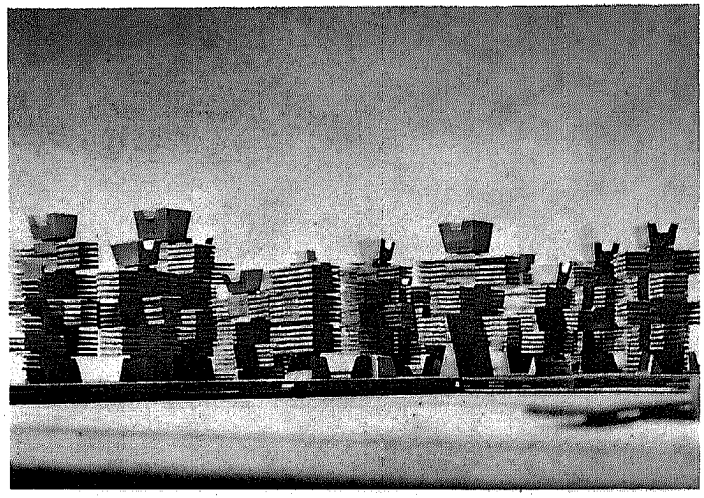
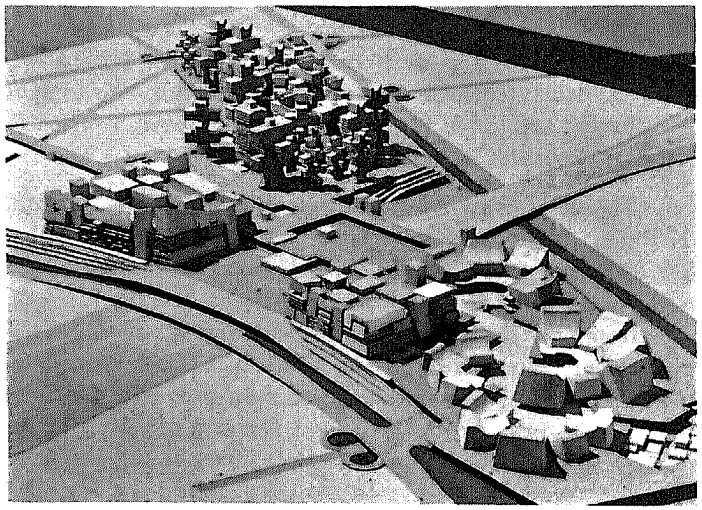


Fig. 30, (above), and fig. 31, (below) .Two views of Shinjuku Redevelopment Project Model.



NO. 1 SHINJUKU REDEVELOPMENT PROJECT

Shinjuku is one of the biggest commercial and amusement sub-centers of Tokyo. Everyday more than a million people use the Shinjuku Terminal, at which point several subways and transit systems converge. The land value around the terminal is one of the highest in Tokyo, yet without intensive use proportional to the value. Most of the existing structures are either one or two stories, rarely more than three. (Average floor area ratio is 1.50). Recently, however, more and more high rise office buildings are being built at the west side of the terminal.

This is a proposal to reorganize existing chaotic traffic situations around the terminal into a more orderly pattern and at the same time suggest new shopping, amusement, and office blocks under more intensive land use, thus relieving a certain amount of land for recreation and high rise residential structures.

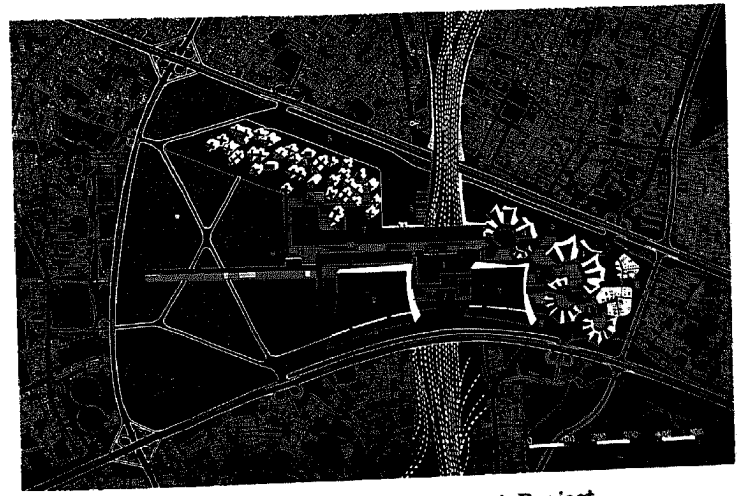


Fig. 32. Plan of Shinjuku Redevelopment Project.

The area taken for this proposal runs approximately one mile from west to east. Two major highways which connect downtown Tokyo with one of the most densely settled commuter zones are north and south boundaries. They are one-third of a mile apart at the center of the area.

Assuming future growth of this area as 150% to 200%, we may predict:

1. Floor areas of 400,000 m² for shopping town. (at present 220,000 m²).
2. Floor areas of 150,000 m² for amusement. (at present 73,000 m²) . (51 movie houses, total seating capacity 33,000).
3. Office space for 50,000 people (up to 100,000 people).
4. Garage for 10,000 cars will be provided within the area.

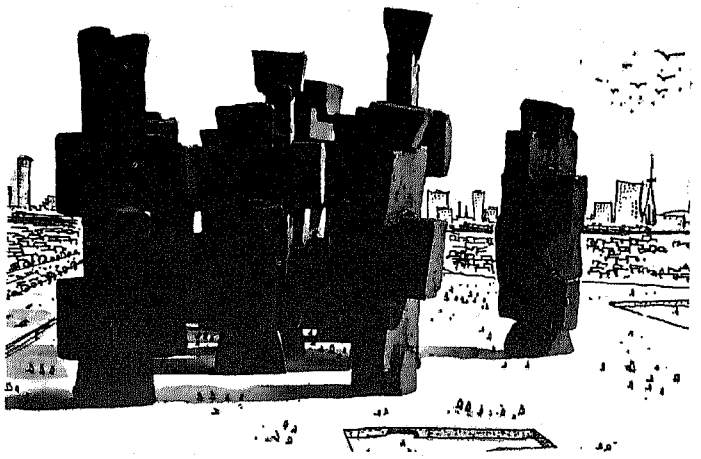
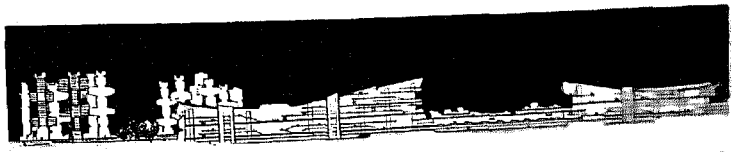


Fig. 33. Office Structures of Shinjuku Project.

The rail terminal is stategically located at the center of the area. Through multi-level platforms for rapid transit systems, subways, trains, buses, and automobiles, the flow of people will be spread in four directions. Except for approaches to the terminal through underground tunnels, all automobiles will be parked in parking structures along the major highways, thus making the inside area completely free from vehicular traffic.

Master form. Shopping, amusement, and office blocks are expandable. The over-all form is somewhat loose. We call this 'master form'. The master form is not a static composition, but is a state of equilibrium sustained by given elements. The concept of 'master planning' has often been criticized for several reasons: first, the whole plan can not be comprehended until it is completed; second, when completed it may well become socially obsolete or at least obsolescent. At worst, the plan is never completed. A master plan is basically a static concept, whereas the concept of master form we are proposing here is more elastic and enduring through changes in the society. Master form is one of the principles of a more dynamic approach in urban design.



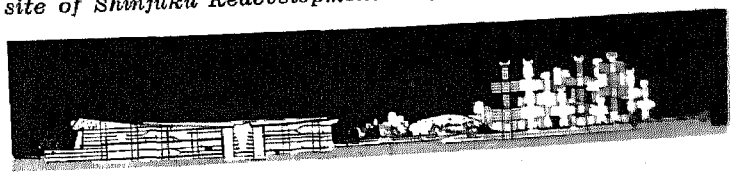


Fig. 34 (above), and Fig. 35, (below). Typical sections through site of Shinjuku Redevelopment Project.

In this project the concept of the collective form is applied as follows:

In the amusement squares, for instance, 'gathering' is a main theme. The plaza forms a center about which opera houses, theaters, concert halls, movie theaters, variety theaters, etc. radiate like petals of a flower. Several plazas are linked together and form the amusement area. We think that this is a kind of form which retains the total image, even if individual elements were designed differently by several architects.

In the multi-level shopping centers which are directly accessible from the terminal, 'milling' of people who engage in retailing, wholesaling, window-shopping, drinking, eating, chatting and passing is the theme which determines the character of the space. It contains shops and stores of various styles and kinds,—both old and modern, western and eastern. Vertical service shafts are the only permanent elements in the structures. Floors will be extended freely vertically and horizontally: shop areas, access lanes, and passageways are also freely changeable, depending upon needs at a given time.

In the office town, a group of towers in various sizes and heights extends densely in a tight area like the Milky Way. Once, Le Corbusier said that 'air' and 'sun' are the basic needs for a humane working place in urban environment. Today we have air-conditioning and fluorescent light. Here, the vista and the development of interesting vista from the windows of the buildings becomes the main consideration. The group of cantilever elements protruded from main shafts start to compose dynamic vistas. The roofs of the cantilevers become gardens.

Elements and systems have been developed through several themes which are generated from human association such as 'gathering', 'milling', and 'vista'. This is an attempt to create an image through grouping of elements that is a reflection of growth and decay in our life process—a metabolic process. This is to conceive a form in relationship to an ever-changing whole and its parts. This is also an attempt to express the energy and sweat of millions of people in Tokyo, of the breath of life and the poetry of living.

NO. 2. PROTOTYPE INVESTIGATION OF URBAN SHOPPING AND HOUSING ELEMENTS.

The formlessness of Japanese cities is almost historic. While there has been the enduring tradition of architecture, landscaping and fine arts, the art of city-building has long been neglected except for brief periods in history. It has also suffered from many fires caused by either war or other misfortunes, against which the wooden houses were vulnerable.

This does not, however, mean the entire absence of spatial languages which have been associated and identified with city life. One of the most outstanding elements is walls. Walls, made of clay, stone or bamboo, low or high, have always contributed to the organization of city structure. They protect and define private sectors from public domain, or even symbolize sacred places against secular ones. They mediate, relate and enhance diversified elements in the city.

The following investigations are an attempt to explore potentialities of the walls in urban design:

(a.) LOCAL SHOPPING DISTRICT DEVELOPMENT

Street patterns of Tokyo may well be described as labyrinthian. One can vaguely discern two major directions in the whole pattern of streets—one is radially projecting from the central district toward the outskirts, and the other is circumferential. The dense development of minor streets between them, however, tends to make the whole pattern a continuous web.

Small shops, stores and restaurants—mostly one or two stories high—occasionally mingled with small factories, make continuous linear development along with the streets where street cars (artery) and bus systems run. Attached small residences behind commerical structures are occupied in general by those who own the shops or who are in low income groups.

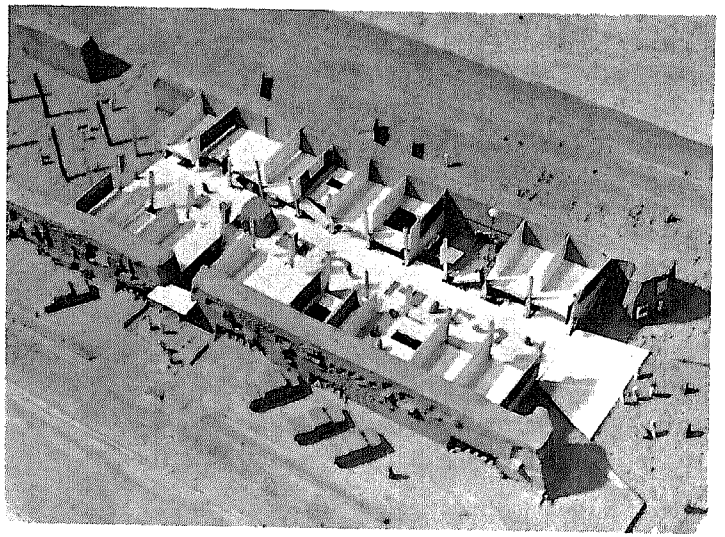


Fig. 36. Prototype Shopping Element.

These areas are subject to becoming slum areas. Surrounded by these areas, the inside areas are generally for better residences, though the degree of decency generally depends on topography and locality of district.

Our suggestion is to develop shopping districts as compact areas so that shopping activity and traffic are separated. This also helps to reorganize the undifferentiated urban facade by giving punctuation of greens, shops and residences. Two parallel walls (the inside of which can be used as either offices or storage space) make the basic skeleton of this shopping development. The area between the walls and the row of columns will be taken and furnished freely by individual retailers. The pedestrian walk can be raised a half-level so that shops above and below will have same access from the walk. The top of the walks is covered by a roof as in many existing shopping districts in Japan.

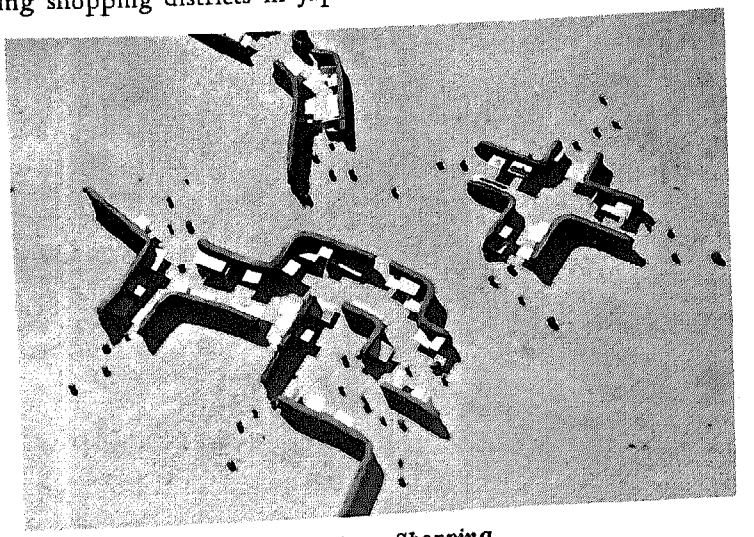


Fig. 37, Variation of Prototype Shopping.

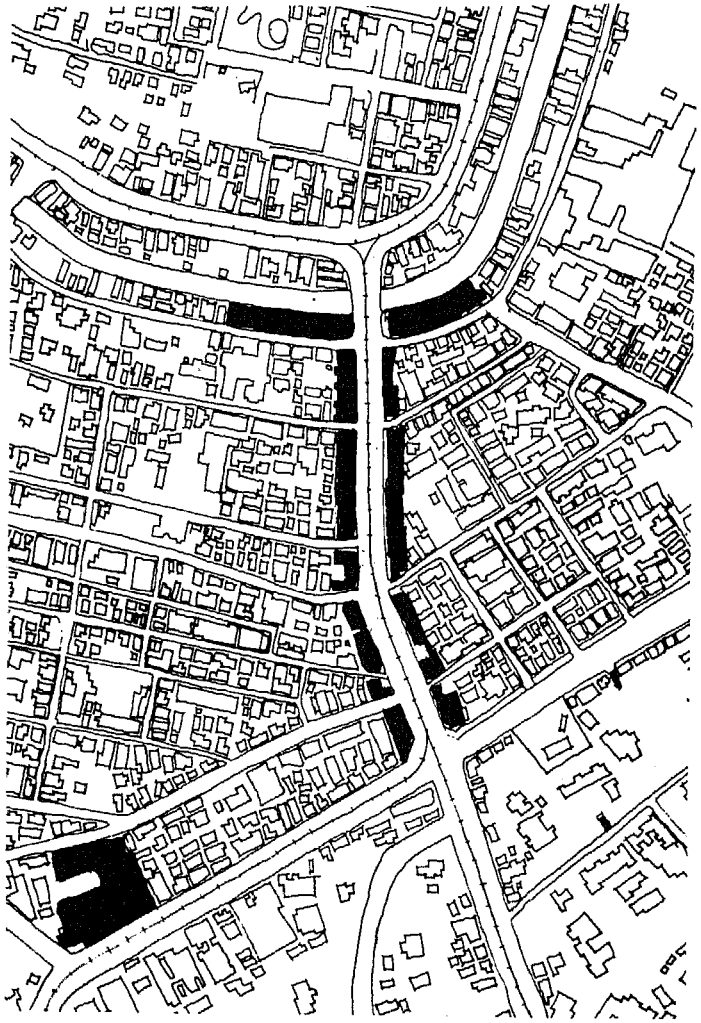


Fig. 38, Typical existing Shopping District.

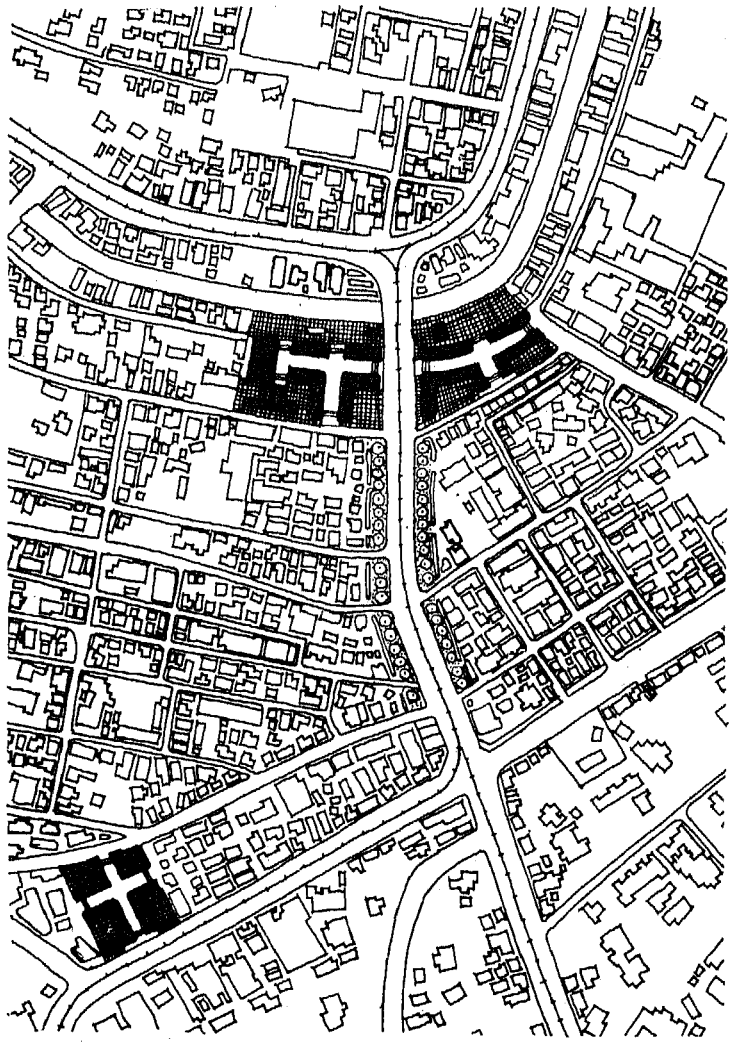


Fig. 39, Proposal for Shopping District.

After the proto-type is established, many different forms and volumes can be developed according to given situations. One might have a cross plan, thus establishing a center for an open plaza; another might be a complex form growing from a given environmental camplexity.

(b.) DISTRICT SHOPPING CENTER

This district shopping center is a further extension of the idea suggested by the preceding project. Multi-parallel and multi-level walls, which house service facilities, are placed perpendicular to an elevated highway in order to facilitate access of motor vehicles from both major and local streets.

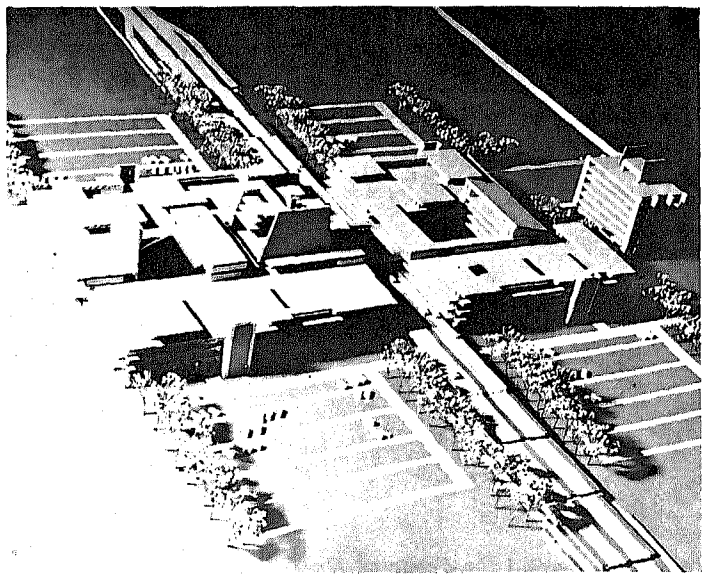


Fig. 40, District Shopping Center.

The area between the walls would be leased to individual retailers. The top floor would be used for restaurants, movie theaters, galleries and civic functions. In the area where land value is high, it will be more appropriate to provide parking garages in the basement and ground floor level. Pedestrian bridges connect the development at both sides of the elevated highway.

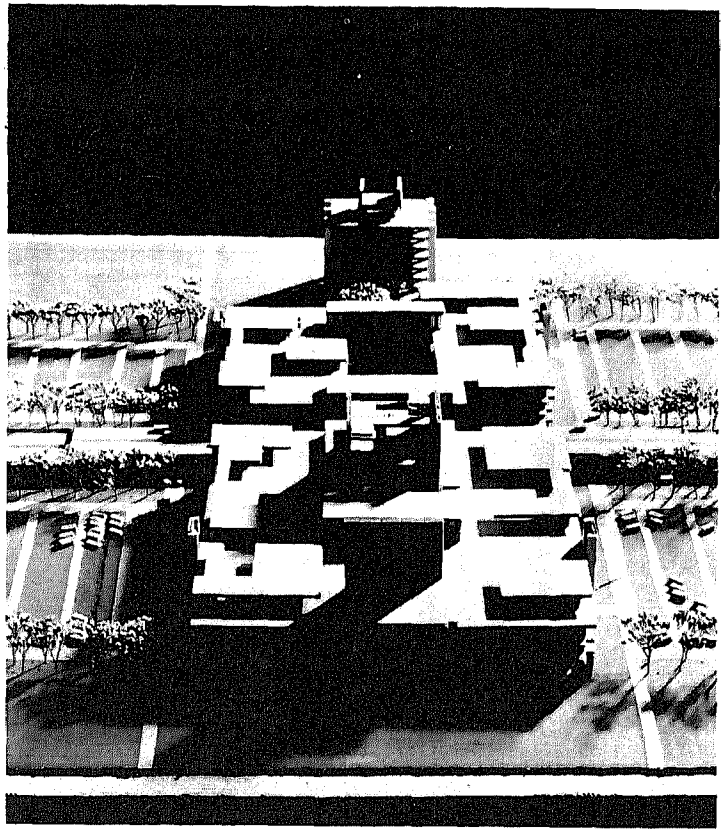


Fig. 41, District Shopping Center.

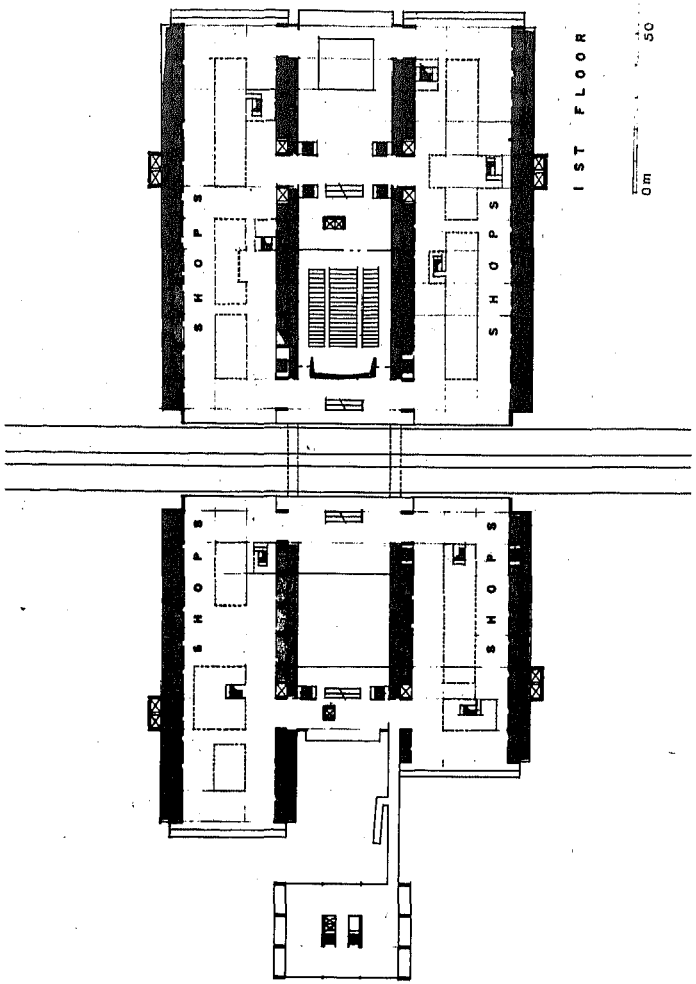


Fig. 42, Floor Plan of District Shopping Center.

(c.) COMMUNITY WALL

This is a device to provide a transitional space between busy streets and quiet residential sections. This community wall, which is a continuous mound, is made up by a series of garages, small community stores, gates, children's play area, etc. This is an environmental wall which begins to be molded by activities outside and inside the community.

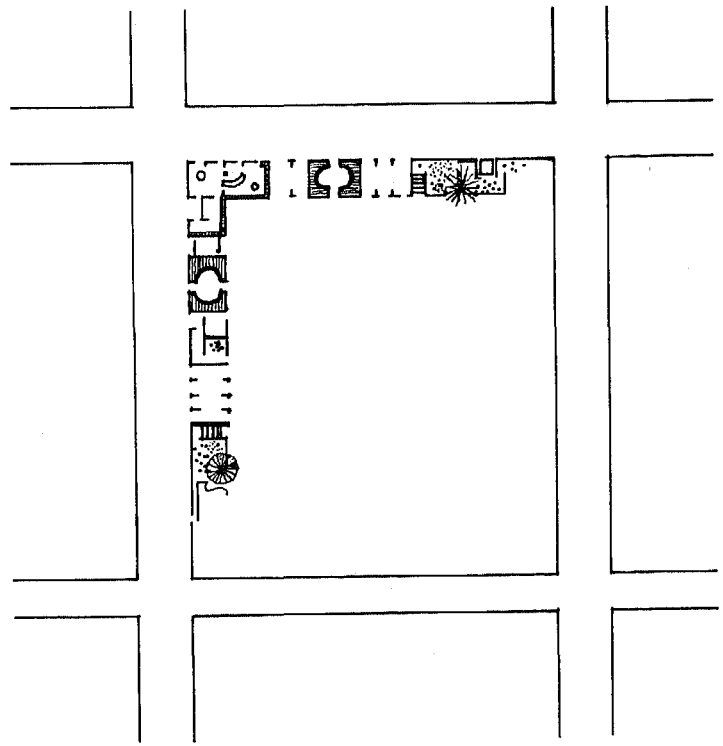


Fig. 43. Community Wall. This mound-wall separates busy street activities from quiet interior which is devoted to residences.

(d.) HOUSING WITH WALLS

Walls between housing units make a landscape. The walls merge to a communal place. Precast elements which come in various sizes create many different spaces within these walls. The walls become the controlling element of a collective form.

In other example, each house has a big roof whereon families have a chance to build additional space—den, studio, living-bedroom and terrace. Below the roof there are more standardized living quarters. Ground floor level becomes communal while the roof level is reserved for individual activities. This idea reflects a trend in the increasing companionship of primary family members. Here roofs as well as walls become environmental mediators.

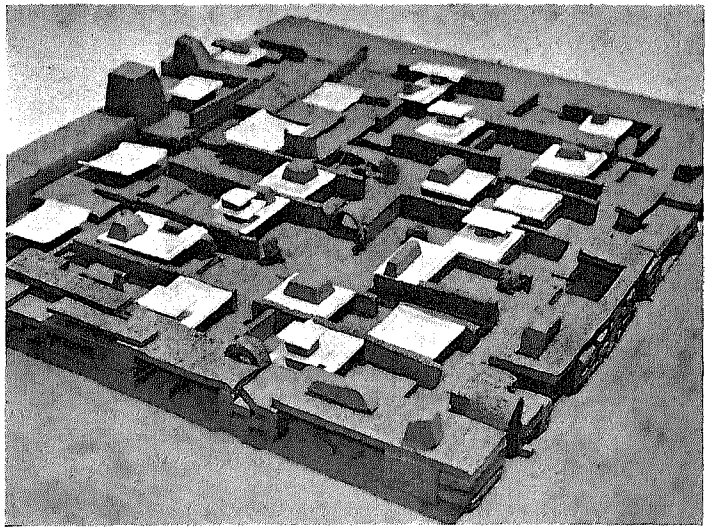


Fig. 44, Housing with walls. Roof spaces used by each family as needed.

Fig. 45, Housing with walls. Walls merge to form a communal space in center of development.

(e.) HIGHRISE HOUSING

This highrise apartment solution suggests the use of walls not as a definer of units but of properties.. The current phenomenal land price in residential districts ($4.00 to $15.00 per square foot in Tokyo) supports the idea that to develop man-made land in the air and on the water is economically justifiable. One will acquire the concrete land on the air and build a housing unit on it. The environmental meaning of walls will be radically transferred from unit divider to property divider, and a corridor becomes a street.

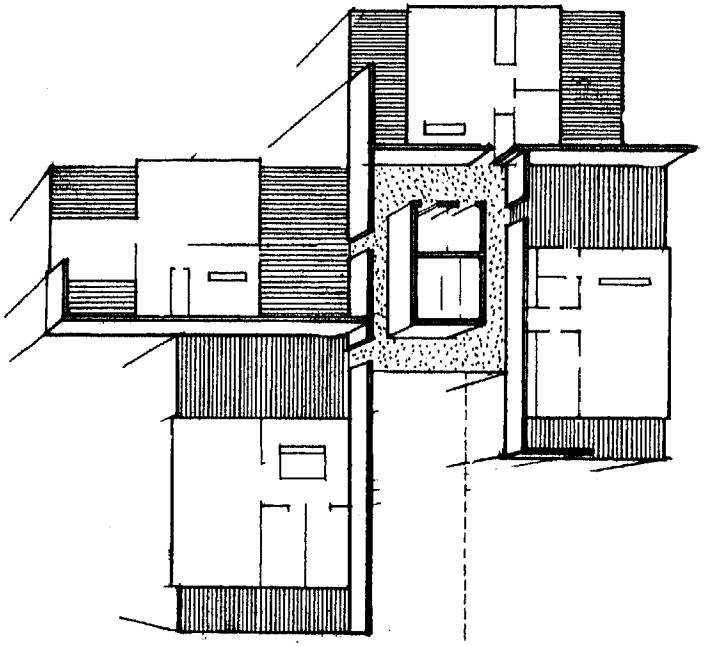


Fig. 46, Plan of Highrise Housing. Walls define properties rather than units.

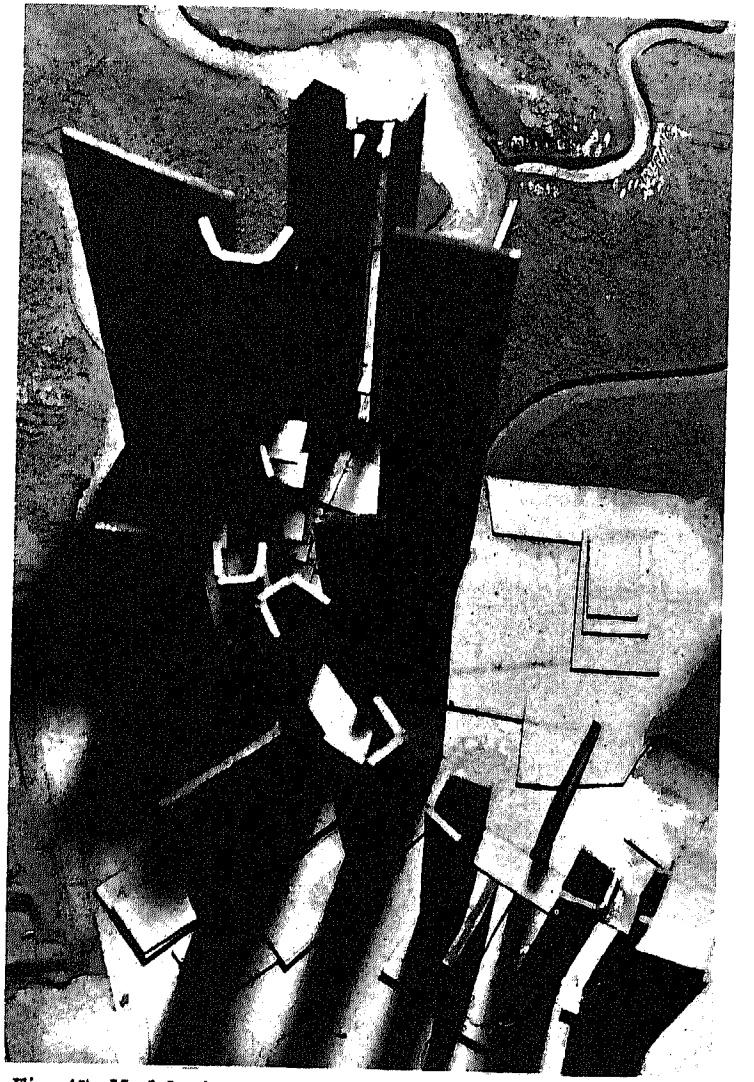


Fig. 47, Model of Highrise House.

3. DOJIMA REDEVELOPMENT PROJECT

Osaka is the second largest city in Japan, second only to Tokyo. Today it has the population of 5 million, and is one of the most active commercial and industrial centers in Asia.

This redevelopment project is intended for an area of approximately 11.5 acres in the District of Dojima, which lies across a river from Nakanoshima, Osaka's chief business center, and on the main traffic artery running north and south through the city. The important terminals of Yodobashi and Umeda are only a fifteen-minute walk away. The area is ideal for a commericial center, and it is possible to provide ample links with factory zones.

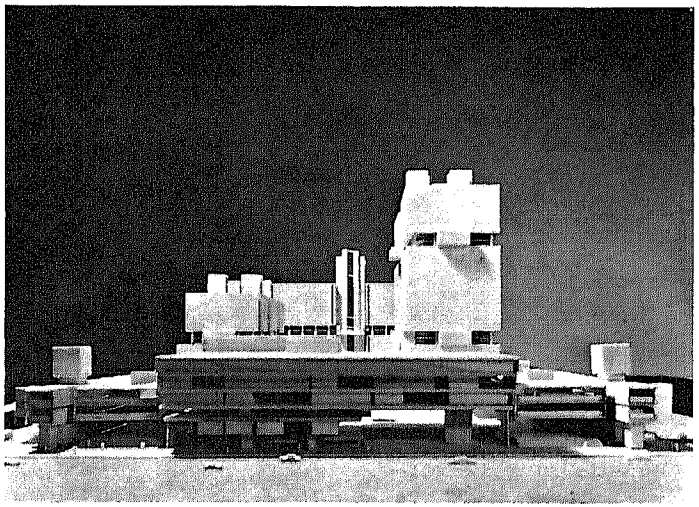


Fig. 48, Model of Dojima Redevelopment Project.

In setting up a program for a district of this sort, it is necessary to consider not only efficiency of operation, but desirability of environment. We believe that about 500% of FRA would be the suitable rate of land usage. This figure alone would give the area three times as much floor space as the buildings now occuping the land, and by adding underground spaces for commerical arcades, parking, and machinery, it would be possible to increase the rate of land use to 840%, or about five times the present rate. The capacity of the area would then be from 20,000 to 25,000 persons and about 1,200 parked cars, as compared to 8,000 persons now and 300 parked cars.

The plan introduced here calls not only for doubling the office floor space in the Dojima zone, but for adding buildings to perform the various functions needed in a downtown center of this sort.

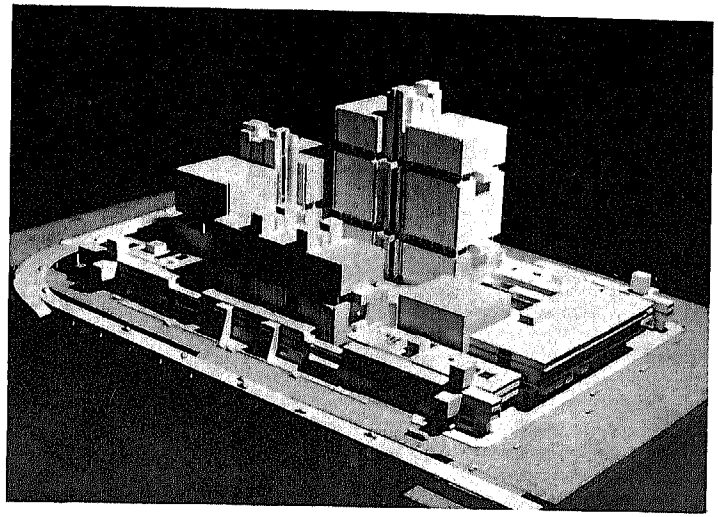


Fig. 49, Model of Dojima Redevelopment Project.

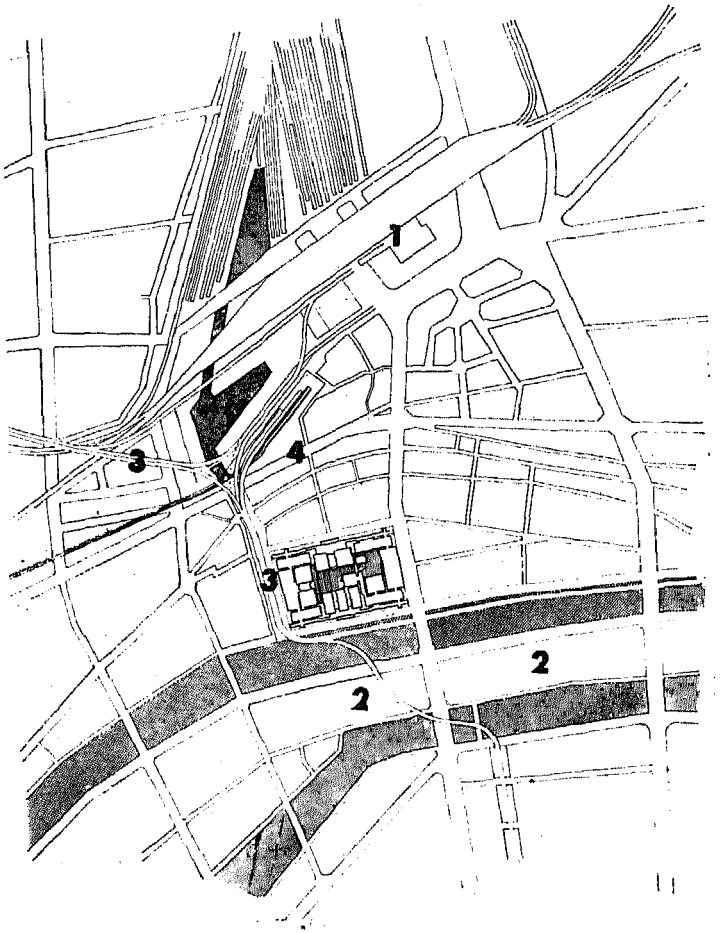


Fig. 50, Dojima Redevelopment Project. Large site plan showing principal characteristics of neighborhood.
1, Osaka Station.
2, Nakanoshima.
3, Highway.
4, National Route 1

The purchasing power will support a shopping center and an amusement area along the north-south edge of the zone, and these installations will provide a necessary element of vitality to the zone as a whole. There will also be room for a large public hall, rentable space for meetings and conferences, and an exhibition hall, all of which are types of space that Osaka needs badly. An art center, which would contribute much to the development of culture in Osaka, is also being considered. All of these things are possible only when one considers the whole district as an organic entity, rather than confining one's attention to single buildings.

In the society of today, the structure of which is ever changing and becoming more complicated, it has become necessary, whether one is laying a plan for a single building or for a whole city, to discover a clear and organic relationship that will link together people, automobiles, goods, and urban facilities.

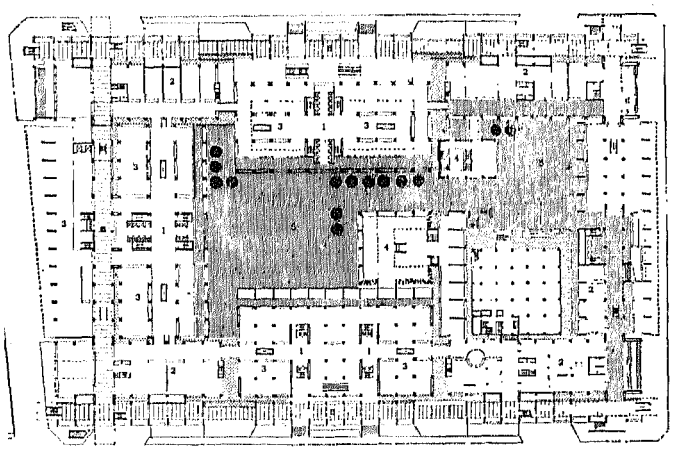


Fig. 51, First floor plan, Dojima Project.

By "organic relationship," we do not mean a relationship that involves the subordination of one element to another, but rather one in which each element maintains its identity, while at the same time being engaged in dynamic contact with the others. The system that permits the greatest efficiency and flexibility with the smallest organizational structure is the ideal. In the Dojima plan, the functional relationships form a skeleton, while rentable space, such as that which might be used for offices and shops, has been considered as a variable element, with an interchangeable character.

In discussing the Dojima plan, we should like first to go into the structure of the control system for automobiles. The

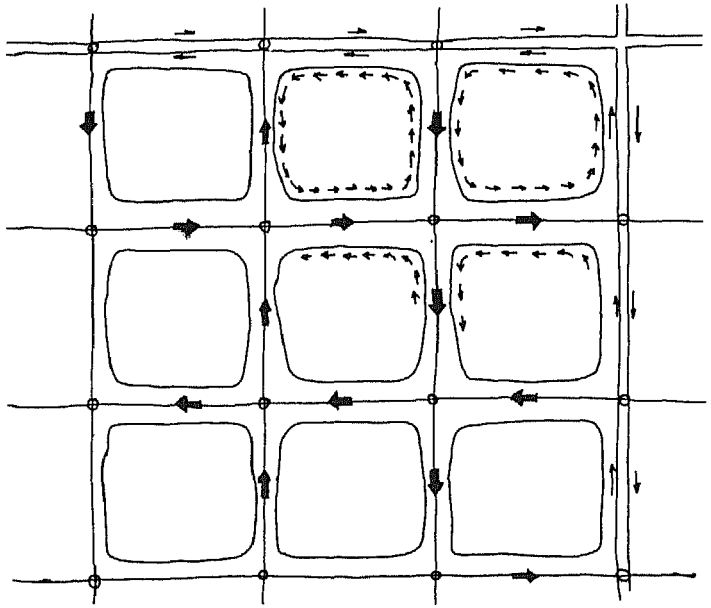


Fig. 52, Dojima Redevelopment Project. Sketch showing underground movement of cars.

area in question is already fairly congested, and since the redevelopment plan calls for increasing the daytime population from 8,000 to 25,000 and the number of parked cars from 235 to more than 1,000, it is the social responsibility of the planners to make adequate provision for these increases. The plan, consequently, contains the following provisions:

a. Four presently existing blocks would be combined into one superblock, and traffic on streets within the area would be diverted to streets around it.

b. Since it is possible that the direction of movement on lanes in the surrounding streets will change in the future, the redeveloped area would be surrounded by a belt road (6 feet lower than the surrounding streets), which would facilitate the incoming and outgoing flow of cars. The belt would connect with four ramps leading to underground ring garages. One reason for the service belt was that it is not certain how the surrounding street system will develop. The service belt provides a flexible solution for almost any foreseeable change in the surrounding traffic system. (Fig. 52 and 53).

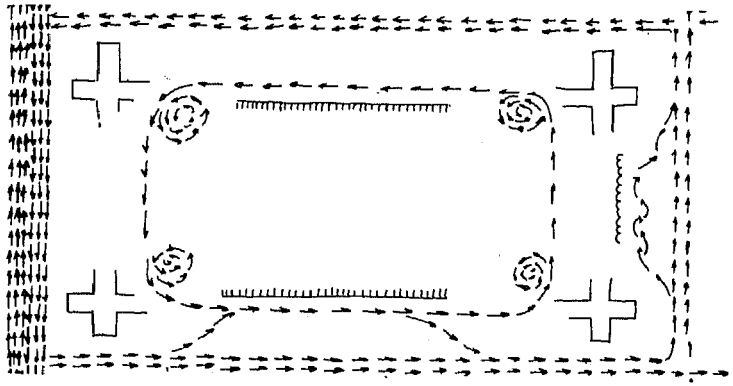
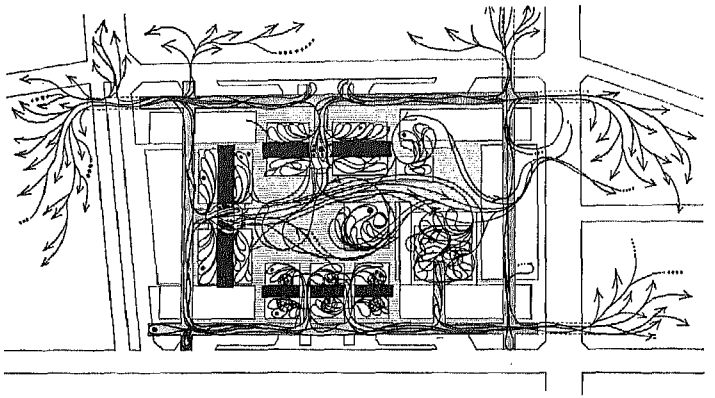


Fig. 53, Sketch of car belt system connected to ring garages.



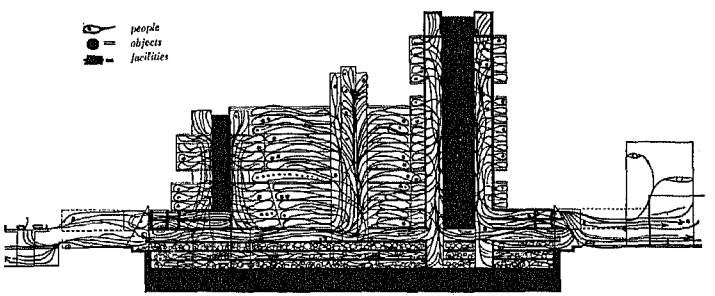


Fig. 54, (above), Movement diagram, and Fig. 55, (below), section.. Key plans of the Dojima Redevelopment Project. Work by Kiyoshi Awazu.

c. In principal the approaches for private automobiles and taxis would be on the north and south sides of the area. The service approach would be on the west side. The approach for pedestrians would be on the east (see floor plan for first floor). There would be collective terminals for automobiles on the north and south sides, and people, having alighted from the automobiles, would walk to buildings. Cargo is delivered by trucks of the sort used at airports and then to a ring service lift, from which door-to-door service would be possible.

There are two basic approaches for pedestrians. On the one hand, there would be a two-level promenade above the peripheral underground streets. The walks would link with the offices, the commercial core, and the automobile terminals. Along the promenades there would be shops and show windows which would create an urban facade. The effect would be a street for pedestrians only.

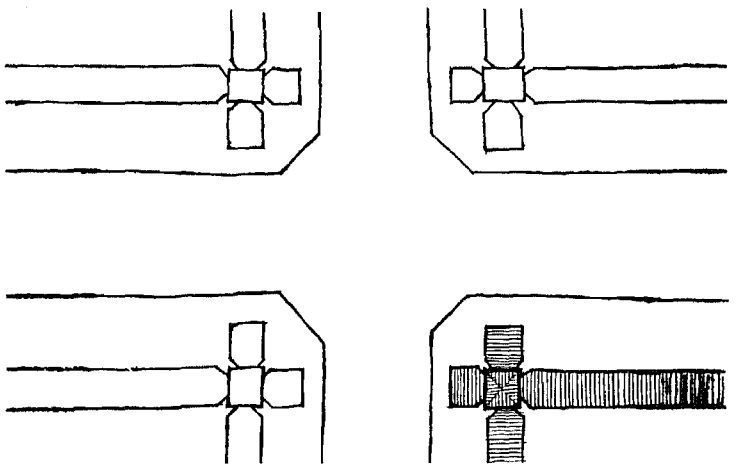


Fig. 56, Diagram of nodal parts.

On the other hand there are a series of plazas which can be approached through the gateway from the busy east side shopping street. The promenade would link with the plazas through buildings' vertical cores. The plazas would also have fountains, sculpture and band-shells, and would be surrounded by show rooms and restaurants free of automobile noises.

At the four corners of the area the promenades would intersect with cantilevers, from which bridges would lead to adjacent blocks, when the adjacent areas have been developed.

Two intersecting cantilevers create a small plaza at the corner where crowds gather and disperse. It is a form derived from the recognition of the strategic importance of the corners in human movement and association in urban areas.

With regard to office space, the relationships linking people, goods, and mechanical facilities were explored in a different fashion. Basically, there is a central core for elevators and stairways that intersects with the promenade and plaza at a right angle. At the same time ducts and toilets are arranged into a facilities space that runs at right angles to the vertical core. Around the facilities there is open space for offices

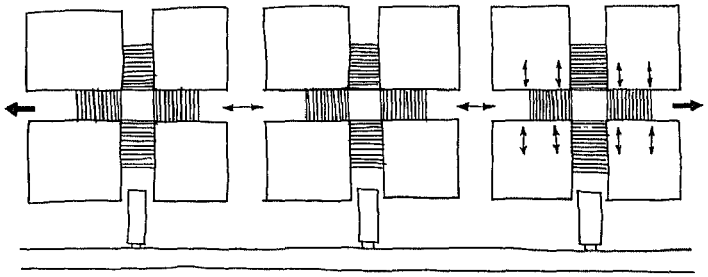


Fig. 57 Diagram of Office Towers.

Machinery is located on the third and fourth basements. Here there is a heat supply plant, which is linked with substations on the upper floors. These in turn are linked to control rooms on each floor. The heat-supply plant is designed in such a way that it could be the basis for a private company supplying steam to buildings outside the redeveloped area. The ends of the upper sub-plants project out beyond the walls of the building, so as to express the idea of taking in and letting out air.

The spatial relationships in this plan, then, are aimed at giving an urban form to the functional relationships that link people, cars, goods, and mechanical facilities. The aim in the future will be to find a still clearer and more dynamic solution for these relationships.

NO. 4 K-PROJECT

The site of K Project lies along a rapid transit terminal near downtown Tokyo. The site is at present occupied by an inactive railway yard, and the National Railway System, the owner of the site, is considering selling the entire property to a private developer if his plan would contribute for a further development of the area around the terminal.

The site is approximately 100 meters in the south-north direction, and 1,000 meters in the west-east. Along the other side of the rail line, there are the main entrance to the terminal, a department store, and a complex of movie and other entertainment facilities. The vicinity is predominantly for low class residential structures, with mixed use of small domestic industry and wholesaling. A considerable amount of the area is below sea level, and subject to frequent floods.

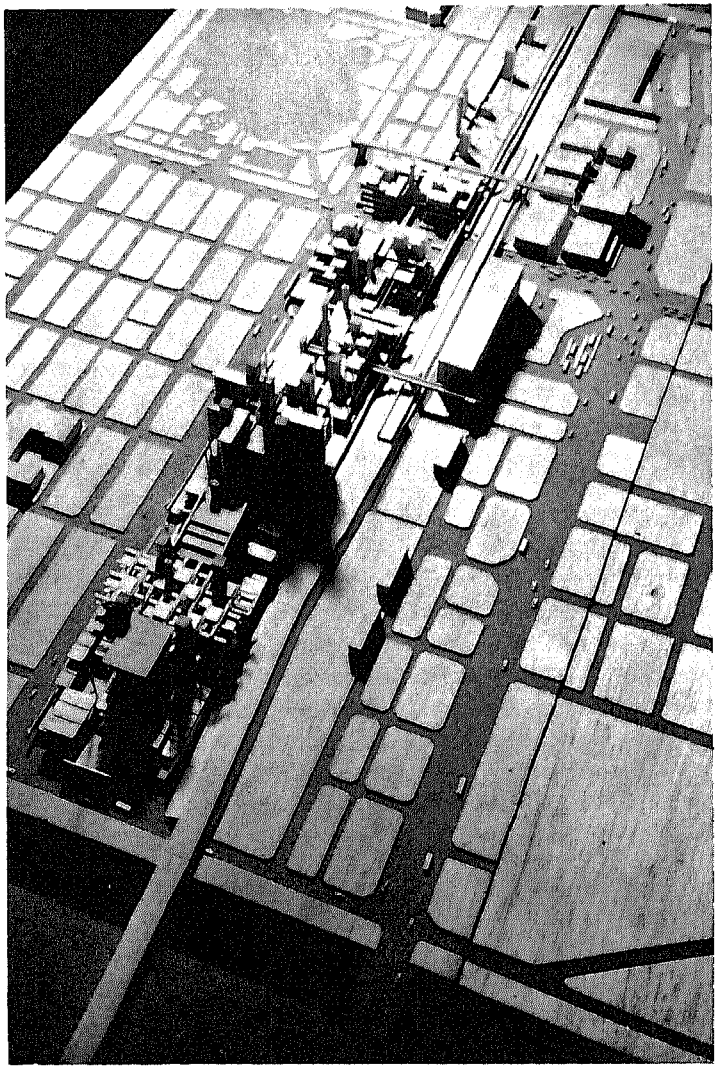


Fig. 58, Model of K-Project.

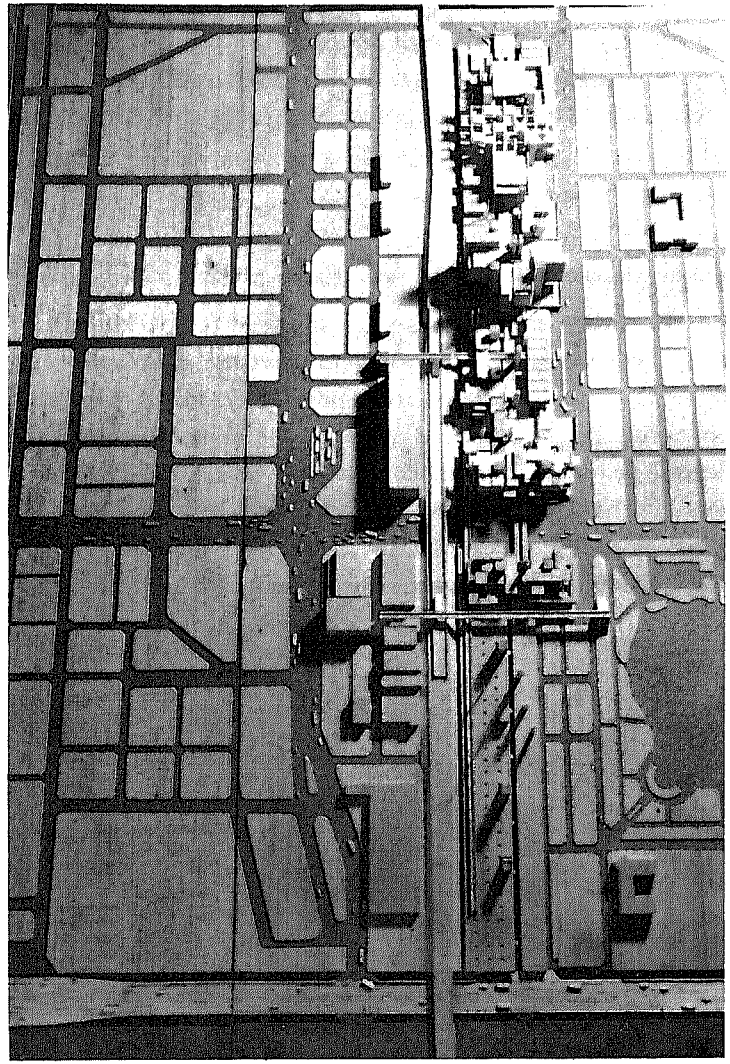


Fig. 59, Model of K-Project.

It is proposed to develop a complex of buildings, which consist of medium and small size stores, a terminal for local and express buses, a wholesale department store (one like the Merchandise Mart in Chicago) and educational and social facilities.

Since the initial investment may not be sufficient to develop the entire site at once, the scheme is designed to make the development through several stages possible.

The sub-ground level is primarily used for parking facilities. The main level is three meters above the ground level in order to prevent the floor from possible flooding. A central pedestrian promenade runs through the center of the site. Several pedestrian vertical cores would be erected from this zone. The promenade is connected with the existing terminal by the bridge, and at the cross point provides a main plaza. Numerous stores would be generated from this spine.

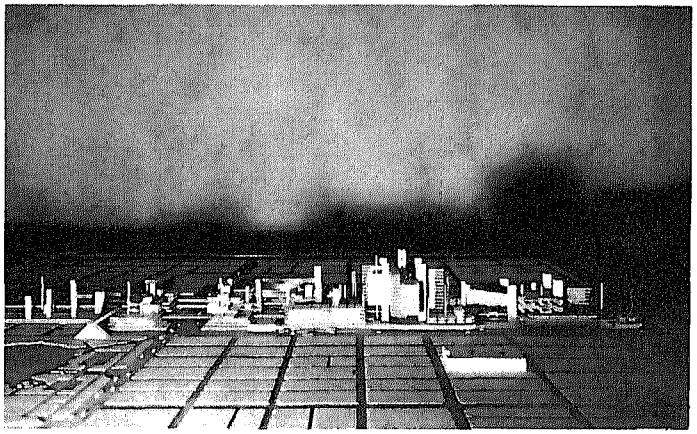


Fig. 60, Model of K-Project.

The wholesale department store has a pedestrian vertical core at the center of the building and four shafts for goods at the corners. The spaces for exhibit and office work are developed between these four shafts in a swastika manner.

This whole concept suggests a "master form", that would preserve the essential concept of the design principles, at the same time providing certain flexibility.

EDITOR'S NOTE

In all research of an investigatory nature, there is never a formal ending. This work into Group Form is being continued in Japan by Professor Maki. It is to be hoped that many of the projects outlined in this appendix will become realities.

PHOTOGRAPHIC CREDITS

Fig. 7. A Sudanese Village — Photograph by R. U. Light: Focus on Africa, American Geographical Society.

Fig. 9. A Japanese Village from "Japan From the Air" by Susumu Higachi.

Fig. 14. The Long Wall, Athens. Photograph by John Travlos.

Fig. 16. Piazza in Verona. Photograph by G. E. Kidder-Smith.

Fig. 17. Amsterdam in the 19th Century. Photograph from "Towns and Buildings" by Steen Eiler Rasmussen.

Fig. 18. Gateway Interchanges by Louis Kahn (from Perspecta).

Fig. 21. A Japanese Village from "Japan From the Air" by Susumu Higachi.

Fig. 23. Manarola, Italy. From "Italy Builds" by G. E. Kidder-Smith.

Fig. 24. New Town Center, Hook. From "Planning a New Town" (London County Council).

Fig. 28. Tokyo Bay Project by Tange. From "Japan Architect," April 1961.