Physical Urban Growth Design: An Integrated Urban Prototype Model New Town Guasare, Venezuela

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We will look at a dynamic physical urban growth process (developed for a specific project, New Town Guasare in Venezuela) which utilizes prototypes at varying scales as a means of creating towns and neighborhoods. This approach is a departure from the typical contemporary urban design processes... especially in the application of infrastructure. Modern urban design commences with the definition of the infrastructure. In the Integrated Urban Prototype Model the infrastructure is subject to an incremental growth which corresponds directly to the growth of the structures of the neighborhoods. This differs from current urban village schemes such as Seaside (Duany and Plater-Zyberk)[1] or Poundbury (Leon Krier),[2] as it is based on process rules with no fixed master plan. The assumption is that a general **process** can be defined which will, at each stage, seek to build something which affects the growing whole positively. The whole emerges stepwise, becomes complete and solid in the process, and is capable of changing over time with only good effects. This theory is genetic as it seeks to define a process, which like the processes of biology, allows a coherent whole to emerge from a large number of independent acts of design and construction, and which are controlled by social, legal and fiscal mechanisms.

THE IDEA OF A GROWING WHOLE

In the book *A New Theory of Urban Design*, the process of achieving wholeness in the structure of the city starts with the idea of a growing whole:

> When we say that something grows as a whole, we mean that its own wholeness is the birthplace, the origin, and the continuous creator of its ongoing growth – that its new growth emerges from the specific, structural nature of its past; that it is an autonomous whole, whose internal laws, and whose emergence, govern its continuation, govern what emerges next. We feel this quality very strongly in the towns which we experience as "organic." To some degree we may know it as a fact about their history. To some degree we can simply feel it in their structure as a residue.[3]

For example, the growth of the town of Motovun in Istria may serve as an example of a growing whole.[4] Some years ago I studied this town in detail together with my colleagues. We found some fascinating growth features about Motovun, such as a particular growth pattern and a structure of the town which was reflected in an urban fabric of overlapping and interconnected urban entities. A better known and often cited example of this kind of organic urban growth or growing whole is the historic growth of the city of Amsterdam from the 15th to the 20th century.[5]

The following quotation from *A New Theory of Urban Design* gives a detailed and more formal description of the idea of a growing whole:

This kind of growing wholeness is not merely something that existed in old towns. It exists always in all growing organisms (which is why we feel that old towns are somehow organic ... simply because they share, with organisms, this self determined inward-outward governed, growing wholeness)...

In each case, we are aware that the future growth of the thing, is created, from the present, by an impulse towards wholeness. Somehow, this impulse towards wholeness, is allowed to govern the next steps in the creation, the expansion, the formation of details, the formation of the largest and the smallest wholes. Furthermore, in each of these growing wholes, there are certain fundamental and essential features.

First, the whole grows **piecemeal**, bit by bit.

Second, the whole is **unpredictable**. When it starts coming into being, it is not yet clear, how it will continue, or where it will end, because only the interaction of the growth, with the whole's own laws, can suggest its continuation and its end.

Third, the whole is **coherent**. It is truly whole, not fragmented, and its parts are also whole, related like the parts of a dream, to one another, in surprising and complex ways.

Fourth, the whole is **full of feeling**, always. This happens because the wholeness itself touches us, reaches the deepest levels in us, has the power to move us, to bring us to tears, to make us happy.

Many traditional towns had these features in their process of growth. But the process of modern urban development does not have these features. It does not deal with growing wholes at all. First, although the growth is often piecemeal, the piecemeal character does not contribute to a growing wholeness. It is merely piecemeal, and produces unrelated acts, which lead to chaos. Second, the growth is not, in any deep sense, unpredictable. It tends most often, to be controlled by conceptions, plans, maps , and schemes. But these plans do not have the capacity to generate growing wholeness. Instead, they force an artificial contrived type of wholeness. Third, planned development is also generally not coherent, not in a deep felt sense. It is supposed to be. But if we ask ourselves, whether the final product of current urban design (and architecture) projects, actually is coherent in the real deep sense that we know from traditional towns, then we must say no. The order is superficial, skin deep, only in the plan or in some contrived orderliness of the arrangement. There is no deep inner coherence, which can be felt in every doorway and every street. And fourth, this modern planned development which we think of as normal, certainly has NO power to evoke deep feeling. It can, at best ask

for some kind of admiration for "design." But of deep feeling there is no word, not a tremor, not a possibility.[6]

According to this short description of wholeness and a growing whole as applied to the structure of the city, it is clear that the quality of wholeness will have to come from the process. And this process must be capable of making each act of construction related to the construction before, so that one network of interrelations and connections can occur. This task can only be accomplished by a process which has the creation of wholeness as its overriding purpose, and in which every act of construction, no matter how small, is devoted to this task. In our work we have developed a set of principles which are directed at creating a process which enables this state of wholeness to emerge and are outlined in the following section.

PRINCIPLES, RULES, AND SYSTEMS OF RULES FOR CITY BUILDING AND MODERN URBAN GROWTH

We may say then that City Building[7] and modern urban growth according to this line of thought is based on the principle of wholeness and the idea of a growing whole. And with this, we must ask ourselves how many laws, rules, or principles are needed to make this single overriding principle of wholeness and a growing whole applicable to the formation of part of a city, town, or neighborhood. Over a period of time various principles, rules, or systems of rules were developed as theories and for application in real projects. These principles were then shaped into more detailed rules for testing, simulation and application. Some of the relevant principles (listed here without sub-rules) include the following:

Organic Urban Order: The city or urban area is made up of many individual elements and buildings and is not planned and built according to one master plan.

Piecemeal Growth: The city or urban village is being planned, designed and built in step by step formation, one building after the other, thereby forming the city or urban area in a dynamic growth pattern.

Structure Preserving Transformations: The step by step formation occurs in a qualitatively definite way through the enhancement of the existing structure (see below for more details).

Visions or Concrete Imaginations: Each individual project or building is first conceived by the individual owner, architect or participant as a vision or concrete imagination, in the mind's eye.

Formation of Larger Wholes: Larger urban aspects are considered and the larger urban structure will emerge in the process of growth.

Creation of Positive Urban Space: All space in the development of the city is "positively" shaped.

Application of Spatial-Geometrical Properties: Positive space and other geometrical properties will not only be applied at the larger scale but will also occur at the medium and smaller level of buildings and other urban details.

Participation: The people, users, owners and inhabitants of the urban area should have a say and be part of the history of the making of an urban neighborhood.

Pattern Language and Project Language: The formation of a Pattern Language or Project Language ensures that the participants have a common language based on functional arguments for the development of the new area.

Formation of Centers and Fields of Centers: The overall development occurs as a field of centers, itself made up of many other fields of centers at various levels of scale.

Continuous Design and Construction: Design and construction are integrated so that the field of centers can also manifest itself at the very small level of construction.

Note: Principles for particular projects can include specific and more detailed rules, such as A) rules for the layout of buildings, or B) rules for particular construction systems or rules for particular material or color schemes.

A Particular Principal In Detail: Structure Preserving Transformations

So that we can understand its operational means and applications, the principal of Structure Preserving Transformations will be discussed. Essential to the understanding of processes and good processes is the notion of transformation. Designing and building are essentially a continuous series of transformations. The principle of Structure Preserving Transformations is one of several tools which help guide the process of transformation toward the creation of centers and fields of centers. The principle is made concrete in three detailed and sequential rules which one carefully applies over and over again:

1. With each act of placing an increment of design or construction, we have to **understand and respect the existing structure** of what is there so far.
2. With each act of placing an increment of design or construction, we also have to **preserve the existing structure.**
3. We not only have to preserve the existing structure, but we also have to **enhance the existing structure** of what is there so far.

A very basic example illustrates this principle starting from a set of points. Each step can be checked with regard to the criteria of preserving or not preserving, preserving and not enhancing, or preserving and enhancing such that a greater and denser field of centers is created in the emerging whole. An interesting historical example may be the growth and change of the development of the Piazza San Marco in Venice as discussed in the book *Design of Cities* by Edmund Bacon.[8] The example of Piazza San Marco does not only include straight transformations, but it also includes change through subtraction. The church San Marco and the square itself do not only grow through straight additions but sometimes something (such as the earlier church) is taken away to make place for something new (the new church, San Marco).

THREE INTEGRATED PROCESS MODES OF URBAN GROWTH DESIGN

Over the years various City Building projects were developed or carried out either as theories or as part of built projects. Each particular urban project was developed with its own set of principles, rules, or system of rules. From these projects with their particular set of principles, three types of process development or three basic process modes of City Building can be identified for communities, neighborhoods and urban villages. These three modes or models share the same ultimate goal of creating cities with a quality of wholeness and therefore are made up of the same basic principles and rules used to create a good process. With these similarities in mind, it is the actual working process used to get to the same point (i.e. the emergence of wholeness) which defines their differences.

Model 1: The Standard Integrated City Building Model: The Urban Structure Grows According to a Definite Physical Plan

This first process mode of City Building is the most typical case and the one we are most familiar with. In this process the urban structure is conceived, designed, and built as a complete entity. Its particular quality in terms of City Building grows out of the integrated process of design and construction — a process of building in which design is embedded in the process of construction and throughout the project to its completion. Examples in which we have applied this process include the Eishin Campus in Japan and the Amazon Urban Village in Eugene, Oregon. The development of the town of Seaside in Florida, by Duany Plater-Zyberk is an example of a project which shares some similarities to this model.

Model 2: The Integrated Prototype City Building Model: The Urban Structure Grows According to a Prototypical Physical Plan With the Need and Provision For Variations

In this second process mode a prototype for an urban structure, such

as a neighborhood, is developed in detail both in plan and model. This prototype model is then applied in an actual place. The quality of the urban structure then grows out of the process of multiple variations and reformations of the prototype which arise from each particular situation, such as the particular needs of people and the particularities of landscape and contours. We have used this approach to the New Town Guasare in Venezuela (the focus of this article) as well as Moshav Shorashim in Israel. An historical example of this kind of model might be any of the numerous Latin American town designs which were born from the codes set forth by Philip II in the "Law of the Indies" from 1573.[9]

Model 3: The Integrated System of Rules Model: The Urban Structure Grows According to a System of Rules in a Dynamic Process

In the third process mode there is no physical plan or prototype for the ultimate urban structure at the beginning of design and construction. Instead the plan is embedded within a system of rules which carry the possibility of endless manifestations and mutations within one coherent framework. In this process a particular urban structure (a neighborhood or an urban village) grows step by step as each element of structure is added in relation to the previous step according to the defined system of rules. The quality of the urban structure comes out of this generative process of growth. This third procedure, has to my knowledge never been attempted or materialized in modern urban design, and only exists as a theory, spearheaded in the book, *A New Theory of Urban Design.* The San Francisco Waterfront Project served as the first project which demonstrates this kind of dynamic approach to urban growth and development. This approach is currently being tested in the Park City Frankfurt project in Germany.[10]

Application of Model 2: The Integrated Prototype City Building in New Town Guasare, Venezuela

In this paper we are mainly concerned with the understanding and the application of the integrated Prototype City Building Model. The plan for the New Town Guasare is an example of this particular model of dynamic urban growth. This model may be best understood by distinguishing between A) the development of a prototypical neighborhood, and B) the simulation of growth patterns of the neighborhoods as particular phenotypes. In the case of the neighborhoods for New Town Guasare the prototype came from an overall idea for the town.

A. Development of the Prototypical Neighborhood
   The development of the prototypical neighborhood was done with the application of the following principles:
   Organic Urban Order.
   Structure Preserving Transformations.
   Visions or Concrete Imaginations.
   Formation of Larger Wholes.
   Creation of Positive Urban Space.
   Application of Spatial-Geometrical Properties.
   Participation.
   Pattern Language and Project Language.
   Formation of Centers and Fields of Centers.

B. Simulation of Growth Patterns of the Neighborhoods as Particular Phenotypes.
   Piecemeal Growth.
   Participation.
   Formation of Centers and Fields of Centers.
   Continuous Design and Construction.

The development of the prototypical neighborhood started with a discussion of the overall new structure of the new town and the application of the principles of *patterns* and *participation* as well as *organic urban order.* We began by describing the large scale structure of the town in such a way that we saw clearly how the individual neighborhoods would be embedded in the town. Essentially, we envisioned the town as a system of arterial collector roads, with neighborhoods hanging on these collectors like bunches of grapes. At the center of the system of collectors, the town has a square or main center. This concept is described in a diagram which was worked out together by CES and ISA and Kevin Lynch in 1982 in Maracaibo.

As a result of this exercise, we defined the critical elements which must be adhered to for the proper implementation of this diagram. These are a combination of both the essential patterns and systems of rules that were determined to be necessary to allow for the emergence of wholeness.

1. The neighborhoods are not too large and not too small. Specifically we believe that they need an area of about 6-9 hectares each. If they are much smaller than that, they do not have enough structure to mean anything. If they are larger, they will become too amorphous and not capable of providing people with local identity.
2. Each neighborhood has a small central square.
3. Each neighborhood has one "mouth" where it meets the collector road and which provides the neighborhood with its entrance. This mouth connects directly to the central square of the neighborhood.
4. The neighborhood has a collector (road) along *one* side only, and remains open for growth and development on the other three sides. The neighborhood must not be surrounded by collector roads.
5. Local traffic within the neighborhood is extremely slow and mainly pedestrian.
6. There are a few small local link roads and paths from one neighborhood to the next, but these are always minor, and are placed so that they never destroy the function of the main square and the mouth of the neighborhood as its primary channel of movement to and from the outside world.
7. As the town grows, new neighborhoods and new collector roads may be built to extend the population and area of the town but always in such a way as to preserve the essential structure defined by these few parameters.[11]

The application of principles for the development of the prototype as well as the simulation of growth processes was then applied to the following main entities which are listed with some examples of their subdivisions of processes and rules:

The Internal Layout of the Neighborhood:
The Patterns for the Internal Layout of the Neighborhood
The Layout and Subdivision Process
The Layout of the Individual Houses
The Basic Principles of House Organization
The Possibility of Piecemeal Growth
Financing and Administration:
Financing Programs and Modes of Construction
The Overview of the Growth Process
Construction and Embellishment of Streets:
The Vision of the Streets
The Creation of Positive Space in the Streets

FINAL NOTES

The urban process, its nature and implementation, determines the extent to which one can succeed in creating a sense of place in the city and quality in the urban environment and buildings. The Integrated Prototype City Building Model formulates and implements an integrated approach to design and building in which planning, design, construction, and theory are unified. The approach where buildings, based on a prototype model, start to form the city in a piecemeal growth process may be very old but it is also new in today's planning processes in that its application of this particular set of principles.

This type of process is perceived by observers in various ways. Some people feel that this is exactly how old towns grew organically and wonder why one would desire or attempt to do this today. It seems that in a time where accelerated and sometimes anonymous processes have become a key feature of our lives, we need to find ways of coping which actively incorporate living processes into our design, architecture and urban development. In this way we may not only be able to slow down the overheated architectural and urban process, as Juhani Pallasmaa suggests,[12] but we may also be able to control the urban and architectural process more actively.

The Integrated Prototype City Building Model with its system of dynamic rules goes beyond the static codes used in contemporary urban design projects (such as those by Duany and Plater Zyberk, Rob Krier and Leon Krier, the Urban Village Group in England, or the CNU projects in the US). What is common among our work and that of these important new urbanists is a critique of the modernist urban movement as well as a definite positive validation for the importance of density and non one-functional zoning to create life within the structure of our cities. What is also common is a definite understanding of the necessity of coherent urban space. However, it is the way we attempt to achieve our common goals that we differ and it is the process in which we differ. In any event, we always return to the question of having the possibility of attaining both freedom and quality in design. It is possible that the combination of freedom of choice and pursuit of quality may depend on the application of the right system of rules which help us to be free and at the same time help us to utilize our potential for achieving good quality in architecture and urban design.

The processes we have described in this paper are demanding by the standards of contemporary urban design and therefore need a high level of attention. Additionally, while developed and used in smaller-scale projects these projects need to be implemented at larger scales to truly exhibit their potential.

NOTES

[1] Andres Duany and Elizabeth Plater-Zyberk, *Towns and Town-Making Principles* (New York: Rizzoli, 1992).

[2] Tony Aldous, *Urban Villages* (Cheltenham: The Urban Villages Group, 1992).

[3] Christopher Alexander, Hajo Neis, Artemis Anninou, and Ingrid King, *A New Theory of Urban Design* (New York: Oxford University Press, 1987).

[4] Werner Funke, Thomas Heinrich, and Hajo Neis, *Development Planning Istria/Four Hilltowns/Motovun* (Edinburgh: University of Darmstadt and Herriott University, 1974).

[5] Leonardo Benevolo, *The History of the City* (Cambridge: MIT Press, 1985), pp. 708-711.

[6] Christopher Alexander, Hajo Neis, Artemis Anninou, and Ingrid King, *A New Theory of Urban Design* (New York: Oxford University Press, 1987), pp. 10-15.

[7] Hajo Neis, *City Building* (Ph.D. Diss., University of California, Berkeley, 1989).

[8] Edmund Bacon, *Design of Cities* (New York: Viking Press, 1974), p. 104.

[9] Lars Lerup, *Building the Unfinished: Architecture and Human Action* .

[10] Hajo Neis, "Three Process Modes of City Building." (Los Angeles: ACSA West Regional Conference, Jan. 1997).

[11] Christopher Alexander, Artemis Anninou, and Martine Weissman, *The Construction of New Neighborhoods for Guasare New Town, Venezuela.* (Berkeley: Center for Environmental Structure, 1983).

[12] Juhani Pallasmaa, "Six Themes for the Next Millennium" *Architectural Review* (July, 1994).

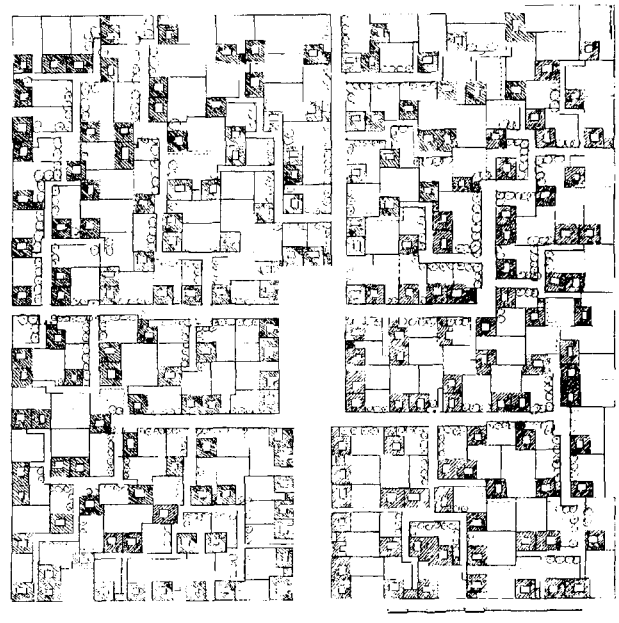

Fig. 1. Neighborhood Prototypes.

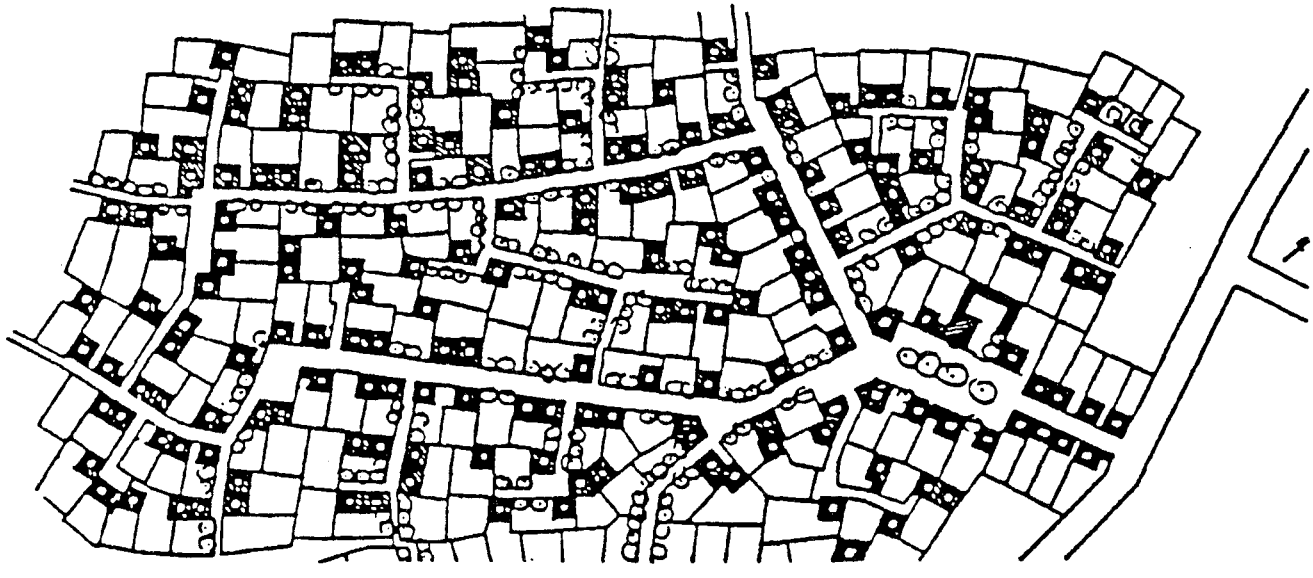

Fig. 2. Neighborhood Phenotypes.

Fig. 3. Completed plan for 2 of the 15 neighborhoods for Guasare New Town.

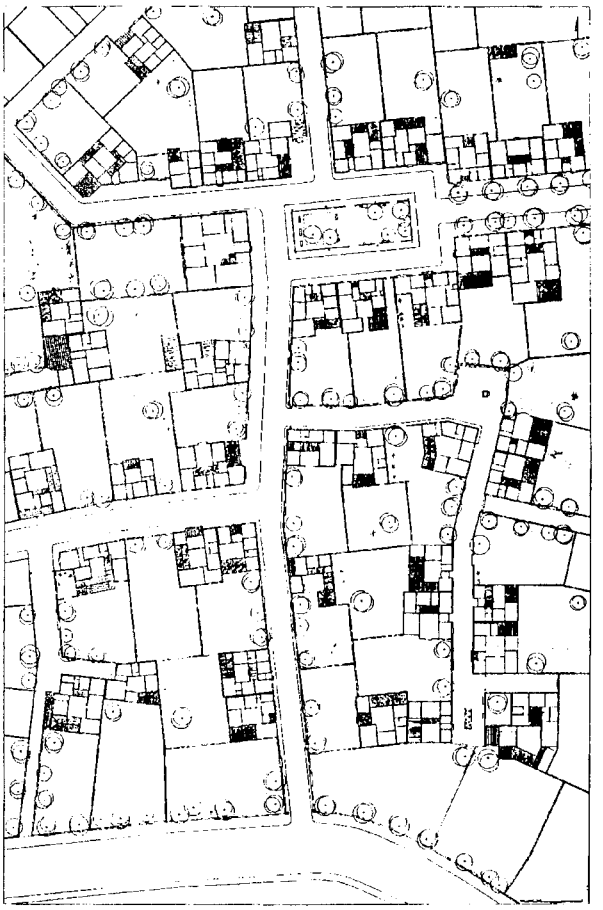

Fig. 4. Detailed plan of a portion of a completed neighborhood.

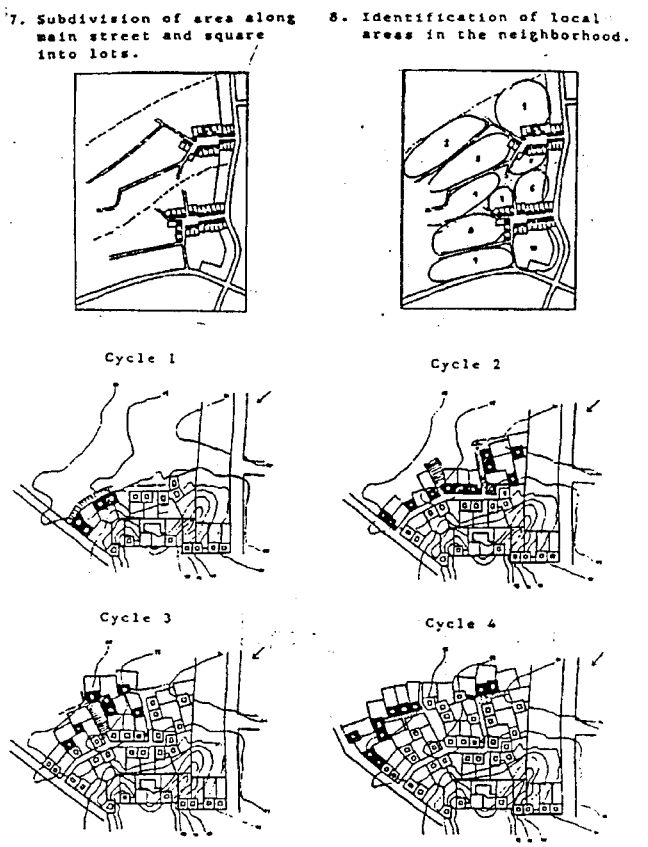

Fig. 5. Piecemeal Growth of two neighborhoods.

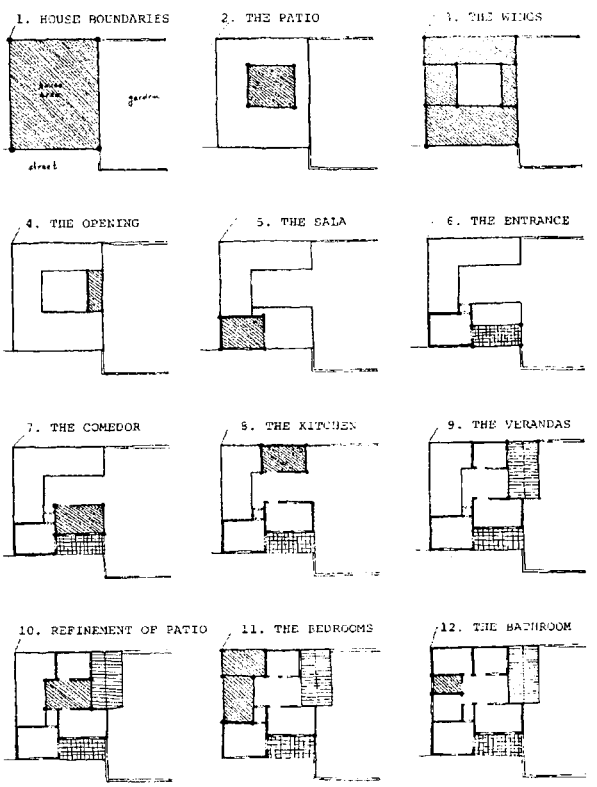

Fig. 6. Steps for the layout of a typical house.