

## PRE DESIGN NOTES:

### URBAN DESIGN IN HISTORY

Workable forms, obtained by trial and error, eventually become the physical models for planning.

Two patterns have characterized town form in history: the rectilinear and the circular.

- **Rectilinear pattern** – originated in agricultural societies, derived from the logic of parallel plowing. Also suited the logic of ordered land planning, property ownership, and building construction.
- **Circular pattern** – was derived from practices of grouped societies, the necessity of enclosing the maximum amount of land with minimum amount of fence (cattle pen, fort...).

Both patterns have been used for planning towns, both systems were used by colonists: the *rectilinear* usually for agricultural settlements whereas *circular* settlements for military installations.

Another planning form is the **radio-centric**, which is a consequence of incremental urban growth, radiating from a center and expanding outward to an urban perimeter.

Town formation and human settlements are a collection of forces and events, a collective intention.

- **Greek** town planning utilized the rectilinear pattern of blocks, forming a town and terminating in an irregular wall. Topography determined the shape of the enclosing wall and position. Towns were limited in size and contained a harbor, central market, a theater and other public buildings. The size of such towns was limited by the food supply obtainable from the surrounding region.
- **Roman** town planning, derived from Greek experience, also utilized the rectilinear form, but with a significant difference. Roman towns had regular rectilinear enclosing walls and two main intersecting streets, the *cardo* and *decumanus* as well as sites for markets, business, government, sport and worship. Roman towns were of two types: the commercial town (*oppidum*) and the military camp (*castrum*). Roman towns were often sited to command strategic land areas.
- **Medieval** towns, often built on foundations of pre-existing Roman towns, may seem like they lack geometric order (Florence, Paris and London were originally Roman towns). But the absence of precise geometry is not an indication of lack of order or planning, rather it is an indication of a sensitive on site adjustment to particular conditions (land use).
- **The Renaissance** Era recalled elements and forms of the classical world; it made use of the classical forum, or town square. It served as a public gathering space, a market, and a site for important public buildings. Several plazas (*piazas*) might be connected in careful composition; plazas and squares are found in all cultures, worldwide, and for the same utilitarian reasons.

The “ideal” city of the Renaissance – a star shaped configuration- was an idealization of a military town, surrounded by defensive walls, subdivided into a star pattern of streets and blocks

- **Baroque** town planning made much use of the boulevard. The plaza served as a convening public forum in a town of archaic size (focus) where the boulevard served to unite the various parts of larger, often expanding city (connector).

The ideas of Baroque planning were practiced in the French landscaping at Versailles, where the principals were developed first for forest landscapes and later applied to towns. The plan of London, Paris and Washington, DC were based on the same principals.

Canberra, Australia and New Delhi, India were the last major city plans to be formulated using the principals of Baroque planning (focus & connector).



### The First American City:

Washington, D.C. In 1791, Ellicott and L'Enfant were commissioned to survey land on the side of the Potomac River for a federal capital. L'Enfant determined Capitol Hill as the location for public buildings.

The plan aimed to be workable for first settlers as well as being capable of enlargement by progressive improvement. L'Enfant was clearly influenced by: a childhood in Versailles; a sense of civic urbanism; and ideas from Jefferson.

The basic idea was one of civic art based upon an understanding of the work of Andre Le Notre, but transformed in scale and intent to operate as a working grid overlaid by axes, vistas, and diagonals, forming a geometry within which to place key buildings and monuments.

It was the implanting of a grand manner, as opposed to an expedient urban form, that brought about a revolution of an idea, combined with the role of classicism framed against a geometry of landscape.

### The City Beautiful:

It could be argued that this created the framework for what later became known as the City Beautiful Movement.

Although there were parallels in other cities, the boldness of the proposals could be seen as a truly American ideal. It is no surprise that it would act as a frame of reference to work on the 1893 Columbian Exposition, where the criteria were framed in greater detail.

The return to classicism also reflected the aspirations of American "city fathers" to show the world that American cities were about more than just commerce and industry, and could be endowed with some of the qualities of the finest European cities.

1. The role of grand public place, with a thought-capturing landscape feature.
2. The creation of civic place interrelated with public place as a central point of the composition.
3. The re-introduction of boulevards into urban form.
4. The role of classicism and monuments to inspire a sense of grandeur.

### Radburn, NJ:

The 1920's saw the emergence of a number of environmental design concepts geared to industrial technology; a good example is the work (largely in the NYC area) of Henry Wright and Clarence Stein which incorporate well designed housing and residential communities. Their efforts are apparent in the town of Radburn, NJ.

Radburn, NJ is a satellite commuter suburb for Manhattan, but with its own work places, commercial center, schools, parks, etc.

Radburn included a separate pedestrian system and a street pattern that prevented thorough automobile traffic. (i.e. superblocks).

### New York State

Stein and Wright also re-planned the entire the entire state of New York – wilderness, rural and urban with the objectives of utilizing land resources rationally and distributing urban and rural population workably. This plan provided for conserving natural resources,



restoring damaged landscapes, rebuilding obsolete cities or towns, and accommodating future growth.

The post World War II era witnessed the acceleration of metropolitan trends. This included the decline of small and mid size towns and the growth of the large cities. Here emerging a,

20<sup>th</sup> century city namely – the regional metropolis.

American cities stopped developing their public systems, or failed to extend their system into the growing regional metropolis (suburbs). As a result, the suburban auto-dependant shopping center largely replaced the city old downtown public dependant shopping areas, leaving it principally as commercial office centers.

On the other hand European cities, with less land to develop and much stronger traditions in urban planning and public transit have succeeded in creating quite livable and economical environments by employing ecologically based regional land planning, a proper balance of collective and private transit, adequate tax financing for public improvements and tax policies that encourage proper development.

The form of cities has always been a reflection of how a society lives and operates. The challenge in urban design is to understand how our society functions, and how government policy, taxation, production, and distribution are the forces which shape cities. *The test is to be able to create urban forms which aid social and urban evolution.*

The architect's responsibility in urban design, as both professional and citizen, is to help develop design solutions and to promote their use.

## URBAN FORMS AND PATTERNS

Land use patterns which have evolved as urban areas have developed include: *the concentric zone pattern, the sector pattern, and the multiple nuclei pattern.*

### Concentric Zone Pattern

The concentric zone pattern portrays the modern American city as a series of concentric rings around an original central business district. These rings are the result of progressive phases of growth, contain various mixture of use, and may have places of obsolescence. The rings do not have precise boundaries, but blend into each other. Examples of this type of cities are, Chicago, St Louis, Albany, Baltimore.

### Sector Pattern

The sector pattern portrays various land uses in pie shaped wedges, radiating from the center of the city.

### Multiple Nuclei Pattern

The multiple nuclei pattern describes a city composed of several distinct central points. Some of these nuclei, or sub centers are old, while others developed as urbanization progressed. In large metropolitan area, many of the nuclei are similar (shopping centers for example), certain similar activities tend to group together for mutual benefit (office parks for example).

Other forms within urban areas illustrate the influence of high speed expressway and public transit systems (i.e. circulation). These circulation systems determine patterns of growth and development in and around an urban area.

The characteristic forms are: the finger, the cluster, and the satellite configuration.

- **Finger Plan or form**, development occurs along corridors of public transit and automobile expressway routes (Long Island towns for example).
- **The Cluster form** consist of varying centers or cluster of activity which may include new towns whose population may range from 10,000 to 100,000 people or more. Each cluster is served by roads connecting to another providing multi directional travel in the region. Ideally public transportation follows the same and also link to the urban core as this supplements the vehicular route.
- **The Satellite pattern** is a variant of the cluster. The difference is that the satellite system has a dominating center, usually the original city.

Other Descriptions of forms or pattern systems

Other ways of describing the various forms or pattern systems of the modern city and urbanized regions, which relate form to transportation are as follows:

- **Linear** describes the shape formed by several cities laid out in a continuous line, and connected by a transportation spine (the eastern seaboard cities, Portland, Maine to Richmond, Virginia forms a large scale linear configuration, connecting along I95). The term "megalopolis" was coined to describe these extensive arrangements of cities. Each city is independent and functions separately.
- **Rectilinear** patterns are formed by systems of streets and blocks formed at right angles. This is the typical pattern for smaller cities and towns, as well as some larger ones.

- **Radiocentric** describes a large circular urban form with a series of radial bands of intense development emanating from the central core, this is the most typical form of urban development and cities that grew over time (Washington DC, Boston are an example).
- **Star or finger** describes a radiocentric form with open spaces or low density agricultural bands or fingers of development (Chicago and surroundings is an example).
- **Ring** shaped development describes a linear form encircling an open undeveloped area, such as a body of water. The cities around San Francisco Bay form a ring.
- **Sheet** describes the shape of an extensive urban area without any specific focal points, well defined routes, or articulated form. (For example, rural land in Midwest). *Urban or suburban sprawl describes low density development.* Haphazard growth or extension outward; one of the disadvantages is that you need more infrastructure (i.e. police, fire dept. etc.) that is not there.
- **Satellite** describes a constellation of urban developments, each with its own central core, located around a major urban center.
- **Constellation** describes a series of urban developments of approximately equal size and population located fairly close to each other but without a dominating center.

Most American cities can be described in one of the ways outlined above, in whole or in part. More often, a city may be described as a combination of more than one of these forms or patterns.

### THE NEIGHBORHOOD CONCEPT

Since the greatest use of land in a city is residential, the concept of the neighborhood has been a major influence in 20<sup>th</sup> century planning. The neighborhood can be defined as a number of families (dwelling units) living in close proximity and having common needs. It comprise of a group of people with common needs and goals for living, education, work, recreation, and other activities.

There have been efforts to formulate the concept of the neighborhood. In 1929 Clarence Perry published the "Neighborhood Theory" proposing that all neighborhood planning should reflect the following six principals:

1. No major traffic arterial or thorough routes should pass through a residential neighborhood; these roads should be on the edge and should form boundaries of each neighborhood.
2. Interior street patterns should use cul-de-sacs, curvilinear layouts, and low volume roadway systems to limit traffic and preserve a quite, safe environment.
3. The population of each neighborhood should be determined by the number of people necessary to support one elementary school. (Of course, busing, made this concept meaningless...).
4. The neighborhood focal point would be the elementary school, centrally located on common green space.
5. The neighborhood would occupy approximately 160 acres of land, at a density of roughly 10 families per acre. It would be shaped so that no child would have to walk more than ½ mile to school.
6. The neighborhood would be served by shopping facilities, churches, and a community center located in conjunction with the school. Also about 10 percent of the total area would be allocated to recreation.

### Concept of a "neighborhood unit" in the 1920's-1930

In 1942, Clarence Stein suggested similar theories concerning the elements of a typical neighborhood, it states that:

- There should be a grouping of three neighborhoods served by a high school and one or two major commercial centers. The maximum walking distance to these facilities is one mile.
- Each neighborhood will have an elementary school in the center within ½ mile of all residents; near the school is a small shopping center.

The concept of a neighborhood can be expanded to the community which is a group of several neighborhoods, having a total population of between 20,000 and 100,000 people.

### **HOUSING TYPES**

*The most fundamental element of urban planning is housing.* The most common residential type is:

- **The single family house**, dominated the new housing market in America since World War II. Advantages are that it provides considerable amount of natural light and air, space for a garden, outdoor space for play.

The negative aspects to the detached house are the relatively large land area that is required, potential urban sprawl, and loss of communal open space. When land costs are high the single family house becomes unaffordable by most people.

When densities begin to exceed five to six units per acre, the advantage of space, privacy, and noise control begin to diminish and therefore makes the single family house unattractive. Row or Town houses then become a possible alternative.

The arrangement of single family houses into a well integrated visual composition is considerably more difficult than grouping larger multi family complexes.

The concept of "Territoriality" is most traditionally expressed by the single family dwelling where ones territory is well defined by a series of boundaries (i.e. property lines).

- **The two-family house (duplex)** comprise of two attached living units. It is less costly than the single family house due to more efficient land use. It can be sited to create higher densities, and retain most of the advantages of natural light, air, access and privacy as enjoyed by the single family house.

It requires as much design coordination to organize into a cohesive visual scene as the single family house. Otherwise its usage can result in a monotonous series of geometric forms governed by uniform setbacks.

The row house consists of three or more attached units, with a maximum of eight in most municipalities. Row houses are usually two stories high and are between 25 to 30 feet wide. It also makes for a more efficient use of land. Disadvantages are sound control between adjacent units, and some loss of individuality.

- **The walk-up apartment**, normally limited to three stories high, combines efficient land use with comfortable human scale (i.e. condo). This type of housing offer apartment living at relatively low density and also provide considerable freedom and flexibility to small families and single persons in the inner city and suburbs.

- **The high rise apartment** accommodates a large number of people in small areas of land (NYC). Disadvantages are, fire safety, lack of recreation spaces on ground floor, and greater security are all contributing to higher costs. The potential for social freedom are some advantages.

Properly sited high rise apartments can make a considerable contribution to the cityscape; provide relatively large number of housing units in relation to land coverage, while conserving valuable space.

## DENSITY & HOUSING PATTERS

**Residential density is a measure of the number of people accommodated in a given area of land.**

Densities can be described in two ways, *net or gross*.

**Net Density** is the ratio of people to land excluding streets, which may represent approximately 25 percent of the total site.

**Gross Density** is the ratio of people to land including streets, local facilities, and open spaces.

**Gross Density is a more useful measurement.**

*It is possible to design perfectly livable communities at a great range of densities.* The difficulty arises from trying to build communities with one type of building. Housing types should be mixed with adequate communal open spaces and access to shopping, work, recreation, schools, etc. (for example, the concept of the New Urbanism).

Density affects costs; lower densities mean expensive public utility distribution costs. Roads, sewer, water, power, and other distribution networks are greater in length in relation to people served.

*Dependence on automobile circulation favors low densities.*

Effective and efficient public transit requires moderate densities; the average is 30 persons per acre. Many European new towns, as well as older American towns are built to that density (considered high...).

**In general American residential suburbs have a density of 10 persons per acre.**

Housing patterns are determined by the layout and configuration of streets, open spaces, and apportionment of land into building lots.

**The most common housing patterns are:**

**The street front pattern** is one of the most common, developed in a linear fashion along a street. This provides for an easy access to units, uniformity of orientation, and a clearly defined plan. Although the linear design may result in monotony, a strong axial feeling can be softened with setbacks and landscaping.

**The end on pattern** consist of rows of units located at right angle to the street. This reduces the total street frontage but increases the lot depth. There can be a saving of street length but units are more remote from the street. Parking must be arranged in grouped rather than individual arrangement. Units may face each other on common pathways, or they may be placed front to back (horizontal or vertical) to enjoy a favorable orientation.

The court pattern groups units to face into a common open space. The result is a visually pleasant enclosed space encouraging sociability. Since this pattern also reduces street frontage, the land cost per unit are reduced considerably.

Patterns should be adopted with careful consideration of their full impact. A thorough examination of all of the aesthetic and social influences is the basis for designing livable neighborhoods.

Cluster developments are developments where dwelling units are grouped, and more densely sited, than in conventional developments. The remaining land serves as common open space. (I.e. cluster housing concept). Developing this way reduces costs whereas length of utility runs and streets is reduced. Also better use is made of open spaces, where it is serving the residents within the development (left over spaces...).

The common spaces may be deemed to the public, or owned and operated cooperatively by the residents through an association.

The planned unit development (PUD) is the legal recognized zoning designation used to achieve the cluster concept. The planned unit development may apply to commercial and industrial as well as residential types of development. It is therefore broader in concept than the residential cluster pattern.

There are three major characteristics of the planned unit development:

- Normally involves large scale development ranging from an entire neighborhood to a town.
- It is usually involves a mixture of uses and types (in contrast to the conventional subdivision where it is limited to a single use or type).
- It requires phased development extended over a period of time where changes might take place to respond to later concepts, changes in requirement, or financing.

Urban redevelopment and urban renewals (names for federally funded programs) are a form of planned unit developments.

Urban renewal refers to rebuilding, in whole or part.

Planned unit development refers to new development, as in the developing of the suburbs.

Zoning prevents harmful uses while protecting property values within a given area, but it does so at the cost of monotony and uniformity.

The planned unit development is an attempt to reintroduce diversity and mixture (as in the new urbanism).

Reston, Virginia and Columbia, Maryland both developed in the 1960's as well as Irvine, California are examples of residential planned communities. The residential planned community zoning permits the integration of residential, commercial, and industrial use and to divide the land into different density areas.

## THE FUTURE OF THE CITY

Effective city planning must deal with the larger physical scale in which the city exists. It also must deal with the smaller scale of the neighborhood.

To deal with the larger scale, we must look at the ecology and determine where we should or should not build. At a smaller neighborhood scale, we must be sure that we provide for the full range of needs of all peoples and for a variety of life style.

## ARCHITECTURAL DESIGN

Architectural design is a an exercise in synthesis, or putting together a complex array of disparate parts to form a unified, interdependent composition. Thus, one of the chief functions of the architect is to coordinate a tem of specialists, who together create a design.

Design is the process of giving form to an idea. It is not a mystical activity. Artful solutions are the goal to be sought.

The term “form must follow function” is most attributed to Sullivan.

The process of design involves the understanding of a functional problem which requires a physical solution. Functional problems are very complex and each element of a problem may itself be an intricate problem challenging for the architect’s ability to design with it.

During certain architectural periods, designs became so formularized that they constituted a “style”. The problem is that social, cultural, and industrial patterns are in almost constant transition making certain styles obsolete or even burdensome.

It is more useful in architecture to rely on method than on style.

Traditional design involves the use of a widely accepted style of design developed in the past.

In certain areas where materials are limited, such designs may be called “indigenous architecture” that is architecture of the region. New England and Mediterranean architecture are examples.

## CONSIDERATIONS IN ARCHITECTURAL DESIGN

The purposes of architecture are many, but all derive from the basic purpose of accommodating human activities. An architect, in undertaking design, should consider the following:

1. Architecture requires an *appropriate relationship* between the structure and its site.
2. Architecture should *respond* to the natural characteristic of the site, its form, climate, solar position, vegetation, and existing structure.
3. Architecture should be placed in the landscape *to be seen*, conversely, views of the *surrounding landscape should be visible* from the building.
4. Architecture should serve the *purposes* it is intended to serve; it should function properly.
5. Architecture should express the *purposes it serves*.
6. Architecture should use *economy of means* to achieve its purposes.
7. Architecture should *utilize available technologies* ingeniously.
8. Architecture must have a *human scale*, in both its material parts and its spaces, and in its interior and exterior.
9. Architecture should *utilize materials* properly.
10. Architecture should utilize the *familiar and commonplace* building techniques of its locale.
11. Architecture should be *graceful in silhouette and massing*.
12. Architecture should exhibit a degree of *exuberance (expression)*, it is an assertive act.
13. Architecture should exhibit a priority or *hierarchy* of parts.
14. Architecture should offer the human eye a *visually rich and interesting* field of view.

15. Architecture should establish a *relationship between interior and exterior* spaces.
16. Architecture should have *integrity, honesty, and wholeness throughout*.
17. Architecture should be expressive of *human spiritual aspirations*.
18. Architecture work should be regarded as an *opportunity* to demonstrate architecture's basic principals.
19. Architecture should have an *all-embracing and encompassing* physical design concept.
20. *Architecture should be a place, or spatial forum, that encourages human contact. It is an arena where activity, interaction, and accomplishments take place. Architectural space, therefore, facilitates a broad range of human activities; it does not prescribe or limit them.*

## RELATIONSHIP TO HUMAN BODY

Design is a reflection of the society which produces it, and even more it is the reflection of the whole of human nature.

There is a direct connection between the human body and designed objects. We often judge the success of a design by how well it responds to or recalls the form of human features.

**Anthropomorphic design** relationships establish associations between human characteristics and man made objects; objects are described as they were alive. An example of this is found in classical architecture, where a supporting column was given a human form, such as a caryatid. The same concept is expressed in Greek columns by a slight outward curve that gives the impression of vertical strength, as in a leg. Similarly, the echinus curve of a Doric capital approximates the shape of an upraised hand supporting the entablature above. Pedestals are vertical supports derived from the Latin term for "foot".

Design may be viewed, therefore, from a perspective of human associations. Everyone develops an intuitive awareness for judging the appropriateness of a design, based on personal experience.

Originally, measurements derived from parts of the body. Which is the base for a system of architectural measurement in use in the U.S.

Inch – was the full width of the thumb to the next finger.

Foot – was the human foot length.

Yard – was the distance from the center of the body to the arm extended.

Fathom – was the spread of the arms.

By the 18<sup>th</sup> century, in Europe, most systems were replaced by the metric system which corresponds to the earth's physical entities namely, the equator and earth's pole.

**System of measurement in architecture are generally derived from and must be related to, familiar human dimensions as well as the dimensions of the world we inhabit.**

## NATURE AS A SOURCE OF INSPIRATION

The Crystal Palace, designed in 1851 might have derived its design of shape from that on a water lily. In the lily's structure Joseph Paxton recognized a regular, precise, and delicate skeletal pattern. Its constituent veins enabled the stalk to support a very large area of leaf structure.

Objects found in nature, being the products of evolution, of the natural response to particular forces, are well suited to their purposes. Otherwise they would not survive. Because natural things are so

appropriate to their purposes, and so expressive of them, designers have always found creative inspiration in the realm of nature.

Houses have been designed which are a form of a seashells. Airlines terminals have been designed which are inspired by symbols of light, such as wings of a bird. Commercial structures have been designed as tree-like forms, in which floors are cantilevered like branches.

To learn from nature, one must understand the principals underlying natural forms and their evolution, transporting those processes into our own. We should not imitate form, but rather emulate process.

## BASIC SYSTEM OF GEOMETRY

*Design concepts are described by a visual language or tools which can be learned; consider the geometry which generates three dimensional forms:*

- **Point** indicates position, it has no dimension nor does it occupy any space. It can represent the beginning or end of a line; it is the place where two lines intersect.
- **Line** is the path described when a point moves. It has position, direction, and length, but no thickness.
- **Plane** is the path described by a line in motion, in a direction other than its own. A plane has position, direction, length, and breadth, but no thickness.
- **Volume** is the three-dimensional space described by a plane in motion; it has position in space and is bounded by planes.

When one draws on paper, the drawn lines represent elements of an imagined concept. These concepts have the following attributes:

- **Shape** is the outline or configuration of a thing.
- **Size** is the physical dimension, magnitude, or extent of something. All shapes have size.
- **Color** is the appearance of something caused by the quality of light reflected by it. White is the absence of color, black is the absence of light.
- **Texture** is the surface characteristic of an object.

The geometric shapes which are particularly useful and *are part of the tools include the square, the circle, and the triangle*. The corresponding three dimensional shapes are the cube, sphere, pyramid, cone and cylinder.

## SPACE

The aim of all design should be to create spaces in which one will feel secure, sheltered, oriented, and therefore at ease.

Since space also exists to accommodate movement, the shape of spaces can indicate how one is expected to *move*.

**Movement** is governed by the amount of spatial freedom, or access, provided. A long narrow space suggests efficient axial movement; a perfectly square or round room, with no specific orientation implies repose – that one may pause or remain at rest (i.e. at museum).

The term “manipulation of space” describes the relationship between spatial designs and feeling of people in that space, achieved through design.

## FORM

*The perception of form is based on memory associations developed in childhood, which involve the tactile as well as visual sense. For example, to convey a sense of stability, or rigidity, one might utilize straight lines and right angles, or a designer wishing to create an object which is comfortable to touch would use a curved form.*

*Form can also imply movement, as in the case of a church spire that extends toward heaven. Similarly, the twisted columns of a Baroque interior suggest perpetual motion (one that continues forever).*

## SCALE

Scale in design is the relative size of a structure or space with reference to the human body.

For example, a stair riser is six to seven inches high because that is the distance a person raises his foot comfortably when climbing a stairway. Similarly, a handrail is about waist high; seat height is approximately the length of the lower leg. All are said to be in scale.

Extra-human scale derives from allowing *functions to determine size*. A large factory, for example, derives its size from its production processes. The length of a runway is determined by the laws of aerodynamics that govern flight.

## PROPORTION

Proportion is the relationship between the component parts of the structure.

*It expresses the order of importance of the parts, casting some into primary roles where others into secondary or supporting roles.*

Proportion suggests the role of the part in a structure, for example, a fat column suggests a heavy load where a very slender column suggests very light loads.

*Consistency in the proportional relationship between a structure's parts make the aesthetic intent easier to comprehend.*

From Pythagoras to Leonardo to Le Corbusier, **proportioning systems** have been devised whose purpose was to provide harmonious order.

The most ancient system in western architecture and art is the so called "**Golden Section**", which is based on proportions found in nature, as well as the human body.

The Golden Section is the basis of the "modulor" system devised by Le Corbusier.

The Golden Section was a renaissance concept of proportion in which a whole is divided so that the smaller part is to the larger as the larger is to the whole. The mathematical expression of the golden section is  $A:B = B:C$ .

With reference to the human body; we can see that the full height of the body (A) is to the distance from the feet to the navel, central point of stomach (B) as (B) is to the distance from the navel to the head (C).

## RHYTHM

Rhythm is another design service for establishing order. Rhythm is the regular occurrence of elements, in time or space.

## BALANCE

Balance is the equilibrium among the constituent parts of a structure. It is also a visual quality. There are two types of balances, static and dynamic.

- **Static balance** the parts are equal in size, and located equally about a reference axis.
- **Dynamic balance** the parts are of unequal size, and arranged about a reference axis so as to compensate for their differences. For example a large window close to the centerline can be balanced by a smaller one at a greater distance on the other side.

**A structure that has equilibrium among its constituent parts is considered to be in balance.**

## SYMMETRY

Symmetry is balanced arrangement of elements' equally deployed on either side of central axis.

Symmetrical designs are found throughout nature. Throughout history symmetry has come to be associated with formality and authority, as well as certainty.

*Symmetry also requires a relatively uncomplicated building program. Hence, symmetry may not be practical for many structures.*

## LIGHT

Light is radiant energy that is perceived by the human eye.

Among design elements, daylight is one which a designer is particularly able to control. Not only does the quality of light change during the day and from one day to another, but its intensity and color might vary considerably in different regions.

Architect must always be concerned with light for the aesthetic contribution it can make to designs.

## COLOR

Color and light are inseparable; when we see a color, we are experiencing a sensation caused by radiation of a particular wave length of light.

We respond emotionally to color as it has associations such as warmth, coolness, etc. Color can also affect the perception of time, in green environments time seems to pass more slowly than in a red one. Color can also have psychological effects. Red for example, is exciting where green is soothing. A blue environment is relaxing, a red one is stimulating and a white environment leads to boredom and restlessness. Architects should be aware of colors as they affect behavior.

Color can:

- Affect the perception of form
- Affect human emotions.
- Hide defects.
- Not be distinguished in dim light as readily as in bright.

## HUMAN ELEMENTS

Design is a human activity; it is performed by people for people. Therefore, an architect must develop sensitivity to people – to their senses, habits, and feelings.

**Senses** – environmental messages are continuously communicated to our sense organs, and we respond to these messages continuously. Of all the senses, vision is of the greatest concern to the designer. However, the other senses – hearing, smell, and touch are also significant.

*When we speak of hearing architecture, what we experience is the reflection or the reverberation of sound which gives us an impression of size, shape and material (gothic churches for example).*

**Style** – all societies develop a general consensus about what is acceptable. This applies to social behavior as well as to aesthetic judgment. Although we are all individuals, we are also members of a society, and, therefore, we conform in most respects to socially accepted norms.

Preoccupation with style in design is both good and bad. On the positive side, *style enables the designer to produce buildings that are functional and attractive.* In such cases, conforming to a style – that is, relying on conventionally accepted solutions helps produce building that conform to accepted design standards.

On the other hand, the rigid acceptance of a *standardized style can be overly restrictive*, and may prevent innovation where it is needed, as in a new type of building serving a new type of function.

Architectural design is a practical art concerned with buildings used by people. We should therefore be aware of some of the differences which exist among peoples of varying cultures.

Responsible architects, therefore, must consider cultural diversity in solving design problems.

**Beauty** – a beautiful design must express order. It must also possess quality. It must be skillfully made from appropriate materials. It must also be useful and practical, based on the function it serves. Beauty confirms our ideas of what is right, proper, and fit for the use of human beings.

The purpose of a beautiful design is to enrich life.

**Architectural Design** – is the creative organization of forms which are developed to serve certain functional needs. Architecture combines *external form, internal space, materials, and structure into a unified whole.*

**Organizational concepts** – architectural designs satisfy people's needs in an efficient and comfortable way. The designer can determine the proper system of organization when he determines what people would want to do in a building and how they will do it.

*The organizational arrangements in any project are the key to successful function.* Central locations are provided for activities used by the majority of people.

The activities used by fewer people, or for specialized purposes, are placed toward the periphery (i.e. conference room might be in the center of an office with smaller workstations on the perimeter).

Architects generally refer to a variety of standard forms that have become part of the vocabulary of design.

*These forms are similar in nature to those of urban design and include:*

The ring, the radial star, the axis, the constellation, and the grid. Each of these forms has particular functional implications. No system guarantees good design, even if that system is based on traditional forms.

## THE HUMAN DIMENSION

For over 200 years, the increasingly predominant form of human settlement in Western society has been the city. The greater majority of our population lives in urbanized areas.

The simple reason for this is *opportunity, primarily the opportunity to earn a living.* Furthermore, the compensations include *convenience, privacy, and proximity to cultural institutions.* Therefore we are willing to tolerate the imperfections of urban life.

*The purpose of planning is to create an optimum environment for the widest range of human activities,* our objective ought to be to create designs which permit, even encourage, the widest diversity of human activities, designs which offer opportunity for social contact as well as well individual privacy, sensory stimulation as well as restfulness.

Our designs should not prescribe, but rather allow. A proper design is one that is broadly inclusive of opportunity, rather than narrowly exclusive.

## BIOLOGICAL CONSIDERATIONS

Cro-Magnon man, named after the area of France where the first remains were found, lived approximately 100,000 year ago, and was biologically and mentally identical to man. *Our biological and physical abilities were fully developed by 100, 000 years ago; however, our cultural systems-our physical, environmental, and institutional systems – were not.*

*There are both healthful and unhealthful rural environments, as well as healthful and unhealthful urban ones. Children raised in either setting may become either well developed or unhealthy human beings.*

When we refer to the environment, we mean eve thing that surrounds us: physical, visual, social, etc.

As architects we deal with the physical environment and in doing so we influence all the other aspects of the environment as well.

## PERCEPTUAL CONSIDERATIONS

There is a quality required of our physical environment that goes beyond function. That quality may be described as *sensory stimulation*. Just as our bodies need food and exercise, our brain needs adequate sensory stimulation.

Diversity of sensory and perceptual experiences is vital to our well being.

*There is a clear relationship between diversity of surroundings and mental capacity. Studies have shown that people try to avoid monotonous environments.* For example in NYC social scientist found that pedestrians preferred streets with diversity to ones that are not diverse.

People need and seek stimulation. For example, on a monotonous stretch of open highway, we tend to drive faster. This is a way of compensating for lack of variety in the visual field.

Knowledge of how people react to their physical environment is extremely important; it is particularly helpful to be aware of the permanent features in environments, as well as transitory.

Environmental perception is discontinuous, partial, and fragmentary. It involves all the senses.

*Each person's environment comprises numerous memories, experiences, smells, feelings, hopes, and dramas.*

Each individual construct a mental picture of his or her environment which may be stable in overall form, but is forever changing in detail. Thus they form a collective image, which Kevin Lynch as called the "image of the city".

Urban legibility refers to the ease with which parts of the city can be recognized and organized into a coherent pattern. Legibility in the environment is important because it is the basis of orientation. Total disorientation can produce anxiety, so maps, street signs, guide posts, and other devices guide us around a modern city.

Individual environment images are a combination of both immediate sensation and memories of past experiences. A clear environmental image provides a sense of emotional security, which aids in maintaining a harmonious relationship between an individual and his environment.

Imageability is the quality of a place which is clearly recognized and is understandable as a physical environment. For example, San Francisco, NYC, and Paris can be considered imaginable cities.

Kevin Lynch reports findings based upon data gathered in Boston, Jersey City, and Los Angeles.

He asked his subjects to draw a sketch map of their city, to give detailed descriptions of certain routes such as the path from work to home, and to list the most distinctive and vivid elements of their respective cities. Upon comparing these data, he identified different elements that seemed common across three different cities.

Kevin Lynch recognized elements for structuring mental images of the environment, he found that five categories of features can be used to describe and analyze cognitive maps: paths, edges, districts, nodes, and landmarks.

Paths are the routes of circulation along which people move.

- Every area has a network of major and minor routes such as streets, foot paths, transit lines, railroads, and rivers. *These are the predominant elements of most of our environmental images, since other elements are arranged along or related to paths.*

Districts are sections of the environment having an identifying character.

- A district may be a residential neighborhood, a suburb, a college campus, or an industrial area. *Many people structure their city by districts, which often become dominant elements of their mental images.*

Edges are the boundaries, terminations, or separations between districts.

- When two districts are joined at an edge, it forms a “seam”. Edges may be railroad lines, shore lines, a wall of buildings, or a highway. A park or pedestrian boulevard may be thought of as a “seam” when it joins two districts.

Landmarks are prominent visual features which act as points of reference.

- They may be large and visible at great distances, such as a skyscraper or even a mountain. Other landmarks may be small and meant to be viewed close up – a statue, a fountain, a sign, or a tree. Landmarks help to identify an area and so serve to orient people.

Nodes are centers of activity. They are types of landmarks, distinguished by their function.

- Nodes may be junctions, such as a square or a plaza. They may be the core of a district, such as a civic center, a financial district, or an entertainment area.

These elements of orientation and identity are not separate; they exist as mixtures and overlaps, such as an edge that is also a path or a node that is also a landmark.

These elements are the basic material of environmental images.

They are the structuring elements of city form, and they are quite important in the analysis of the environment.

A large city needs large, working, organizing systems, such as highways, public transit, or utility systems.

The activities which such systems support are varied and juxtaposed. That is what makes a city workable yet complex.

At the turn of the 20<sup>th</sup> century French architect Tony Garnier, in his *Cite Industrielle*, suggested the separation of work from housing. Based on the nature of industry at that time, Garnier designed a model industrial city, in which such separation was appropriate. In our present era of clean industries, such as electronics extreme separation may not be needed and often desirable.

Another contribution of Lurch's studies was the writings about the early recollection of those elements of the early childhood environment which produced the deepest impressions.

- Most subjects were keenly aware of ground surfaces.
- Lawns were particularly important.
- There was also a strong and pleasant memory of materials. Foliage, color, topography, and elements contributing to environmental the quality or state of being orderly were noted.
- Children prefer openness, and spaciousness, and a dislike of crowding.
- The majority preferred suburban living and several expressed intense dislike of the city.
- Most admitted to the excitement of central urban areas.

Almost all were aware of play and, without exception, stated a preference for playing elsewhere than in conventional playgrounds.

It is clear that most responded to variety, with the opportunity for adventure. A child's perceptions and memories, and his or her emotional responses to those experiences, may serve as a useful information resource for design.

## DEMOGRAPHIC CONSIDERATIONS

The statistical study of human populations is called demography and includes information on birth, death, marriage, age, sex, education level, length of schooling, family size, etc.

*The study of population goes back to ancient times.* In modern times the means for gathering demographic information is via implementing of the **census**, a periodic listing of the number of people, their conditions of living, and their resources.

The Romans undertook a census periodically throughout their colonies for purposes of registering adult males and their property for tax purposes, military obligations, and political status.

**In the United States, systematic census-taking began in 1790 and has continued ever since at 10 year intervals.**

In our days, more and more people live in urbanized areas at densities far exceeding those in rural areas. But urban densities themselves are actually declining, because urbanized areas are becoming larger. It is important to distinguish between population density and population size.

**Density refers to as the number of people per unit of area.** (I.e. in NYC 100,000 persons per square mile).

**Population size refers to the actual number of persons in a given location, without regard to density.**

*For example, a small town may have a high density if building sites are small and buildings are tall. Conversely, suburbs may have low density but contain a large population distributed over and extensive area.*

**High density does not imply crowding. And is therefore not itself bad.**

## **SOCIOLOGICAL CONSIDERATIONS**

Sociology furnishes numerous perspectives for understanding human society, many of which are relevant to the work of environmental design.

One perspective of framework is to describe two fundamental social groupings, namely, the primary social group and the secondary social group.

The primary social group is that group of persons with whom one has the most intimate and greatest variety of social interactions. Family and immediate friends constitute that group. It is also the group which one has the longest association.

The secondary group is that group with which one has less intimate no more specialized interactions, such as one's work or professional group. In the case of office of factory workers, it is one's fellow workers. In the case of a school, it is one's classmates. For many it is one's church congregation.

Both groups are necessary for one's psychological health.

*The association with one's primary group helps a person develop as a full individual (i.e. develop emotional perspectives).*

*The association with one's secondary group allows one to give to the larger society (i.e. team play), which is equally essential to a sense of self worth.*

Each individual is said to live in two social worlds, which are independent of each other. In the creation of new communities, one method of creating a "sense of belonging" is to establish various clubs or associations, modeled around recreational interests, such as theater, cycling, hiking, etc. These are secondary group activities, whose purpose is to provide a diversity of primary groups (i.e. families).

## **PRIMARY, SECONDARY, AND TERTIARY WORK GROUPS**

Not to be confused with the two main social groups; there is a there part grouping whose distinctions are based on one's work, avocation, or profession.

Primary work group is that one which deals with resources; it includes miners, lumbermen, fishermen, farmers, and cattlemen.

Secondary work group is that one which takes the raw materials produced by the primary work group and converts them into usable products. It includes food processors, construction and factory workers at all level of skill.

The third work group is one that manages and services society and its industries. It includes professional of all sorts, managers, salespeople, teachers, and a broad range of people who provide services of all kinds – repair, maintenance, delivery, communication, etc.

*More and more people are living in cities today.*

In developed societies, like the United States and Europe, the reason is that production efficiency has resulted in fewer people being required to produce the food products needed by society.

At the same time, more and more people provide services. Thus, the large city is the result of fewer people needed on farms and factories.

Architects design places to accommodate the primary-secondary social needs of large number of people.

*For example, few work places should be without any care facilities. The elderly (often alone, without their traditional family to care for them) must be located within communities where they have daily association with a viable and stimulating “secondary group.”*

All individuals in a city, or rural areas, develop “Use network” which is a physical pattern of places which they use for residence, for work, for recreation, and for cultivation. For each individual this differs.

A well designed city should provide places of residence of many kinds, similarly varied places of work, of culture, of commerce, of services, of leisure, and of learning – all which are accessible by systems of convenient transportation.

## **HUMAN FACTORS: RESEARCH, DESIGN, AND BEHAVIOR**

The most ancient and useful lessons for conducting human affairs are embodied in the many work of wisdom of the world’s cultures. They are found in religious practices.

Modern times have examined human behavior more systematically, and more narrowly. *It has been necessary to study the work process of factories in relation to human operations, for reasons of efficiency.*

The system of studying the factory environment in order to improve productivity of an individual’s physical effort has been called “time and motion” studies.

As a result of such studies, one recent innovation is to organize individuals as small teams, in which each person task is conducted in view of all the others. Another has been to alternate tasks, to prevent boredom.

A whole field of behavioral information has grown up, and it has many applications.

For example, ergonomics deals with the design that is based on mechanics of the human body and its various senses.

Office design, and office work station has been improved by design based on human factors.

This work, based on human dimensions also draws on an understanding of color, its affects as well as appropriate level of lighting.

The design of large and complex places involving large volumes of human movement is dependent on the understanding of human behavioral characteristics (i.e. airport design – legible path and graphics).

**In all architectural design, the prime concern is the human being and his or her senses and physical mechanics.**

The term “chance encounter” refers to the phenomenon where spontaneous contacts are encouraged in order to achieve greater stimulation and thereby improve individual creativity.

An example can be found among research laboratory members, the more spontaneous contacts a researcher has with fellow workers, the more he or she is stimulated mentally – by sharing and

explaining the work being done, by posing questions, by expressing ideas of doubt, etc. (similar situation in architectural studio, open office planning...).

An example of ways to increase the phenomenon of “chance encounter” while designing a research laboratory includes:

- Movement and public places (corridors, intersection, and small gathering places like vending areas) are essential to chance encounters. Seating where provided should be arranged in a sociopetal way. A corridor should be thought of as a pedestrian street.
- Horizontal (same floor) laboratory arrangement is preferable to multi floor. The fewer the floors the more contact.
- When horizontal distances exceed 200 to 300 feet in length, encounter tends to reduce dramatically; therefore, a large laboratory should be designed as a campus or incremental system, with the design connections being social links.

## LAND ANALYSIS

Land has always been a precious resource, for the simple reason that it is limited in amount.

Man has damaged (through poorly planned development) and, **therefore in order to prevent this we must plan for the optimum use of land.**

**The architect must seek ways to establish a relationship between a proposed development on a site and the existing character of the neighborhood around the site, considering a building and its site as a unity.**

Land was first owned communally, establishing the precedent for leading states to own land.

**In medieval times, land ownership was in the hands of few people.** Under the practice of primogeniture (inheritance to eldest son) land passed on and therefore limited the diffusion of land ownership.

In 1066, the Normans conquered England and introduced a system under which ownership of land was vested in the king, who granted parcels of land to nobles in return for loyalty, military support, and financial support.

This system of medieval character relating to land ownership was gradually eliminated in England, and has evolved into the system of **“fee simple” ownership.**

**Fee simple ownership** implies that a parcel of land can be transferred by its owner as he pleased.

Some land in England, remains the property of the Crown, or the public, but its use can be obtained by leasing.

Such leasehold property may be held by the lessee for a period of up to 99 years, after which time it reverts back to the Crown.

**Initially land in America was controlled by colonizing companies, publicly franchised and privately financed.**

After the Revolution, the colonial lands were placed under the authority of the respective states. Individuals who had owned their lands under the Crown now owned it under established states.

The land gained from the British, and later the French, which had not been under the control of a colony, became public domain, under the control of the government.

The original public domain was known as the Northwest Territory, because it was northwest of the Ohio River.

The land of the Louisiana Purchase was purchased from the French during the Napoleonic Wars.

Land was also obtained from Spain and Mexico.

Most of this land has been since sold or deeded to individuals; some was transferred to states and municipalities for public use. Some land was given to veterans for their service, and a large amount was granted to universities and other educational institutions.

A large amount of public land was transferred to private ownership through the **Homestead Act**, passed by Congress in 1862. 160 acres of land were given, free, to anyone who built a house and lived there for five years.

About one third of the nation's area still remains as public land. The policy of the federal government today, for the land of public domain, is a combination of conservation and resource extraction.

In the 19<sup>th</sup> and 20<sup>th</sup> century building and development has grown, therefore land is scarce and easily damaged resource. And so we have developed a number of methods for the proper and responsible use of land; **including, planning, resource management, and land use regulations.**

## CATCHMENT AREAS

The term "catchment" means the geographic area from which the participants are drawn. For example, a catchment may comprise the area within which the customers of a supermarket reside.

A given parcel of land may be located within numerous catchments simultaneously – some large, some small – each catchment containing a specific class of participants in a particular activity.

Catchment areas may be distinctly defined by physical boundaries, or the boundaries may be indistinct.

The size and shape of a catchment may be drawn with respect to a particular function or population.

Catchment boundaries may be determined by geographic features. Two neighborhoods, for example, may be separated by a physical feature such as a railroad or a waterway.

Catchment areas may also be termed "market areas", "trade areas", or "tributary areas".

A catchment area can come into existence, or grow, as a result of population growth in an area or as a result of a municipal development program – **its size can vary and is not fixed.**

School districts are catchments serving students residing within established boundaries.

Recreation facilities can also form a catchment areas.

A catchment area may be local, regional, or national (i.e. Disneyland, draws visitors from Los Angeles, Orange Counties, along with other visitors out of state.).

Zoning ordinances help to create and preserve catchment areas by specifying which land uses are permitted.

## LAND USE AND LAND VALUE

The land use depends on its potential role in the catchment area, its **location**, its topography, and its cost.

Additional factors contributing to land value are:

- Topography.
- Access to land.
- Zoning.
- Utilities.
- Nearby uses.

Land can be placed into categories of potential use:

- Natural resources.
- Agricultural.
- Residential.
- Commercial.
- Industrial.
- Governmental.
- Institutional.
- Open space / conservation.

Whether land is vacant or improved, it is valued in relation to the type of use which will yield the most return; thereby location of property is important (as use is governed by zoning which is a variable of location).

There are 4 ways to determine value of land:

- **Comparison method or market data approach** – comparing identical parcel of land.
- **Residual method or income approach method** – value may be determined by estimating the potential income from site improvements.
- **Allocation method** – value of land may be estimated by deducting the value of the site improvement from the total value of the property (including building).
- **Development method** – value of land may be determined by estimating developmental costs of a parcel and determining sale price of individual lots.

To summarize the four methods, the comparison method of determining land value is applicable to all classes of land. If proper data is available, this is the most accurate method.

The residual, allocation, and development methods are used when data for comparable parcels is not available.

## OVERIMPROVEMENT AND UNDERIMPROVEMENT

The concept of over improvement or under improvement is related to highest and best use.

The term **under improvement** refers to a property which is not being used to its highest and best use. For example, an owner might build a structure which produces substantially less income than could be obtained with a better, larger, or different building.

Such an under improvement will reduce the value of the property, because it is not being put to its “highest and best use.”

The term **over improvement** means that the cost of improvement exceeds potential revenue or income.

In addition to determining the cost of land, other factors must be analyzed:

- Suitability
- Access
- Circulation
- Variety
- Adaptability
- Amenities

## SURVEYS

Surveys describe the location, form and boundaries of land. They also describe special features of a site which are pertinent to site development and building design. There are different types:

- **Preliminary survey** – provide basic information for preparation of building plans.
- **Construction survey** – describes precise condition of the site and adjacent structures, and establishes base lines, offsets, and bench marks. (i.e. stakeout survey).
- **Possession survey** – made after the completion of the construction to record completed development. (i.e. final survey).

Land surveys are of two types, geodetic and plane.

**Geodetic surveying** take into consideration the spherical shape of the earth, thus they describe large land areas with great precision.

**Plane surveying** assumes that the earth is a flat plane. Used for most site development work.

Among the various kinds of plane surveying are:

**Land survey** – general measurement and description of land where building is sought.

**Topographic survey** – contour lines are shown to indicate the topography and elevations.

In land surveying, distances between points are measured (in feet and decimals) on a horizontal plane. Vertical distances, or elevation is expressed with reference to distance above sea level or some other established point of reference.

## TOPOGRAPHY

Topography refers to the surface features of an area. The change of elevation between two adjacent contours is called the contour interval.

Ground slope is extremely important in determining site utilization.

A convenient way to measure ground slope is by percentages.

If  $\langle H \rangle$  is horizontal distance & If  $\langle V \rangle$  is vertical distance then,  $\langle g \rangle$  which is grade is

$$g = V / H (100)$$

For example 50% slope refers to a vertical dimension of 1 ft and a horizontal dimension of 2 ft.

(for every 1 ft rise, 2 ft horizontal).

### General Grades:

Fewer than 4% are considered flat.	Less than 4' per 100' horizontal	All activities
Between 4% and 10 % are moderate	4' -10' per 100' horizontal	Require effort to Climb or descend
Between 10 % and 50 % are steep	10'-50' per 100' horizontal	Steep, may be Usable for limited Activity only
Over 50% are very steep	50'-100' per 100' horizontal	subject to soil Erosion

- Handicapped ramp – for every 1' vertical 12' horizontal is required,  $1/12 (100) = 8.3 \%$
- Generally, roads should not exceed a 10% slope. A 15 % slope (15' per 100' horizontal) approached the limit a vehicle can climb for a sustained period of time.
- Parking lot areas should not exceed 5% slope (5' per 100' horizontal).
- Grass areas should not exceed 25% slope (25' per 100' horizontal).
- Streets, Paved Drives should not exceed 10% slope (10' per 100' horizontal).

- Planted areas should have at least 1% slope (1' per 100' horizontal).

Cost of regarding may be excessive, and in general change in natural topography should be kept to a minimum. If grading is required, however, the amount of cutting should approximately equal the amount of filling.

## LAND PROBLEMS

Thorough land analysis must consider the following:

- Soil.
- Rock.
- Ground water.
- Surface soil.
- Slopes.
- Flood hazards.

In analyzing earthwork and foundations, the subsurface material and the presence of water are of fundamental importance. Subsurface conditions determine excavation procedures.

Water table is defined by the level at which water is present below ground surface.

When water table is located less than six feet below land surface, excavation, utilities, and underground structures will require special attention, since most excavations are deeper.

If possible, buildings should not penetrate the water table level.

If excavating below the water table, concrete slabs are subject to seepage as a result of capillary action. Other issues include the formation of hydrostatic pressure on foundation walls.

Other subsurface conditions also pose potential problems for development and require detailed investigations. These include:

- Rock formations close to the surface of the ground.
- Presence of underground streams.
- Presence of soft clay.
- Fine water-bearing sand or loose silt.
- Evidence of slides or sinking earth.
- Areas of recent fills such as garbage dumps.
- Presence of swamps or peat.

## SOILS

Soil is the pulverized upper mantle of the earth, formed from rock and plant remains through the action of weather and organic processes.

There are 4 levels of soils:

- **Level A** – Topsoil, essential for growth of plants and takes a long time to develop.
- **Level B** – Minerals, it lies below the plants roots and contain minerals, it can support life.
- **Level C** – Weathered and fractured rock with little biological activity.
- **Level D** – Solid Bedrock.

Some conditions of geology and soil which scientifically affect the way in which land may be used and ways to deal with surface or subsurface conditions:

- A high water table requires that construction excavation be braced and kept dry by pumping. Basements must be waterproofed and walls must be designed to resist hydrostatic pressure.
- Construction of buildings over underground streams require special provisions and should be avoided.
- Soft clays, loose silts, and soils which are unstable when wet or frozen may require deeper foundations or piles.
- If power equipment is inadequate for excavation of bedrock, explosives may be required.
- Existing surface drainage courses must remain unless redirected underground by means of a culvert or channels but water must never be restricted.
- The presence of inappropriate fill, swamps, or peat may require removal and replacement with an appropriate substitute fill. Otherwise piles must extend through to bearing soils.
- Evidence of slides, sinking, or faulting may restrict sitting of structures, or even render the land unsuitable for construction.

In many jurisdictions, it **is necessary to retain the precipitation falling on the site**, rainfall, in holding ponds, so that runoff water can be released slowly, preventing downstream flooding.

**Runoff** refers to that portion of rainwater which is not absorbed in the ground. Must be collected in a system of surface and sub surface drains.

## LANDSCAPING

Landscaping completes, links, and harmonizes the connections between buildings, open spaces, natural features, and human beings.

**Landscape architect** combines earth, rock, water, plants, and other details to develop open spaces to their maximum potential. In contrast to architectural space, site space is larger, and looser in form.

Exterior space is usually passive (inactive) and intended for exterior circulation, recreation and quiet enjoyment. Much of it has no assigned usage other than complementary relief.

**The landscape architect should consider climate, light, weather, orientation, scale, and the activities which are to take place on the site.**

Bright light sharpens and emphasizes details. Shadows define surfaces.

Twilight (the light from the sky between full night and sunrise or between sunset and full night produced by diffusion of sunlight through the atmosphere and its dust) creates unifying composition.

Weather changes the appearance of and outdoor space considerably.

Plants are one of the fundamental landscape materials for site enhancement.

Trees and plants require many years to mature; therefore the planner must exercise great care in preserving existing vegetation on a site.

**Deciduous trees** are full of leaves in the summer but empty in the winter. (deci = two).

Proper and intelligent planting and landscape design can reduce the effects of climate in the following ways:

- Trees may be used to screen winds.
- Conifers (cone shaped mostly evergreens) are more suitable for the control of winter winds than deciduous trees (because of their wider shape).
- Trees can be used to direct wind flow, and to increase ventilation in desired areas.
- Vegetation, particularly needle leafed trees, captures moisture, reduce fog, and thus increase amount of sunlight reaching the ground.
- Deciduous trees screen out direct sunlight in the summer while allowing it to pass in the winter.
- Planted areas are cooler during hot days and have less heat loss during the night.

Vegetation may absorb as much as 90 percent of the light energy that falls upon it and it can reduce wind by speed to less than 10 percent. It can reduce daytime temperatures by as much as 15 degrees. Grass arrears have low albedo and high conductivity.

## CLIMATE

Climate is one of the most influential factors in site development. Climate analysis can be examined at two levels: **macroclimate and microclimate.**

**Macroclimate** refers to the general climate of the region.

**Microclimate** refers to the local conditions surrounding the site modified by the type of vegetation, elevation, slope, the presence or absence of water, wind velocity and direction, and man-made structures. (Micro-small)

In site planning and design, information on both macroclimate and microclimate for all seasons, should be obtained and analyzed.

This information helps to determine the orientation of buildings, their protection or exposure sun and wind, fenestration, building materials, heating and cooling, and the location and selection of plant material.

Aesthetics and appearance is also influenced by these findings. Natural light establishes the conditions under which a building's mass, profile, colors, details, and materials are seen.

For example, warm colors are best seen in bright sunlight, and cool colors in overcast light, or northern light which contains more blue.

**The macroclimate of an area depends on:**

- Site Latitude.

- The site's elevation.
- Proximity to body of water.

All life depend on the sun, thus, a primary determinant of the climate in a particular location is the amount of solar energy it receives, which has to do with it's location with relation to the equator (latitude). Longitude has unimportant effect on solar energy.

#### Factors which influence climate (macroclimate):

- **Site elevation** – as the elevation increases, the temperature decreases, about 1 degree per 300 feet of height. This is because the thinner air of the higher altitude is not able to hold as much heat as the denser air of lower attitudes.
- **The proximity of bodies of water** – water is much slower to rise or fall in temperature in comparison to land, and does not reach extreme high or low temperatures that are reordered on land. The effect of bodies of water is to reduce temperature extremes, both daily and seasonal.

This moderating influence increases as the size of the body of water increases. Thus, island and coastal areas usually have a more constant and moderate climate than do inland areas at same latitude.

- **Prevailing winds also influence climate.** The prevailing southerly winds (winds from the south) of the southeastern part of the country carry moisture and warm air from the Gulf of Mexico into the plains states, altering their climate. Particularly in the summer, when these areas are quite humid. Similarly, during the winter, cold Arctic air from the north makes the same central plains states quite cold. Such air is cold, dry and clear.
- **Climate is also influenced by ocean currents.**
- **Mountain barriers** influence climate by forcing prevailing winds to rise. The air cools as it raises, clouds form, and rain falls.

This phenomenon has several factors involved, such as the strength and regularity of winds, altitude, sunlight, soil and vegetation combinations, etc.

Area in front of mountain (windward) is wetter and colder than the leeward side where the climate is dryer and warmer.

The range of daily and seasonal temperatures is also dependant on weather the sky is clear or cloudy. Clouds are as blankets, on a cloudy day less solar radiation is received during the day, and less is lost at night. As a result there is a narrow temperature change on a cloudy day.

#### There are four zones of climates:

- Cool Zone.
- Temperate Zone.
- Arid Zone.
- Tropical Zone.

Each has its own significant implication on the intended use of a land area. See *class notes*.

**Microclimate** of an area should be studied individually as it will impact on sitting of a project.

To learn about the microclimate, the architect should walk the site and study the following:

1. Presence of indigenous plant material, as well as those features that is inherent to the particular site – elevation, land forms, slope, orientation, bodies of water, and structures.
2. Another way to learn about an area is to study the climate influenced details of indigenous architecture, such as roof slopes and overhangs, window orientation, planting, etc. (i.e. existing conditions).
3. Physical location of site in relation to sun exposures.

Factors of sun radiation:

- **Altitude** is expressed as the angle of elevation measured between the sun and the horizon. In the summer it is a larger angle and therefore it is more perpendicular, hence more radiation is received.

This also explains why the more southerly latitudes are warmer than those of the northerly; the sun's angle with the horizon is higher in the south.

- Duration of exposures to sun.

In the northern hemisphere, the hours of sunlight are greater in summer than in the winter.

**Summer solstice** – occurs on 6/ 21 and is the day that has maximum hours of sunlight.

**Winter solstice** – occurs on 12/21 and is the day that has minimum hours of sunlight.

**Equinox** - Summer equinox occurs 3/21 and winter equinox occurs 9/21. A day when the hours of sunlight equal the hours of darkness.

The slope of a site also affects the amount of solar energy it receives.

Since the sun's path is inclined southerly in the northern hemisphere, the angle between the ground surface and the direction of the sun's rays is greater if the ground slopes to the south than if it is level. Hence, south sloping site receive more radiation than north sloping sites.

The amount of solar radiation received on a site is a function of the angle between the ground surface and the direction of the sun's rays. The more perpendicular the rays, the greater the amount of solar radiation received. This is the reason for seasonal variations.

4. Topography which affects the microclimate in a number of ways;

The wind velocity at the top of the hill (crest) is 20 percent greater than on flat, influenced by the steepness of the slope and wind direction.

Area in front of mountain (windward) is wetter and colder than the leeward side where the climate is dryer and warmer. Also, bottom wind velocity there is minimal (the so-called "wind shadow").

Winds, weather an element of the macroclimate as a whole or the microclimate, are an important characteristics of a site.

Winds can make a site very unpleasant and can have a cooling affect. This is referred to as the “wind chill factor.”

Factors of prevailing winds during the various seasons will have direct affect on energy consumption. (i.e. cooling in summer, heating in winter). It is wise to plan site developments that admit cooling summer breezes while blocking winter winds.

5. Bodies of water moderate the microclimate; a body of water is usually warmer at night and cooler during the day than land adjacent to it. Same effect as oceans moderating the macroclimate.
  - Site that are adjacent to body of water enjoy a constant breeze. (Due to difference in temperature).
6. Ground surface material – has a direct affect on the microclimate. Heat energy is absorbed and released later when the temperature drops.

Albedo – is a measure of reflectivity.

Conductivity – refers to material’s ability to absorb.

Grass areas (soft landscaping) have low abedo levels (they reflect less) and high conductivity (absorb) and therefore are cooler than nearby paved areas (hard landscaping).

Urban environment (NY City) lacking much planted areas are warmer.

7. Trees – have a moderating affect on the microclimate, they help to maintain a stable, pleasant microclimate, clean air, and a naturally pleasing environment by the following:

Rows of trees act as windbreaker, reducing wind speed on a downhill by one half or more.

The wind-chill factor can be dramatically reduced (i.e. less wind).

Trees block the direct radiation of the sun, as well as glare. Deciduous trees that shed their leaves in the winter provide an excellent way of blocking summer sun and letting in winter sun and light.

Trees and plants can filter the air by absorbing dust, dirt and other pollutants.

Plants absorb carbon dioxide and release oxygen in photosynthesis. The air in a forest for example has a natural freshness that can not be duplicated.

## CLIMATIC CONSIDERATIONS

Physical well being as mental health is related to climate. The closer the microclimate is to the comfort zone, the higher the level of health and energy (temperate zone climates).

Architects must be aware of the factors influencing human comfort which are:

- **Temperature** – comfort zone ranges between:  
63-71 Degrees in winter,  
66-75 Degrees in summer.
- **Humidity** – comfortable humidity ranges from:  
30 to 60 percent.

75 percent relative humidity is uncomfortable regardless of temperature level.

- **Air movement** – makes people more comfortable, by causing a cooling sensation. The greater the speed of air movement the greater the cooling effect.

Air movement of 50 feet per minute - not noticed.

Air movement of 50 – 100 feet per minute – pleasant.

Air movement of 100 – 200 feet per minute – pleasant and noticeable.

Air movement of 200 -300 feet per minute – drafty.

Air movement of 300 and more – uncomfortable.

- **Solar radiation** – solar radiation and sun has a direct effect on human behavior.
- **Air pollution** – natural weather action can magnify the effects of man-made pollution. Such action is the temperature inversion phenomenon.

This occurs because air temperature at the ground level is lower than above.

It becomes warmer as we go higher. At some point (temperature inversion point), this changes,

and the air becomes cooler as we continue higher.

The cooler air at the ground is heavier than the air above (blanket) and can not move upward, trapping pollutants; they linger over the city in the form of smog (smoke and gases).

An increased public awareness tends to control air pollution but can not eliminate it entirely.

## NOISE

Noise is defined as unwanted sound. The sound (sonic) within a building is a primary design concern. External noise is more difficult to control.

Noise can be confined to its place of origin by:

- Careful acoustical design.
- Absorptive insulation.
- Isolation devices.

Noise levels are measured in decibels, on a logarithmic scale with values between 1 (threshold of hearing) and 140 (threshold of pain).

One decibel is the smallest difference that the human ear can detect.

### Generic Noise Range:

- |                   |  |
|-------------------|--|
| ▪ 10-60 Decibels  | Whisper to comfortable conversation.       |
| ▪ 60 Decibels     | Normal conversation.                       |
| ▪ 30 Decibels     | Recommended for Sleep or Study.            |
| ▪ 70 Decibels     | Normal Office Conversation.                |
| ▪ 80-90 Decibels  | High level, safety to hear is jeopardized. |
| ▪ 90-130 Decibels | Dangerous level and can cause damage.      |
| ▪ 140 Decibels    | Threshold of pain.                         |

Noise can contribute to stress, especially when it disrupts sleep. Apartment dwellers are subject to noise invasion from outside sources (traffic, nearby apartments, corridors, elevators).

### Ways to deal with noise:

- Sound level diminished with distance, doubling the distance reduces the sound intensity to  $\frac{1}{4}$  (1:6).
- Gusty winds reduce the effect of sounds by adding white noises which are a blend of all frequencies. Thus, wind sound minimizes the effects of traffic noise.
- Trees thin out high frequency noises.
- Building solid barriers, such as earth, walls, and structures.

In general, noise can be controlled either by locating activities at some distance from the noise source, or by placing physical barriers between the noise and planned activity.

## GLARE

Glare is a common environmental problem that can be controlled by careful planning.

Glare occurs when there are two sources of illumination of extremely different intensities, such as very light against very dark.

Glare is not a result of too much light, but rather of too much contrast.

Some structures create problems of glare, looking out from a south window facing a lake is an example. While consideration must be given to the desirable aspects of solar radiation, glare must also be dealt with.

Exterior sun control devices such as overhangs, fins, or louvers are effective in reducing glare and heat.

## ECOLOGY

Ecology is the science of the patterns of relations between a community or organism and its environment, the community comprising all the living animals and plants occupying a given area.

Ecology is a term relatively new in environmental planning however an ecological approach to planning goes well back into history.

In general, the environment should be altered as little as possible. Grading should be minimal, natural drainage patterns left intact, and points of interest, left undisturbed.

## MOVEMENT AND UTILITY SYSTEMS

The usefulness of any parcel of land, whether urban, suburban, or rural, depends on the existence of adequate roads and utility system to serve it.

Land is useless for development if it is not readily accessible, or if it cannot be serviced by the various required utilities.

A primary consideration in the planning of the use of the site includes the adequacy of circulation access and utility services.

Circulation access includes: pedestrian, vehicular, and public transit movement systems. Utility services include water, sewer, gas, electricity, and communication systems.

As the amount of vehicular or pedestrian flow increases, the need to organize and define the channels of flow also increase. Channels that carry large volumes over greater distances are often physically separated from the region served. Expressway, freeways, and railroads are examples of this separation.

Urban circulation must utilize all possible means of transport available: individual auto, public transit, and truck or rail.

The planner must determine the best possible system for a given set of conditions; however, in all cases, the system selected must be compatible with the overall pattern of circulation of the surrounding region.

The forms of circulation networks have evolved as:

- Grid
- Radial
- Linear
- Curvilinear

**Grid** – the grid system consists of equally spaced streets or roads which are perpendicular to each other. This is used because of its regularity, simplicity, and convenience.

- The grid system simplifies the subdivision of land for both agricultural and urban use, as well as providing a sense of orientation, if it is not used too extensively and if it contains sufficient orienting landmarks.
- Well suited for level ground.
- Grids can be used for complex distributions of flow, provided hierarchy of flow channels is established. Traffic can be increased in some channels, while decreasing in others.
- Grid does not have to consist of straight lines, nor need it enclose blocks of equal shapes and sizes.
- Grid can provide efficiency of movement and ease of orientation without necessarily being monotonous or ignoring the topography of an area.
- A Grid loses its efficiency when its channels become congested. Before this occurs, an expressway or freeway system is introduced, relieving local streets of high speed through traffic.

**Radial** – the radial system directs flow to or from a common center, with straight channels of circulation radiating from this center point.

- Radial systems are the patterns that circulation routes assume as cities grow outward radially from small settlements.
- Congestion grows as radial routes converge at center. To avoid this, a series of bypasses can be introduced (beltways).

**Linear** – the linear system of circulation connect flow between two points, either along a single line or along a series of parallel lines.

- Various activities are located along the linear route.
- In theory, the shortest time to get from one point to another, however congestion is an issue.
- Other disadvantage, no focal point is created, and the numerous off-on movements will impede the smooth flow of traffic.
- Linear route of circulation is useful where development is restricted by natural topography (i.e. narrow valley).
- Linear routes are most often referred to as “strip commercial” where retail stores are located; they are a common outgrowth of urban expansion into the developing suburban countryside.

**Curvilinear** – the curvilinear system responds to the topography of land and aligns with natural contours.

- Desirable form at small scale, and helps in reduction of traffic speeds.
- Harmonizes with the natural surroundings.

- Curvilinear system can also be used in planned residential developments PUD's to create interesting streets, better views, and adaptability to topographic changes.

## VEHICULAR CIRCULATION

The planner must be aware of the problems in gaining convenient and safe access to a site in relation to site use. For example, the placement of a regional shopping mall in the heart of a residential development would place a burden on the local streets.

An understanding of the classification and patterns of urban roadways is essential.

The basic categories of traffic arteries are:

- Freeways – Expressway - Motorways.
- Arterial Streets - Highways.
- Collector - Distributor Streets.
- Local Streets.

**Freeways – (expressways)** are designed to allow movement of large volumes of traffic between, around, or through urban centers. Movement is at greater speed because access and egress are limited and occur at greater intervals. Crossings are handled by means of underpass or overpass and eliminating all grade intersection. Intersections (off-on ramps) are approx. ½ to one mile apart.

**Arterial Streets or highways** are continuous channels that connect with expressways (at exits from expressways). These are typically two or three lanes wide in each direction and parking is not allowed, direct access to adjacent commercial is restricted while residential access is provided. Traffic is controlled by traffic signs. Intersections are at least 800 feet apart.

**Collector – Distributor Streets** serve as transitional channels between local access to a neighborhood and arterial channels. These are sometimes discontinuous to prevent through traffic (which reduce speed). Curbside parking is allowed, but at limited times. Intersections with Arterial Street are handled with traffic lights, and local streets intersections may only have stop signs.

**Local Streets** – provide access to low intensity uses in front of them. Loops, cul-de-sacs, are a typical form. They allow unrestricted pedestrian use and speeds are kept to a minimum.

Vehicular traffic flows in sequential order, from low to high intensity:

Local Streets → Collector, Distributor Streets → Arterial, Highways → Freeways, Expressways.

### Design Criteria of Streets:

- The paved vehicular right of way (property line to property line) slopes from a high point at the center (crown) at 1/8 to 1/2 inch per foot for positive drainage.
- Streets with heavier traffic are designed with a six inch curb and gutter.
- Minor residential streets might be designed with “roll curbs” that are four inches high or simple gravel shoulders flanked by narrow drainage devices.
- Road paving consist of: concrete, asphaltic concrete, gravel, decomposed granite, stabilized soil, and graded compacted earth shaped for drainage.
- Street widths are determined by the number of traffic lanes, typical lane is 11 to 12 feet. A typical two lane highway or arterial street, allowing nine feet for shoulders is about 40 feet.

- Parking lanes are 8 feet wide for parallel parking and 16 feet to 20 feet for perpendicular or angled parking.
- Planting strip to divide lanes must be at least 4 feet wide if ground cover material only is provided and 7 feet wide if trees are to be planted.
- Paving of sidewalk might extend to the curb line to allow for maximum pedestrian use of sidewalk.
- Road alignment must be designed to conform to the natural topography of the area, all route patterns require variations in grade to allow for integration into topography and drainage.
- A hypothetical center line is used as a reference in describing the alignment of a road. Roads consist of straight sections called “tangents” and curves.

Road design is important factor in order to achieve safety, efficiency and visual interest. Factor to consider are:

- Two curves in the same direction should be separated by a tangent distance of 200 feet.
- Two curves in opposite direction should be separated by a tangent distance of 100 feet.
- Acute angle intersections (less than 80 degrees) should be avoided because it limits driver visibility and hard to handle.
- Offset intersection should be avoided as movements in those intersections are difficult.
- The length of a cul-de-sac should not exceed 400 feet. Minimum turnaround at the end should be 80 feet in diameter and free of parking to allow for fire department trucks.
- Curb radii at minor street intersection should be 12 feet minimum and 50 feet minimum at major streets to allow for ease of turning.
- Volume of vehicular traffic is defined as number of cars per lane per hour. When the intersection volume exceeds 750 cars per hour, traffic singles are used.
- Grade separation, are the most expensive and space consuming intersections, they include: the cloverleaf, the direct left turn interchange and the diamond intersections. The critical design elements for these intersections are the ramp grades, turning radii, and length of acceleration and deceleration ramps.

Parking constitutes a major land use in itself. Some considerations:

- The location of a parking area should be given a consideration, a desirable arrangement is to locate the on site approach drive between the building and the parking area providing a clear view of the building entrance.
- Safety and distribution of traffic is a consideration of parking lot design especially for parking areas of large shopping centers. On site loop distributor collector drive is developed often termed “cartridge roads” are used to disperse and receive cars one at a time.
- Parking areas should be designed to allow for the largest permitted vehicle. (i.e. bus, etc.)

- All parking areas must provide clearly marked reserved parking for handicapped persons. These must be located near building entrance and designed to allow unimpeded movement by handicapped persons. Number and dimensions are specified by code.
- Parking stalls should be of a minimum of 8'-4", (8'-6"), (this allows for 20" clearance between full size cars when centered in the lane). 18'-20' is the general length.
- Angled parking (40 degrees or less) may lead to reduction in stall width.
- Parking aisles widths are a function of the maneuvering space required to get in and out of the stalls.
- Aisle serving one way circulation (my space...) is 12 feet in width.
- Angled parking at 30 degrees is most economical because stall projection is smaller (about 15'-6" verses 18' of 90 degrees). However, requires greater curb length and triangular space at end is wasted.
- Parking spaces are estimated as 400 sq. ft. per vehicle, this includes 270 square feet of actual required foot print and additional circulation.
- Ramps at parking lots should not be more than 15 percent, slopes over 10 percent should be provided with transition of at least 8 feet in length.

#### Pedestrian Circulation:

An understanding of the characteristic of movement and the physical dimensions of the body assists in the determination of the required width of walkways, stair and entrances.

- The area covered by a person standing still is approximately 3 square feet. In order to stand comfortably and move about easily a total of 13 square feet per person is required. If the allowable area is less than 7 square feet, people tend to move in groups rather than individuals.
- In general sidewalks should not be less than five feet in width, collector walkways handling larger number of people at least six to ten feet. All depending on use (i.e. shopping streets...).
- Walking distance should **not exceed 2.5 miles per hour**. This is the rate of walking on an average person.

#### Provision for Handicapped: (Basic, see ANSI).

The non-ambulatory disabilities, which confine persons to wheelchairs, are of particular concern in design and planning, since they affect the physical layout of sites and buildings.

- Minimum required for two wheelchairs to pass each other is 60 inches, so public walks should be minimum 5 feet wide.
- Walks should have a maximum gradient of 5 percent (1:20), and maximum cross gradient of 2 percent (1:50)
- The incline of a curb ramp should not exceed 8.33 percent (1:12) and flared sides 1:10.
- Ramps should be a minimum of 3 feet wide, and not exceed 30 feet in length. At landings a 5 feet long area should be provided.

- Handrails should be located at each side of ramp if its rise is greater than 6 feet. A protective curb should be installed on the side where a ramp is above grade (to eliminate falling off).
- Handicapped parking stalls should have a 5 feet access aisle between every two spaces.

## LAND AND BUILDING REGULATION

Ownership is the legal possession of a property, such as land and buildings. Ownership of land constitutes, rights and prohibition which are to serve the interest of society as a whole, these are called regulations.

### Types of owners:

Land or buildings may be owned or leased by **individuals (singly or groups), corporations, churches, government entities, or such legal entities as trusts and estates.**

- **Joint tenancy** – two or more people, each holding an undivided interest; that is, the land is not physically divided into individual pieces, but rather each owner has a share in the ownership of the whole. The advantage is that if one dies the survivor becomes the sole owner of the decedent's share.
- **Partnership** – the land is owned as a group. Upon a death of one of the partners, the partnership may be dissolved and assets distributed among surviving partners and the estate of the deceased partner.
- **Corporation** – is a legal entity with rights and liability independent of those of its shareholders. Thus, if a shareholder dies, his shares pass on to his heirs and the corporation remains unchanged.
- **Trustee** – is a type of ownership that holds property in his own name for the benefit of another person or group for whom he acts. Its common uses are when property ownership passes to someone who is unable to act in his own interest, minor child or old person. He may buy or sell the property which he holds in trust.

### Types of Ownership:

**Fee simple or Fee absolute** – the owner has absolute title or ownership, which he can transfer by sale. (For example, as in private homes).

**Condominium** – the buyer obtains fee simple ownership for a portion of a structure. Usually, one also owns part of shared services; in some cases the seller of such ownership has to give first right of refusal to other owners through a tenant or owners' council.

**Cooperative** – differs significantly from condominium in that the owner does not legally own a specific piece of physical property. He owns instead, a share stock in a corporation which in turn, owns the land and structures.

**Leasehold** – is an even more restrictive form of real estate tenancy. Lessee, the person whom the lease is granted, has the right to use a piece of property under certain conditions for a certain time limit. Lease assumes all rights as an owner (i.e. sublease...) and liabilities (i.e. taxes...) but has no right to sell the property. In some cases, the lease period is as long as 99 years.

**Sale-and-leaseback** – an arrangement in which one party sells a property to a buyer and the buyer immediately leases the property back to the seller. (It's a special form of leasehold.)

This arrangement allows the initial buyer to make full use of the asset while not having capital tied up in the asset. Leasebacks sometimes provide tax benefits, *also called leaseback*.

## METHOD OF TRANSFERRING TITLE TO A PROPERTY

When a property is sold, the seller of the property gives a buyer a **deed**, which is a document conveying property from one owner to another.

There are two ways to finance the purchase of the property: the mortgage and the trust of deed.

- **Mortgage** – is a contract by which a buyer of a property (mortgagor) borrows money from a bank or any other lending institution (mortgagee) to purchase the property; he also pledges the *property* as a security to the loan.
- **Trust of deed** – as in a mortgage, the buyer borrows money from a lender, who transfers it to the seller, who in turn, gives a deed to a buyer. The buyer transfers title to a fourth party (called the trustee) by means of the trust deed. When the loan is completely paid the trustee transfers the title to the buyer.

## DEED TERMS AND RESTRICTIONS

**Covenants** are defined as a written agreement or promise usually under seal between two or more parties especially for the performance of some action, i.e. restriction of some kind.

Covenants came to use in large scale residential land development prior to the advent of zoning. Their purpose was to maintain aesthetic harmony between building and maintaining or even increasing value of properties.

Deeds contain restrictive covenants which are normally used to limit the height, size, or appearance of a building.

Other restrictive covenants include:

- Restriction on minimum cost and floor area.
- Restriction on the type of construction.
- Restriction on the style of construction.

Covenants must be legal and enforceable (as in new towns of the new urbanisms) and court injunction can be sought for person violating the covenants. In a subdivision, this applies to all homes, otherwise it may be deemed illegal.

**Easement** – is another form of restriction on a property. An easement is defined as an acquired right of use, interest, or privilege by one party on the property of another, without the ownership of the portion of the property and usually without compensation.

A utility company may use private land to gain access for the placement and maintenance of utility services, such as sewers, etc. by means of an easement. Easements also permit access across or through a parcel of land when there is no alternative method.

An easement which allows one person to cross the land of another in order to reach his property creates a private right of way.

Other type of Easements includes:

**Party wall easement** – used in row housing, when a common or party wall is shared by two adjacent owners.

**Joint easement** – used when it is required for two private owners to use a strip of land between two houses which has a property line running in the center.

**Historic façade easement** – may be established by a municipality to protect a historically valuable architectural façade in an area where redevelopment is occurring, and where the existence of the façade is threatened.

**Condemnation easement** – is an easement for public good. As in the case where required for a street, highway, railroad right of way or for a telephone or electric power line.

## AIR AND SUBSURFACE RIGHTS

**Air right** – the process which allows the usage of the air rights above a land (Grand Central Station, Madison Square Garden...).

**Solar right** – refers to the right of a site or building to have access to solar radiation, therefore restricting height on neighboring buildings.

## EMINENT DOMAIN

An owner may sometimes be required to relinquish his property to a government entity if the property is needed for a public project, and for the public welfare; such as a highway or school.

The constitution states that the owner receives fair market value when property is appropriated in this way. In practice, government does not exercise the power of eminent domain unless necessary as this involves a condemnation process and complex legal proceedings.

## ZONING

Zoning was the product of the late 19<sup>th</sup> and early 20<sup>th</sup> century growth of American cities, in which the stability of the development, particularly long term investment required protection.

The principal purpose of zoning is the protection of property rights.

The first modern system of zoning was introduced in the United States in 1916 in New York City where unregulated construction of tall buildings had created a perceived threat to property values.

Zoning ordinances were adopted under the rationale of protecting the public's right of access to adequate light and air.

In comparison with covenants which were used mostly for residential development of fairly large scale, zoning was used for all types of land development and was less stringent in its requirements for residential requirements.

Zoning is the division of the land of the city, county or any other jurisdiction into districts, or zones and the allocation of different uses to these different zones.

In support of that purpose, zoning exercises the following restrictions:

- Regulation of the use and intensity of use of a particular parcel of land.
- Protection against discordant nuisances.
- Protection against undesirable businesses.
- Protection against danger.
- Protection of light, air, and open space.

Early zoning ordinances recognized three basic land uses: residential, commercial, and industrial. Within these broad categories, many sub-classifications have developed. The various uses are ranked on a scale of priority, starting with single family dwellings, multi family, and commercial, industrial ranking lower.

Zoning must also provide for the so called nonconforming uses; that is, uses which do not comply with current zoning regulations, but which were permitted by zoning when the structure was built.

A conditional use is a use that is permitted by a zoning authority with certain restrictions attached, when the proposed use is not normally permitted in that location.

Zoning ordinances may place unintended burdens on particular parcels of land, or make it difficult to develop a particular parcel. For that reason municipalities refer requests for a variance to a zoning board of review.

In theory, a variance, is granted only where exact and literal application of the ordinance would cause undue hardship or practical difficulties.

Zoning was not originally intended to be a determinant of design, but it has clearly become so.

Zoning, as a design determinant, assures uniformity at the cost of subtlety, refinement, and variety, which are the basis of sensitive architecture. And, too often, such uniformity creates environmental sterility and monotony.

#### Other forms of Zoning:

- As established in European countries, and in urban renewal projects; it is a design plan in which land use and performance specifications are established and for which a design review procedure is utilized.
- To avoid uniformity of conventional zoning, a new type of zone, called the planned unit development (PUD) has been devised, which allows a mixture of uses not otherwise achieved in conventional zoning. (This is been widely used in the development of the new urbanism).

#### **BUILDING CODES**

As zoning ordinances regulate the use of land, building codes regulate the design of structures. Building codes are concerned with the safety and soundness of structures.

- They cover such areas as fire resistive construction, structural safety, size and location of rooms, means of egress, windows and ventilation, sanitary equipment, electrical installation, chimneys, heating plant, illumination of exits, and standpipes.
- Building codes are revised periodically to reflect advances in materials and construction methods and respect a consensus with regard to optimal and safe practices.